BIHANG TILL K. SVENSKA VET.-AKAD. HANDLINGAR. Band 21. Afd. III. N:o 2.

ON

RECENT FRESHWATER DIATOMS

FROM

LULE LAPPMARK IN SWEDEN.

BY

ASTRID CLEVE.

WITH A MAP AND PLATE.

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REVISED BY V. WITTROCK AND A. G. NATHORST.

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The diatomaceous remains found in clays, sands and similar deposits of the later geological periods, have recently become of great importance in deciding the conditions under which these deposits were formed; whether in marine, brackish or fresh water, and even in ascertaining the proportion of salt contained in the water in which they were deposited. Moreover as the geographical distribution of the living species of diatoms becomes well known, valuable indications may be obtained from the presence of their remains, as to the climates that prevailed, while the formations which contain them were being laid down.

This however is not yet the case with regard to Sweden. The recent diatomaceous flora of that country has been investigated only in the middle and southern parts, but the boreal flora has not yet been studied. The only investigations of the arctic-boreal freshwater diatoms of Europe and North America are those by Lagerstedt on the diatomaceous flora of Spitsbergen and Beeren Eiland, and by P. T. Cleve on the diatoms of Greenland. and Russian Lapland (The diatoms of Finland). No list of recent diatoms from Swedish Lapland thus having been published, I accepted with pleasure the opportunity of examining a number of about 40 gatherings from Lule Lappmark, collected in 1883 by Prof. G. Lagerheim and kept in the Riksmuseum of Stockholm, together with some samples from Gellivare (Nos. 43 to 47) collected by Prof. V. Wittrock. Besides I have examined some samples which Mr. E. Nyman had the kindness to gather for me (Nos. 48 to 50, see below).

The following is a list of the different localities in which the samples were collected:

Abbreviations.	Names.	Nos. designating the samples.
Gl.	Gellivare	43, 47.
Gl. D.	Gellivare Dundret	44, 45.
Jm.	Jokkmokk	6, 31.
Ke.	Kerkevare, reg. alp. 750 m.	49.
Kk.	Kvikkjokk, Kaddepakte	48.
Km.	Kamajokk	10, 30.
Ks.	Koskats	15, 20.
Kv.	Kvikkjokk	1, 9, 16, 26, 28, 32, 34.
Ll.	Lule Lappmark (no special locality given)	21.
Na.	Njammats	35.
Nu.	Njunnats	2, 3, 5, 11, 14, 17, 18, 19, 25, 37, 39, 41.
S.-K.	Between Storbacken and Koskats	7, 22, 33.
Tr.	Tarajokk	38.
Tj.	Tjukkbakken	42.
V.	Voullerim	12.
Vi.	Virijaur reg. alp. 600 m.	50.

In the enumeration of the species I have found, I mention the synonyms and drawings only which are necessary to identify the different forms. As to the systematical classification, I have chiefly adopted for the naviculoid forms that of P. T. CLEVE in the Synopsis of the naviculoid Diatoms, Stockholm 1894; and for the rest, with some slight alterations, that of VAN HEURCK in the Synopsis des Diatomées de Belgique, Anvers 1885.

Abbreviations of works referred to in this list:

A. S. — Atlas der Diatomaceenkunde von A. SCHMIDT, Aschersleben 1874.
CL. *Finl.* — CLEVE, The diatoms of Finland. Helsingfors 1890.
CL. *Syn. Nav.* — CLEVE Synopsis of the naviculoid diatoms Pt. I, Stockholm 1894.
CL. & GR. *A. D.* — CLEVE and GRUNOW, Beiträge zur Kenntniss der arctischen Diatomeen. Stockholm 1880.
GR. *Fr. J.*— GRUNOW, Die Diatomeen von Franz Josefs-Land. Wien 1884.
GR. *Foss. Ö.—U.* — GRUNOW, Beiträge zur Kenntniss der fossilen Diatomeen Österreich—Ungarns, Wien 1882.
HÉR. *Anv.* — HÉRIBAUD, Diatomées d'Auvergne. 1893.
LAGST. *Spitsb.* — LAGERSTEDT, Sötvattensdiatomacéer från Spetsbergen och Beeren Eiland. Stockholm 1873.
LEWIS. — LEWIS, On extreme and exceptional variations of Diatoms, in some White Mountain Localities. Philadelphia 1865.
V. H. — VAN HEURCK, Synopsis des diatomées de Belgique. Anvers 1885.
W. SM. *B. D.* — W. SMITH, A Synopsis of the British Diatomaceae, London 1853.

It is my duty here to acknowledge that in the more difficult questions which have occurred during the carrying out of this work I have had the advantage of the help and advice of my father, Professor P. T. CLEVE.

I. Raphideæ.

Pinnularia Ehb.

P. nobilis Ehb. — A. S. XLII, 2, XLIII, 1, V. H. V, 2.

According to Cleve (D. Finl. p. 21) this species has 4,5 striæ in 0,01 mm., but the Lapponian specimens as well as the figures in A. S. all have 5,5 to 6 striae in 0,01 mm. Length of the valve 0,25 to 0,3 mm.

Ks. 15, Kv. 26, 32, Tj. 42. — Somewhat rare.

P. viridis Ehb. — A. S. XLII, 12, 13, 20, 21, Nu. 18. — Rare.

Var. **intermedia** Cl. Finl. p. 22. — A. S. XLII, 9, 11.

Striæ 8 to 9 in 0,01 mm. Valve to 0,13 mm. in length.

Kv. 1, 9, 16, 28, 34, Ks. 15, 20, Nu. 2, 5, 17, 19, 37, 41, Jm. 6, 31, Km. 10, 30, Tr. 38, Na. 35, Tj. 42, S.-K. 22, 33, Gl. 43, 47, Gl. D. 45. — Common.

Var. **commutata** Gr. — A. S. XLV, 35, K. H. V, 6. Striae 10 to 11 in 0,01 mm. Length of the valve 0,06 to 0,07 mm.

Ks. 15. — Rather rare.

Var. **rupestris** Hantzsch. — A. S. XLV, 38, 40, 41.

Striae 13 to 14 in 0,01 mm. Length of the valve usually 0,04 to 0,05 mm.; sometimes up to 0,1 mm.; breadth of the valve 0,01 mm. In Nu. 18 I have found specimens measuring 0,1 mm. in length, but not differing in striation from the forms of normal length.

Kv. 1, 9, 16, 26, 28, 32, 34, Km. 10, Nu. 2, 3, 5, 11, 14, 17, 18, 19, 37, 39, Tr. 38, S.-K. 22, Gl. D. 44, 45, Kk. 48, Ke. 49, Vi. 50. — Frequent.

P. streptoraphe Cl. Finl. p. 23. — A. S. XLVI, 7.

The Lapponian specimens have 7 striae in 0,01 mm. (Cleve gives the number of 5 in 0,01 mm. for this species in Finl. p. 23). Length of the valve 0,135 to 0,22 mm., breadth 0,02 to 0,03 mm.

Kv. 16, 26, 28, 32, Km. 10, Nu. 5, 17, 18, 19, 37, 41, Jm. 6, V. 12, Gl. D. 44, 45. — Frequent.

The largest specimens are from Gellivare Dundret; the smaller forms, occuring for instance in Nu. 37, 41, graduate to the following variety.

Var. **minor** Cl. (P. viridis var. minor Cl. in Finl. p. 22). — Cl. Finl. pl. I, 1.

This variety doubtless belongs to P. streptoraphe, not to P. viridis.

As typical, I consider the forms measuring 0,07 to 0,09 mm. in length and having 8 to 8,5 striae in 0,01 mm., interrupted on one side of the central nodule.

Kv. 1, 32, Jm. 6, Tr. 38. — Somewhat rare.

Var. **gibbosa** A. Cl. n. var. — Pl. I, 1.

Valve 0,15 to 0,2 mm. in length, 0,025 to 0,03 mm. in breadth, gibbous in the middle. Striae 6,5 to 7 in 0,01 mm. sligthly radiate in the middle and the ends. Median line strongly complex.

Gl. D. 44. — Rare.

This form is closely connected with P. flexuosa Cl. from the North American deposits, but is smaller and has closer striae.

P. major Kütz. — A. S. XLII, 8, V. H. V, 3.

Specimens from Lule Lappmark are about 0,2 mm. in length, 0,027 mm. in breadth and have 8 striae in 0,01 mm. The striae usually are 7 in 0,01 mm. (Cl. Finl. p. 24).

Kv. 1, 9, 26, 34, Nu. 2, 37, Jm. 6, 31, Ks. 15, 20, Km. 10, S.-K. 22, Gl. D. 45. — Frequent.

Var. **transversa** A. Sm. — A. S. XLIII, 6.

Valve 0,14 mm. in length, 0,015 in breadth. Striae 9 in 0,01 mm.

Nu. 19. — Rare.

P. Lagerheimii A. Cl. n. sp. — Pl. I, 2.

Valve slender, slightly gibbous in the middle, 0,16 to 0,2 mm. in length, 0,015 to 0,017 mm. in breadth. Striae 8,5 to 9 in 0,01 mm. radiate, alveoli small. Axial area about 1/3 of the breadth of the valve. Median line strongly complex.

This species resembles P. major var. transversa A. Sm., but differs from that by the characteristic median line.

Nu. 5, S.-K. 22, 33. — Rather rare.

P. Esox. Ehb. — Cl. Finl. pl. I, 3.

The specimens from Lule Lappmark do not reach the length of 0,14 mm. given by Cleve in Finl. p. 24. They

measure 0,09 to 0,11 mm. in length, and frequently have less obtuse ends than those shewn in CLEVE's figure.

Kv. 34, S.-K. 33, Gl. 43. — Somewhat rare.

This species seems to be a variety of P. viridis with slightly undulating margins.

P. brevicostata CL. — Finl. pl. I, 5, p. 25.

A form, probably belonging to this species, occurs in S.-K. 33. It is 0,09 mm. in length, 0,017 mm. in breadth and has 8,5 to 9, parallel, very short striae in 0,01 mm. It seems identical with A. S. XLIII, 26, 27 (with 8 striae in 0,01 mm.) I think these forms, considered by CLEVE as possibly belonging to P. hemiptera KÜTZ. (se CL. Finl. p. 25), come nearer to P. brevicostata CL.

S.-K. 33. — Rare.

Var. **tenuis** A. CL. n. var. — Pl. I, 4.

Valve linear, 0,09 mm. in length, 0,012 mm. in breadth; striae 10 in 0,01 mm. Axial area narrower than in the typical specimens.

Ks. 15. — Rare.

Var. **leptostauron** CL. — Finl. p. 25, A. S. XLIII, 25.

Differs from the above variety only by the striae being interrupted in the middle of the valve.

Ks. 15, S.-K. 7, Gl. 43. — Somewhat rare.

P. hemiptera KÜTZ. — A. S. XLIII, 28, 35—40, XLV, 9. — CL. Finl. p. 25.

Striae slightly radiate, 10 to 11 in 0,01 mm. Area about 1/3 of the breadth of the valve.

This species comes near to P. brevicostata var. tenuis A. CL. but is distinguished by its outline, and somewhat more radiate striae.

Kv. 1, 26, 32, 34, Nu. 18, 25, Jm. 6, Km. 10, 30, V. 12, S.-K. 7, 33, Gl. 43, Gl. D. 44, Ke. 49. — Pretty frequent.

P. isostauron EHB. — CL. & GR. A. D. pl. III, 14.

It is often difficult to distinguish this species from P. brevicostata var. leptostauron CL., which has a little broader area and slightly radiate striae.

The length of the valve varies from 0,05 to 0,11 mm.

Kv. 1, Nu. 5, Jm. 6, 31, S.-K. 22, 33, Gl. D. 45. — Not rare.

P. Spitsbergensis Cl. Ms.

Valve linear, 0,055 to 0,07 mm. in length, 0,008 mm. in breadth. Striae 15 in 0,01 mm., parallel, interrupted in the middle of the valve. Axial area one fourth part of the breadth of the valve.

Jm. 6. — Rare.

P. mesogongyla Ehb. — A. S. XLV, 45, Cl. Finl. pl. I, 11.

Kv. 32, Nu. 5, 17, 18, 25, 41, Jm. 6, V, 12, Tj. 42, S.-K. 22, Gl. 47, Gl. D. 45. — Frequent.

This species, occuring in northern parts of Finland (Cl. Finl. p. 26) is pretty common also in Lule Lappmark, and may therefore be considered as a boreal form.

P. stauroptera Grun. — V. H. VI, 7.

Length of the valve 0,09 to 0,15 mm. Striae 9,5 to 10 in 0,01 mm., sometimes not interrupted in the middle of the valve.

A craticular (sporangial?) form, like that figured in A. S. XLIV, 31, occurs sparingly in V. 12.

Ks. 15, Jm. 6, 31, V. 12, Tr. 38, Tj. 42, Gl. 43. — Moderately frequent.

Var. **gibba** Ehb. P. stauroptera var. parva V. H. VI, 6.

Length of the valve 0,05 to 0,055 mm. Striae 11 to 11,5 in 0,01 mm.

Kv. 1, 34, Jm. 6, S.-K. 33, Tr. 38, Tj. 42, Gl. 43. — Moderately frequent.

Var. **capitata** A. Cl. — A. S. XLIV, 33. P. dicephala Ehb. var. stauroneiformis A. Schmidt l. c.

Valve with slightly undulating margins and subcapitate ends, 0,05 to 0,075 mm. in length, 0,008 to 0,01 mm. in breadth. Striae 13 to 14 in 0,01 mm., strongly divergent in the middle, convergent in the ends of the valve; interrupted in the centre.

Kv. 32, Km. 30, Jm. 6. — Somewhat rare.

This form, evidently a variety of P. stauroptera, connects that species with P. stomatophora Grun. (especially the variety ornata A. Cl. (see below)).

P. stomatophora Grun. — A. S. XLIV, 27, 28, 29.

Jm. 6, Ks. 15, Kv. 9, Tj. 42, Gl. 47, Gl. D. 45. — Not rare.

Var. **ornata** A. Cl. n. var. — Pl. I, 3.

Valve 0,06 mm. in length, with slightly subcapitate ends. Striae 14 in 0,01 mm., strongly radiate, interrupted in the

middle of the valve. End-fissures elongated, as in the typical form, but with two rows of puncta instead of the fissure-like lines on the sides of the central nodule.

Kv. 26. — Very rare.

P. subsolaris var. **linearis** GRUN. — A. S. XLV, 29.

Valve 0,1 to 0,13 in length, 0,013 to 0,018 in breadth, slightly gibbous in the middle. Ends rounded, with semicircular end-fissures at some distance from the margin. Striae radiate, 12 in 0,01 mm. Axial area strongly dilated in the middle of the valve.

Jm. 6, Gl. D. 44. — Rare.

P. acrosphæria BRÉB. — A. S. XLIII, 14—17, 23.

A small form, like the above mentioned figure 23 by A. SCHMIDT, 0,05 mm. in length, 0,01 mm. in breadth, with 12 to 13 parallel striae in 0,01 mm. was found in Kv. 26, together with a few larger ones. — Rare.

P. semicruciata A. SCHM. — A. S. XLIV, 44.

Lapponian specimens are 0,045 mm. in length, 0,014 mm. in breadth and have 13 to 14 striae in 0,01 mm.

Tr. 38, Ke. 49. — Rare.

P. divergens W. SM. — B. D. XVIII, 177.

Kv. 9, 16, 32, 34, Nu. 14, 18, 19, 25, 27, 39, Ks. 15, Jm. 6, Km. 10, Tr. 38, V. 12, Tj. 42, Gl. 47, Gl. D. 44, Ke. 49. — Frequent.

This variable species graduates on one side to P. Legumen, on the other to P. microstauron and P. Brébissonii. In Nu. 18 some specimens occur, that differ from the latter by their length only (0,065 mm.)

Var. **elliptica** GRUN. — Fr. J. pl. I, 19.

Typical specimens of this variety were found in Kv. 32, Nu. 17, 41, S.-K. 7; less broad, slightly constricted, forms in Kv. 1, Nu. 25. — Rather rare.

P. Legumen EHB. — V. H. VI 16, 17.

Ks 15. — Rare.

P. microstauron EHB. P. Brébissonii var. subproducta GRUN. in V. H. V, 9. CL. Finl. p. 28, A. S. XLIV, 34.

Kv. 1, 9, 26, 28, 32, 34, Nu. 2, 5, 17, 18, 19, 25, 37, Ks. 20, Jm. 31, Km. 10, 30, Na. 35, V. 12, Tj. 42, S.-K. 22, 33, Gl. 43, Gl. D. 45. — Very common.

P. Brébissonii Kütz. — V. H. V, 7, A. S. XLIV, 17, 18.
Length of the valve 0,03 to 0,05 mm.
Kv. 28, Nu. 14, 17, 19, 25, 37, S.-K. 33, Ke. 49. — Moderately common.

Var. **diminuta** Grun. — V. H. V, 8.
Length of the valve 0,02 mm.
Kv. 32. — Rare.

P. karelica Cl. — Finl. pl. I, 6.
Ke. 49. — Rare.

P. molaris Grun. — P. macra A. S. XLIV, 54.
Striae 15 in 0,01 mm. Valve 0,03 mm. in length, with more or less (V. 12) narrow axial area.
Nu. 5, 19, 41, V. 12, Gl. 43. — Somewhat rare.

P. Braunii Grun. — V. H. VI, 21.
Kv. 32. — Rare.

P. subcapitata Grég. — V. H. VI, 22.
Kv. 9, 34, 28, Nu. 2, 3, 14, 18, V. 12, Km. 10, 30, Na. 35. Tr. 38, S.-K. 33, Gl. 43, 47, Gl. D. 44, 45. — Frequent.

Var. **Hilseana** Janisch. — V. H. Suppl. A, 11.
Axial area indistinct.
S.-K. 7. — Rare.

P. gracillima Grég. var. — V. H. VI, 24.
Kv. 1, 32, Nu. 2, 14, 25, Ks. 15, Km. 10, 30, Gl. 47, Ke. 49. — Rather frequent.

P. divergentissima Grun. — V. H. VI, 32.
As typical, I consider the forms which gradually taper towards the ends.
Kv. 32, Nu. 2, 14, 18, 19, 37, Gl. D. 44, Ke. 49. — Moderately frequent.

Var. **subrostrata** A. Cl. n. var. — Pl. I, 5.
Ends of the valve rostrate-capitate.
Kv. 28, 34, Nu. 2, 5, 37, Ks. 15, Na. 35, V. 12, Gl. D. 45. — Moderately frequent.

P. mesolepta Ehb. — A. S. XLV, 52, 53. P. nodulosa Kütz. P. interrupta W. Sm.
Kv. 26, 32, 34, Tr. 38. — Somewhat rare.

Var. **tenuis** A. Cl. n. var. — A. S. XLV, 62.

Valve only half as broad as the typical form, 0,006 mm. in breadth, 0,04 to 0,045 mm. in length.

Ks. 15, S.-K. 22, 33, Nu. 5, 19, Ll. 21. — Somewhat rare.

P. biceps Grég. — Nav. bicapitata Lagst., Spitsb. pl. I, 5, — A. S. XLV, 70.

Length of the valve 0,06 mm.

Kv. 1, Jm. 6, Ks. 15, 20, Km. 30, Gl. 43. — Not rare.

Var. **stauroneiformis** Cl. Ms. — A. S. XLV, 72.

Length of the valve 0,04 mm. Striae interrupted in the middle of the valve.

Ks. 15. — Rare.

P. borealis Ehb. — V. H. VI, 3.

Kv. 32, Nu. 2, 5, 14, 17, 18, 25, 37, 41, Jm. 6, Km. 10, 30, Tr. 38, V. 12, S.-K. 7, 33. — Frequent.

P. lata Bréb. — V. H. VI, 1.

Kv. 1, 26, 28, 32, Nu. 3, 11, 17, 18, 37, 39. — Rather frequent.

P. undulata Grég. — Cl. Finl. pl. II, 8, p. 30.

Ks. 15. — Rare.

Navicula Bory.

Sectio: **N. lineolatæ.** (Radiosæ).

N. vulpina Kütz. — V. H. VII, 18.

Jm. 6, Ke. 49. — Rare.

N. radiosa Kütz. — V. H. VII, 24.

Kv. 1, 9, 26, 32, S.-K. 7, 33, Jm. 6, Ks. 15, 20, Tr. 38, Ll. 21, Km. 30, Ke. 49. — Frequent.

N. Cari Ehb. — V. H. VII, 11, 17.

Nu. 25. — Very rare.

N. cincta Kütz. — V. H. VII, 13.

Of this species a broad (0,01 mm.) form occurs sparingly in Kv. 9.

N. anglica Ralfs. — V. H. VIII, 29, 30.

Kv. 32, Km. 30, S.-K. 7. — Somewhat rare.

N. dicephala (Ehb.?) W. Sm. — V. H. VIII, 33, 34.

S.-K. 7, Tr. 38. — Rare.

N. rostellata Kütz. — V. H. VII, 24.
Ke. 49. — Rare.

N. tuscula (Ehb.) Grun. — V. H. X, 14.
Ke. 49. — Very rare.

Sectio: **N. punctatæ.**

N. lacustris Grun. — Cl. Finl. pl. II, 14, p. 34.
Km. 30, Kv. 32. — Rare.

Sectio: **N. Decussatæ.**

N. Placenta (Ehb.) Lewis. — Cl. & Gr. A. D. III, 60.
Kv. 1, 26, S.-K. 22. — Rare.

Sectio: **N. Heterostichæ.**

N. cocconeiformis Grég. — V. H. XIV, 1.
Kv. 28, Nu. 2, 14, 17, 37, Km. 30. — Somewhat rare.

N. scutiformis Grun. — A. S. LXX, 62.
Kv. 32, Km. 30. — Rare.

Sectio: **N. Microstigmaticæ** (Stauroneis).

S. anceps (Ehb.) — Cl. Syn. Nav., p. 147.

Var. **hyalina** Br. & Pér. — Hér. Auv. pl. III, 19.
Kv. 32, Nu. 2, 17, 18. — Rare.

Var. **linearis** Grun. — V. H. IV, 8.
Km. 30, Tr. 38, Gl. D. 44, Ke. 49. — Not rare.

Var. **elongata** Cl. — l. c. p. 148.
Jm. 6, Gl. 43. — Rare.

Var. **amphicephala** Kütz. — V. H. IV, 4, 5.
Kv. 32, S.-K. 7, 33, Tr. 38, V. 12, Gl. D. 45. — Somewhat frequent.

Var. **leiostauron** A. Cl. n. var. — Pl. I, 7.
I refer to this new variety a specimen 0,07 mm. in length, 0,019 mm. in breadth, with lanceolate valve and rostrate ends, occuring in Kv. 26. Striae 18 to 19 in 0,01 mm., distinctly punctate; puncta 24 in 0,01 mm. Stauros not reaching to the margin.
Kv. 26. — Rare.

S. Phoenicenteron Ehb. — Cl. Syn. Nav., p. 148.

Var. **amphilepta** Ehb. — Hér. Auv., pl. III, 18.

This variety often in its somewhat rostrate forms graduates to S. anceps. Such transitional forms occur in Nu. 5.

Kv. 9, 32, 34, Nu. 5, 17, 19, 41, Jm. 6, 31, S.-K. 22, Tr. 38, Tj. 42, Gl. 43, 47, Gl. D. 44, 45, Ke. 49. — Frequent.

S. parvula var. **prominula** Grun. — Cl. Syn. Nav. p. 149.

Kv. 32, Nu. 37. — Rare.

This form has more acute ends than S. producta Grun., figured in V. H. IV, 12. It is distinguished from S. Legumen Ehb. only by the valve not being biconstricted.

S. Legumen Ehb. — V. H. IV, II, Cl. l. c.

Jm. 6, Ks. 15. — Rare.

S. obtusa Lagst. — Spitsb. pl. I, 11, Cl. l. c.

The specimens from Lule Lappmark I have seen have, with one exception in Nu. 14, slightly rostrate, more narrow ends than the typical form. They are identical with the form from Blue Mountains, mentioned by Cleve in Syn. Nav. p. 149, and seem to graduate to S. parvula var. producta Grun., which, however, is of smaller size. — Pl. I, 6.

Kk. 48, Nu. 18, Kv. 26, 28, Sl. 21. — Rather rare.

S. lapponica A. Cl. n. sp. — Pl. I, 8.

Valve linear-elliptical, with broad, rounded ends and small diaphragms, 0,035 mm. in length, 0,007 mm. in breadth. Stauros broad, reaching to the margin. Striae slightly radiate, delicate, more than 25 in 0,01 mm., punctate; puncta forming undulating longitudinal rows.

Nu. 14. — Very rare.

This species has some resemblance in outline, to S. obtusa Lagst. but has much finer striae, and is smaller.

Sectio: **N. Mesoleiæ.**

N. Seminulum Grun. — V. H. XIV, 8, 9.

Nu. 14. — Rare.

N. Rotaeana Grun. — V. H. XIV, 17.

Kv. 1, 32, Nu. 2, 18, 25, Jm. 6, Km. 30, Tr. 38, Ke. 49. — Frequent.

N. mutica Kütz. var. **Göppertiana** Bleisch. — V. H. X, 18.
Ll. 21. — Very rare.

N. Pupula Kütz. — V. H. XIII, 15, 16.
N. Pupula var. genuina Gr. A. D. p. 45.
Kv. 26, 32, Km. 30. — Somewhat rare.

Var. **bacillaroides** Grun. — A. D. p. 45.
Jm. 6, S.-K. 7, Ks 15, Gl. 43, Kv. 1. — Rather rare.

Sectio: **N. Bacillares.**

N. Bacillum Ehb. — Gr. A. D. pl. II, 50.
Ke. 49. — Rare.

Sectio: **N. decipientes.**

N. Semen Ehb. — Gr. Fr. J. pl. I, 34.
Gl. D. 44. — Rare.

This species, frequent in fossil deposits, but not living now in Finland (Cl. Finl. p. 36) occurs in moderate abundance on the top of the mountain Gellivare.

N. subtilissima Cl. — Finl. pl. II, 15.
Tj. 42, Ke. 49. — Somewhat rare.

Anomœoneis Pfitzer.

A. serians Kütz. — V. H. XII, 7.
Jm. 6, 31, Gl. 43. — Rare.

A. brachysira Bréb. — V. H. XII, 9.
Nav. serians var. minima Grun. V. H. XII, 9.
Kv. 9, 16, 28, 34, Nu. 5, 18, 19, 25, 37, 41, Jm. 6, 31, Ks. 15, 20, Km. 10, 30, Na. 35, Tj. 42, S.-K. 7, 22, Gl. 47. — Very frequent.

A. exilis Grun. — V. H. XII, 11, 12.
Jm. 6, Ke. 49. — Somewhat rare.

A. Follis Ehb. — Lewis pl. II, 5 b.
Jm. 6. — Rare.

Frustulia (Ag.) Rabh. (Van Heurckia Bréb.)

F. rhomboides Bréb. — V. H. XVII, 1.
Kv. 1, 16, 28, 34, Nu. 5, 17, 18, 19, 37, 41, Jm. 6, 31, Ks. 15, 20, Km. 10, 30, Na. 35, Tj. 42, S.-K. 7, Gl. 43, 47, Ll. 21. — Very frequent.

Var. **crassinervia** Bréb. — V. H. XVII, 4.
Nu. 25, Ks. 20. — Rare.

Var. **amphipleuroides** Grun. — A. D. pl. III, 59.
Ke. 49. — Rare.

F. vulgaris Thwaites. — V. H. XVII, 6.
Kv. 32, Ke. 49. — Rare.

Caloneis Cleve.

C. Silicula Ehb. — Nav. limosa Kütz., Cl. Syn. Nav. p. 51.
Var. **genuina** Cl. l. c. — V. H. XII, 18.
Kv. 32, 26, Ke. 49. — Somewhat rare.

Var. **alpina** Cl. l. c. — V. H. XII, 21, Lagst. Spitsb. pl. I, 6.
Kv. 32, Nu. 2, 18. — Rather rare.
I have in pl. I f. 9 figured a form, which I think belongs to this variety, though somewhat different in outline. It is gibbous in the middle and has slightly clavate ends. It occurs in Kk. 48.

Var. **inflata** Grun. — V. H. XII, 20.
Ke. 49. — Rare.

Var. **ventricosa** Donk. — V. H. XII, 24.
Kv. 26. — Rare.

Var. **Jenisseyensis** Grun. — A. D. pl. I, 18, p. 29.
To this variety I refer the slightly gibbous forms with rounded ends and 21 striae in 0,01 mm., measuring 0,033 mm. in length, that occur in Kv. 1, 28, Jm. 6, Km. 30, Ll. 21. — Somewhat rare.

C. bacillaris Grég. — V. H. XII, 27, Cl. l. c. p. 50.
A form belonging to this species occurs in Kv. 1. The valve is 0,023 mm. in length, 0,007 mm. in breadth, with 23

striae in 0,01 mm. Axial area the fourth part of the breadth of the valve.

Kv. 1. — Rare.

Var. **thermalis** Grun. — V. H. XII, 27 a.

Valve linear, gibbous in the middle, 0,055 mm. in length. Striae about 23 in 0,01 mm.

Ks. 15. — Rare.

C. obtusa W. Sm. — Nav. Hebes Ralfs. Cl. l. c. p. 54.

Kv. 9, 16, Nu. 17, Ks. 15, 20, Jm. 6, 31, Tj. 42, Gl. 47, Km. 10. — Rather frequent.

C. fasciata Lagst. — V. H. XII, 34, Cl. l. c. p. 50.

Ke. 49. — Rare.

Neidium Pfitzer.

N. Iridis Ehb. — V. H. XIII, 1, A. S. XLIX, 3.

Forms (mostly small) occur in Jm. 6, Kv. 32. — Rare.

Var. **ampliata** Ehb. — A. S. XLIX, 5, Cl. Syn. Nav. p. 69.

Jm. 6, Ke. 49. — Rare.

N. amphigomphus Ehb. — A. S. XLIX, 9, V. H. XIII, 7.

Kv. 26, 32, Ks. 15, Tr. 38, Ll. 21. — Not rare.

N. Hitchcockii Ehb. — A. S. XLIX, 35, 36.

Kv. 26, 32. — Rare.

N. productum W. Sm. — A. S. XLIX, 37—39.

Nu. 41, Jm. 31, Tj. 42, Gl. 43. — Not rare.

N. affine Ehb.

Var. **genuina** Cl. — l. c. p. 68, A. S. XLIX, 21—23.

Kv. 26, Ks. 15, Gl. 43. — Somewhat rare.

Var. **amphirhynchus** Ehb. — Cl. l. c., V. H. XIII, 5, **forma minor.** Length of the valve 0,05 mm.

Kv. 32, Nu. 19, Jm. 6, Gl. 43, Gl. D. 45, S.-K. 7. — Somewhat frequent.

Var. **longiceps** Grég. — Cl. l. c.

Length of the valve 0,03 mm.

V. 12, Km. 30, Gl. 43, Gl. D. 45. — Not rare.

N. bisulcatum Lagst. — Spitsb. I, 8, A. S. XLIX, 15, 17, 18.

The valve is sometimes slightly gibbous in the middle, as figured in A. S. XLIX, 18.

Kv. 1, 16, 28, 32, 34, Nu. 2, 5, 17, 18, 19, 25, 37, 41, Jm. 6, Ks. 15, Km. 30, Tr. 38, S.-K. 22, 33, Na. 35, V. 12, Gl. 43, Gl. D. 44, 45, Ke. 49. — Very frequent.

Diploneis Ehb.

D. elliptica Kütz. — Cl. Syn. Nav. p. 92.

Length of the valve 0,027 mm., costae 12, puncta 14 in 0,01 mm.

Tr. 38, Nu. 41, Ke. 49. — Rare.

Var. **Ladogensis** Cl. — Finl. pl. II, 9.

One specimen, 0,045 mm. in length, with 10 costae in 0,01 mm. was found in Km. 10. — Very rare.

D. Boldtiana Cl. — Finl. pl. II, 12. N. ovalis f. minor, Gr. Ö.-U. XXX, 61.

Kv. 32, Ke. 49. — Rare.

D. ovalis Hilse. — Cl. Finl. pl. II, 13.

Kv. 16, 9, 26, 28, Nu. 14, Jm. 6, Km. 10, 30, Kk. 48.

Occurs sparingly, though widely spread.

D. fennica Ehb. — Cl. Finl. pl. II, 11.

A small form, connecting this species with D. Parma Cl., 0,04 mm. in length, with 9 costae in 0,01 mm., occurs in Ks. 15.

Ks. 15, Ke. 49. — Rare.

D. domblittensis Grun.

Var. **subconstricta** A. Cl. n. var. — Pl. I, 10.

Valve very slightly constricted in the middle, 0,055 mm. in length, 0,018 mm. in breadth. Costae 11 in 0,01 mm., alternating with coarse, distant (8 in 0,01 mm.) alveoli.

Ke. 49. — Very rare.

Cymbella Ag.

C. microcephala Grun. — V. H. VIII, 36—39.

Jm. 6. — Rare.

C. Cesatii Rabh. — A. S. LXXI, 48, 49.

Kv. 1, Ks. 15, Jm. 6, Tr. 38, S.-K. 7, Kk. 48. — Somewhat frequent.

C. angustata W. Sm. — Lagst. Spitsb. pl. II, 10.
Of this species I have found specimens with distinctly oblique median line.
Jm. 6, Ks. 15. — Rare.

C. borealis Cl. — Finl. pl. II, 19.
Jm. 31, Gl. 43. — Rare.
Only found before in Russian Lapland. (Cl. Syn. Nav. p. 161).

C. delicatula Kütz. — A. S. LXXI, 54, V. H. VI, 6, Cl. Syn. Nav. p. 161.
Tr. 38. — Rare.

C. leptoceras (Ehb.?) Grun. — V. H. Suppl. A, 2, Cl. l. c. p. 162.
Ke. 49. — Rare.

C. amphicephala Naeg. — V. H. II, 6, Cl. l. c. p. 164.
Kv. 32, Jm. 6, Ks. 15, S.-K. 7, Gl. 43. — Moderately frequent.

C. lapponica Grun. — Cl. Syn. Nav. pl. IV, 28.
Nu. 41. — Rare.

C. naviculiformis Auersw. — V. H. II, 4, 5, C. anglica Lagst. Spitsb. pl. II, 18.
Kv. 1, 26, 32, 34, Km. 10, 30, Tr. 38, V. 12, Gl. D. 44. — Somewhat frequent.

C. cuspidata Kütz. — V. H. II, 3, A. S. IX, 50.
Kv. 1, 26, 32, Jm. 6, 31, Ks. 15, Tr. 38, Gl. 43, Ke. 49. — Rather frequent.

C. heteropleura Ehb. — A. S. IX, 5, 6.
Kv. 9, 28, Nu, 5, 17, 19, 37, 41, Jm. 6, 31, Km. 10, Na. 35, Ks. 20. — Frequent.

Var. **minor** Cl. — l. c. p. 167, A. S. IX. 51, 52.
Kv. 32, Nu. 5, 18, 19, 41. — Somewhat frequent.

Var. **lanceolata** A. Cl. n. var. — Pl. I, 11.
Valve almost symmetrical, lanceolate, with scarcely rostrate ends, 0,09 to 0,1 mm. in length, 0,018 to 0,025 mm. in breadth. Axial area distinct, somewhat broader towards the middle of the valve, where it is dilated, more on the

ventral than on the dorsal side. Striae 10 to 11 in 0,01 mm., distinctly punctate, puncta about 20 in 0,01 mm.

Kv. 26, Nu. 41. — Rare.

I think this almost symmetrical and non-rostrate form must be considered as a variety of C. heteropleura.

C. (Encyonema) turgida Grég. — V. H. III, 12.

Kv. 26. — Rare.

C. (Encyonema) ventricosa Kütz. — V. H. III, 15.

Kv. 1, 9, 32, 34, Nu. 5, 17, 18, 25, Jm. 6, 31, Ks. 15, 20, V. 12, S.-K. 7, Km. 10, 30, Ll. 21, Na. 35, Gl. 47, Ke. 49, Vi. 50. — Very frequent.

Var. **cæspitosa** Kütz. — V. H. III, 14.

Kv. 26, Tr. 38, Ke. 49. — Rare.

This variable species in its larger forms much resembles C. turgida Grég. and passes over completely to that species. Such a transitional form, 0,05 mm. in length, occurs in Ks. 15.

C. (Encyonema) hebridica Grun. — Cl. Finl. pl. II, 16, 17.

Jm. 6. — Rare.

C. (Encyonema) gracilis Rabh. — A. S. X, 39, 40, V. H. III, 20, 21.

Jm. 31. — Rare.

Var. **lunata** W. Sm. — V. H. III, 23.

Kv. 1, 9, 28, 32, Nu. 5, 14, 17, 19, 25, 37, Jm. 6, 31, Na. 35, Tj. 42. — Frequent.

C. (Encyonema) norvegica Grun. — A. S. X, 38, 41.

Kv. 16, S.-K. 7, Jm. 31, Km. 10, Ke. 49. — Somewhat rare.

C. incerta var. **naviculacea** Grun. — Cl. & Gr. A. D. XVI, 11.

Kv. 16, 26, Nu. 2, 5, 19, 25, Jm. 6, 31, Km. 10, 30, Tj. 42, Gl. 43. — Frequent.

C. æqualis W. Sm. — A. S. IX, 41—45, C. obtusa Grég., C. subaequalis Grun.

Kv. 16, Jm. 6, Kk. 48, Ke. 49. — Rather rare.

C. sinuata Grég. — V. H. III, 8.

Km. 30, Ke. 49. — Rare.

C. perpusilla A. Cl. n. sp. — Pl. I, 13.

Valve very small, 0,017 mm. in length, 0,003 mm. in breadth, slightly cymbiform, lanceolate, with obtuse, slightly

rostrate ends. Striae parallel, 15 in 0,01 mm. No isolated puncta.

Nu. 37. — Rare.

This little form occurs in moderate abundance in Nu. 37. — It seems akin to C. parva.

C. parva W. Sm. — A. S. X, 14, 15, V. H. II, 14.

Kv. 34, Ke. 49, Km. 30. — Somewhat rare.

C. cymbiformis Ehb. — V. H. II, 11.

Kv. 1, 26, 32, Ks. 15, Ke. 49. — Not rare.

C. Cistula Hempr. — V. H. II, 12.

Kv. 32, 34, Nu. 41, Km. 30, Tr. 38, Ll. 21, S.-K. 22, Ke. 49. — Rather frequent.

Var. **maculata** Kütz. — V. H. II, 16.

Kv. 26, 32. — Somewhat rare.

f. curta. — V. H. II, 17.

Kv. 26. — Rare.

Var. **arctica** Lagst. — Spitsb. pl. II, 21, 22.

Ll. 21, Kv. 32, Km. 30. — Somewhat rare.

C. helvetica Kütz. — V. H. II, 15.

Km. 30, Tr. 38, Ke. 49. — Moderately rare.

C. aspera Ehb. — V. H. II, 8. C. gastroides Kütz.

Kv. 19, 26, 32, Km. 10, 30, Ks. 15, 20, Nu. 17, S.-K. 22. — Rather frequent.

C. lanceolata Ehb. — V. H. II, 7.

Ke. 49. — Rare.

I have also observed in Nu. 17, 18, a Cymbella, that must be either a sporangial form, or a new species. I give figure of it in pl. I, 12. The end-nodules are at some distance from the ends; the striae are 12 to 14 in 0.01 mm., the valve is 0,04 mm. in length, 0,08 in breadth.

Gomphonema Ag.

G. parvulum Kütz. — V. H. XXV, 9, 10, 11, Cl. Syn. Nav. p. 180.

Kv. 9, 26, 34, Nu. 2, 18, Ks. 20, S.-K. 22, 33, Gl. 43, Gl. D. 44. — Frequent.

Var. **Lagenula** Kütz. — V. H. XXV, 8.

Jm. 6. — Rare.

Var. **exilissima** GRUN. — V. H. XXV, 12.
Kv. 1, Nu. 18. — Rare.

Var. **micropus** KÜTZ. — V. H. XXV, 4, 5, 6.
Nu. 14, 25, Km. 30. — Somewhat rare.

Var. **undulata** A. CL. n. var. — Pl. I, 18.
Valve triundulate, with rostrate ends, 0,02 mm. in length, 0,004 mm. in breadth. Axial and central areas indistinct. Striae 16 in 0,01 mm.
Kv. 1. — Rare.

G. angustatum KÜTZ. — V. H. XXIV, 49, 50, CL. l. c. p. 181.
Kv. 16, 32, Tr. 38, S.-K. 7, V. 12, Jm. 6. — Not rare.

Var. **producta** GRUN. — V. H. XXIV, 52, 53.
Nu. 18, Jm. 6, Km. 30, V. 12, Gl. 43, Kk. 48, Ke. 49. — Somewhat frequent.

Var.? **lapponica** A. CL. n. var. — Pl. I, 20, 21.
Var. linear, almost symmetrical, sometimes slightly cymbelloid, 0,025 to 0,055 mm. in length, 0,01 mm. in breadth, occasionally slightly triundulate; with rostrate to capitate ends. Striae 13 in 0,01 mm. Axial area narrow, distinct, central area a broad, transverse fascia, with a few irregular striae on one or both sides.
Nu. 14 (abundant), 37. — Somewhat rare.

G. intricatum KÜTZ. — V. H. XXIV, 29—31, CL. l. c. p. 181.
Kv. 1, 26, S.-K. 7, Tr. 38, Ks. 49. — Somewhat rare.
Var. **vibrio** EHB. — V. H. XXIV, 26.
Kv. 9, 32, Nu. 17, 38. — Rather rare.

G. subtile EHB. — V. H. XXIII, 13, 14, CL. l. c. p. 182.
Ks. 15. — Rare.
Var. **sagitta** SCHUM. — V. H. XXIII, 27.
Ks. 15, 20. — Rare.
Var. **rotundata** A. CL. n. var.
This variety is distinguished from the var. Sagitta by the apex being rounded instead of cuneate.
Kv. 32. — Rare.

G. gracile EHB. — CL. l. c. p. 182.
Var. **naviculacea** W. SM. — V. H. XXIV, 13.
Kv. 1. — Rare.
Var. **dichotomum** W. SM. — V. H. XXIV, 19, 20.
Ks. 15, S.-K. 7, Kv. 32, Km. 30. — Not rare.

Var. **cymbelloides** Grun. — Pl. I, 16.
Ks. 20, Kv. 32. — Rare.

G. subclavatum Grun. — V. H. XXIII, 36—43, Cl. l. c. p. 183.
Var. **Mustela** Ehb. — V. H. XXIV, 4.
Kv. 9, S.-K. 7, Nu. 17, 41, Ll. 21. — Not rare.
Var. **montana** Schum. — V. H. XXIII, 35, 36.
Kv. 9, 16, 32, Nu. 17, 41, V. 12, Tr. 38, S.-K. 7, Jm. 6, Km. 10, 30, Ll. 21, Ks. 20, Gl. 44. — Frequent.
f. succica Grun. — V. H. XXIII, 32.
Ks. 15. — Rare.
f. media Grun. — V. H. XXIII, 37.
Kv. 34, Nu. 18. — Rare.

G. Lagerheimii A. Cl. n. sp. — Pl. I, 15.
Valve almost symmetrical, linear, biconstricted, with acute ends, 0,045 mm. in length, 0,005 mm. in breadth. Striae slightly radiate in the middle, 15 in 0,01 mm., somewhat more distant in the middle of the valve..
Nu. 18, 41, Jm. 31. — Rare.
This species is probably akin to G. subclavatum var. montana Schum.

G. acuminatum Ehb. — V. H. XXIII, 16, Cl. l. c. p. 184.
Kv. 1, 9, 26, S.-K. 7, Ks. 15, 20, Jm. 31, Tr. 38, Ke. 49. — Rather frequent.
f. Brébissonii Kütz. — V. H. XXIII, 23, 24.
Kv. 26, 32, Jm. 6, Ks. 15, 20, Km. 10, S.-K. 7, Ke. 49. — Somewhat frequent.
f. coronata Ehb. — V. H. XXIII, 15.
Kv. 32, Jm. 6, S.-K. 7, Ks. 15, Km. 30. — Not rare.
f. hastata A. Cl. — Pl. I, 17.
Valve with cuneate apex (like that of G. acuminatum f. trigonocephala Ehb.) abruptly constricted below, not gibbous in the middle, 0,037 mm. in length. Striae 13 in 0,01 mm.
Tr. 38. — Rare.
Var. **elongata** W. Sm. — V. H. XXIII, 22.
Kv. 1, 26, 34, Ks. 15, 20. — Somewhat rare.

G. constrictum Ehb. — V. H. XXIII, 6, Cl. l. c. p. 186.
Kv. 26, 32, Jm. 6, V. 12, S.-K. 7, Ks. 15. — Rather frequent.

In Kv. 26, Ks. 15 the typical form occurs, together with the f. subcapitata Gr. in V. H. XXIII, 5.

f. elongata A. Cl.

Valve elongated, 0,06 to 0,07 mm. in length.

Kv. 26. — Rare.

Var. **capitata** Ehb. — V. H. XXIII, 7.

Kv. 1. — Rare.

G. geminatum Lyngb. — Cl. l. c. p. 186.

Kv. 1, 9. 26, 32, 34, Km. 10, 30, V. 12, Nu. 17, 41, Ll. 21, Tr. 38, Ke. 49. — Frequent.

G. ventricosum Grég. — V. H. XXV, 13.

Ll. 21, Kv. 26, 32, 34, Km. 30, Tr. 38, Nu. 41. — Rather frequent.

G. olivaceum Ehb. — V. H. XXV, 22—25.

Kv. 34, Ke. 49. — Rare.

Var. **pusilla** A. Cl. n. var. — Pl. I, 14.

Valve 0,017 mm. in length, 0,004 mm. in breadth; striae 19 in 0,01 mm.

Km. 30. — Rare.

Cocconeis (Ehb.) Grun.

C. Placentula Ehb. — V. H. XXX, 26, 27.

Kv. 9, Ke. 49. — Rare.

Achnanthes Bory.

A. borealis A. Cl. n. sp. — Pl. I, 24, 25.

Valve elliptical, with subacute ends, 0,02 mm. in length, 0,01 mm. in breadth, the upper one with almost parallel striae, 15 in 0,01 mm., leaving a blank semicircular space near one of the margins. Lower (?) valve with a small rounded central area, and delicate, strongly radiate striae, 21 in 0,01 mm.

Ke. 49. — Rare.

Both valves have not been seen together, but are found in the same sample.

A. linearis Grun. — A. D. p. 93, V. H. XXVII, 31, 32. Striae 35 in 0,01 mm.
Kv. 9, S.-K. 7, Jm. 6, Ke. 49, Gl. 43. — Not rare.

A. microcephala (Kütz.) Grun. — V. H. XXVII, 20—23.
Km. 30. — Rare.

A. marginulata Grun. — V. H. XXVII, 45, 46.
Kv. 28. — Rare.

Achnanthidium (Kütz.) Grun.

A. flexellum Bréb. — V. H. XXVI, 29, 30.
Kv. 9, 16, Jm. 6, Km. 10, Tr. 38, Kk. 48, Ke. 49. — Somewhat frequent.

f. minuta A. Cl.
Valve 0,015 mm. in length, 0,007 mm. in breadth. Striae fine, about 26 in 0,01 mm.
Kv. 34. — Rare.

Var. **alpestris** Br. — Diatomiste, II, 5, f. 15.
Ks. 15. — Rare.

A. maximum A. Cl. n. sp. — Pl. I, 22, 23.
Valves large, the lower one 0,075 mm. in length, 0,02 mm. in breadth, with 23 striae in 0,01 mm. The upper valve 0,065 mm. in length, with 26 striae in 0,01 mm. and a large, rectangular central area 0,015 mm. in length, 0,008 mm. in breadth; axial area narrow.
Jm. 6. — Rare.
Though not seen together, the two valves described above, found in the same sample, certainly belong to the same species. They have the same outline and about the same size and number of striae. The pseudoraphe of the upper valve seems to be slightly sigmoid.

Amphora Ehb.

A. ovalis Kütz. var. **affinis** Kütz. — V. H. I, 2.
Kv. 32, Jm. 6, Ke. 49. — Rare.

f. minor. — V. H. I, 45.
Tr. 38. — Rare.

II. Pseudoraphideæ.

Surirella Turpin.

S. robusta Ehb. — V. H. LXXI, 1, 2.
Jm. 6. — Rare.

S. splendida Ehb. — V. H. LXXII, 4.
Kv. 26, Jm. 6, Km. 10, Ke. 49. — Rather rare.

S. linearis W. Sm. — A. S. XXIII, 33.
Kv. 32, Nu. 17. — Rare.

S. lapponica A. Cl. n. sp. — Pl. I, 26.
Valve linear with cuneate ends, 0,06 to 0,07 mm. in length, 0,01 mm. in breadth. Costae 6 to 7 in 0,01 mm., not reaching to the middle of the valve; striae 27 to 28 in 0,01 mm., pervious, delicate.
Kv. 26, Tr. 38. — Rare.
This species may possibly be identical with **S. delicatissima** Lewis, fig. 4, which is of about the same size, but has 7 to 9 costae in 0,01 mm., according to the figure. No number of striae is given by Lewis.

S. Lagerheimii A. Cl. n. sp. — Pl. I, 27.
Valve linear, tapering towards the narrower, but still obtuse, ends, 0,05 mm. in length, 0,005 mm. in breadth. Costae 6 in 0,01 mm., marginal; striae pervious, delicate, 21 in 0,01 mm.
Nu. 25. — Rare.

Stenopterobia Brèb.

S. anceps Brèb. — Surirella anceps Lewis, fig. 3.
Kv. 1. — Rare.

Nitzschia (Hassall) Grun.

Sectio: **Tryblionella.**

N. angustata var. **acuta** Grun. — A. D. p. 70.
Kv. 1, 26, Jm. 6, Ks. 15, 20, S.-K. 7, Tr. 38, Tj. 42, Ke. 49. — Frequent.

Sectio: **Grunowia.**

N. denticula Grun. — V. H. LX, 10.
Jm. 6, 31. — Rare.

Sectio: **Lanceolatæ.**

N. subtilis var. **paleacea** Grun. — V. H. LXVIII, 10.
Kv. 34. — Rare.

N. communis Rabh. — V. H. LXIX, 32, Gr. A. D. p. 97.
Kv. 26, Nu. 25, Km. 30. — Somewhat rare.

N. amphibia var. **fossilis** Grun. — A. D. p. 98.
Kv. 26. — Rare.

N. frustulum var. **perminuta** Grun. — A. D. p. 97, V. H. LXVIII, 31.
Kv. 34. — Rare.

N. Hantzschiana Rabh. — Gr. A. D. p. 99, V. H. LXIX, 1.
Tr. 38. — Rare.

Hantzschia Grun.

H. amphioxys Grun. — V. H. LVI, 1.
Specimens from Lule Lappmark often have closer striae than is stated in V. H. p. 168, 20 to 21 instead of 16.
Kv. 1, 34, Jm. 6, Nu. 11, 17, S.-K. 33, Ll. 21, Gl. 43, Gl. D. 44, Km. 10, Tr. 38. — Somewhat frequent.
Var. **elongata** Grun. — V. H. LVI, 7, 8.
Kv. 32. — Rare.

Denticula Kütz.

D. tenuis Grun. — V. H. XLIX, 22—38.
Ke. 49. — Rare.

Epithemia Bréb.

E. Zebra (Ehb.) Kütz. — V. H. XXXI, 9.
Kv. 1, 26, 32. — Rather rare.
Var. **longicornis** Perag. & Hér. — Auv. III, 14.
Kv. 26. — Rare.

Var. **proboscidea** Grun. — V. H. XXXI, 10.
Kv. 32, 34, V. 12, Nu. 5. — Rather rare.

Var. **longissima** (Ehb.) Perag. & Hér. — Auv. III, 13.
Kv. 26. — Rare.

Var. **bidens** A. Cl. n. var.

Valve impressed in the middle of the dorsal side, with rostrate ends.

Kv. 26. — Rare.

E. Argus Kütz. — V. H. XXXI, 15—17.
Jm. 6, Kk. 48, Ke. 49. — Rare.

E. gibba Kütz. — V. H. XXXII, 1, 2.
Jm. 6, Kv. 26. — Rare.

Var. **ventricosa** Grun. — V. H. XXXII, 4, 5.
Kv. 32, Nu. 25. — Rare.

E. Sorex Kütz. — V. H. XXXII, 6—8.
Ke. 49. — Rare.

Eunotia Ehb.

E. gracilis (Ehb.) Rab. — V. H. XXXIII, 1, 2.

Valve arcuate, narrow, linear with rounded-capitate ends, 0,08 to 0,11 mm. in length, 0,004 to 0,007 mm. in breadth. Striae 12 in 0,01 mm., equidistant.

Kv. 1, Ks. 15, 20, Km. 10, S.-K. 7, Nu. 17, 18, 25, Ke. 49. — Rather frequent.

E. major (W. Sm.) Rabh. — V. H. XXXIV, 14.

Valve slightly arcuate, linear, constricted under the slightly capitate, rounded ends; 0,09 to 0,12 mm. in length, 0,01 mm. in breadth, Striae not equidistant, 12 in 0,01 mm.

Kv. 1, 16, Jm. 6, Ks. 20, Km. 10, Tj. 42, Gl. 47. — Moderately frequent.

Var. **ventricosa** A. Cl. n. var. — Pl. I, 37.

Valve 0,09 mm. in length, in the middle gibbous on the ventral side. The projecting part of the valve separated from the rest by a distinct pseudo-raphe. Striae not equidistant, about 11 in 0,01 mm.

Kv. 16, Km. 10. — Rare.

E. monodon Ehb. — V. H. XXXIII, 3.

Valve tapering from the middle to the slightly protracted, rounded ends, 0,08 to 0,09 mm. in length, 0,016 mm. in breadth. Striae equidistant, 12 in 0,01 mm.

Kv. 1, 32, Nu. 17, 18, Jm. 6, Gl. 47. — Somewhat rare.

This species is sometimes difficult to distinguish from E. major Rabh.

E. diodon Ehb. var. **minor** Grun. — V. H. XXXIII, 5.

Length of the valve 0,05 to 0,06 mm. Striae 12 to 14 in 0,01 mm., equidistant.

Nu. 5, 19, 25, Jm. 6, 31, Ks. 15, 20, Tj. 42, Gl. 43. — Rather frequent.

Var. **diminuta** Grun. — V. H. XXXIII, 7.

Length of the valve 0,02 to 0,035 mm. Striae 14 in 0,01 mm.

Kv. 28, 34, Nu. 14, 18, 37, Ks. 20, S.-K. 33. — Somewhat frequent.

I think this species may include E. bidentula W. Sm. as a variety. The latter graduates to E. diodon var. minor Grun., from which it is distinguished only by the narrower shape and somewhat closer striae, 17 to 18 in 0,01 mm.

E. robusta Ehb.

Valve arcuate, with rostrate ends. Striae partly not reaching the ventral margin, 10 to 11 in 0,01 mm.

Var. **tetraodon** Ralfs. — V. H. XXXIII, 11.

Ks. 15, 20, Kv. 32, Jm. 6. — Somewhat rare.

Var. **diadema** Ralfs. — V. H. XXXIII, 12.

Kv. 1, Jm. 6, Ks. 15, 20, S.-K. 22, Tr. 38, Ll. 21, Nu. 41, Ke. 49. — Somewhat frequent.

Var. **hendecaodon** Ralfs. — V. H. XXXIII, 13.

Jm. 6, Ks. 15. — Rare.

E. tridentula Ehb. var. **perminuta** Grun. — V. H. XXXIV, 30.

f. 3- to 4-dentatæ. Striae 17 in 0,01 mm.

Nu. 2, 18, Na. 35, Gl. D. 44. — Rare.

E. parallela Ehb. — V. H. XXXIV. 16.

Valve arcuate, linear, with non-protracted, rounded obtuse ends. Striae 11 to 12 in 0,01 mm. End-nodules at the ends of the valve.

Kv. 9, 28, 32, Nu. 3, 5, 11, 14, 17, 18, 19, 37, 39, 41, S.-K. 7, 22, 33, Jm. 31, Na. 35, Tj. 42, Gl. 43, 47, Gl. D. 45. — Frequent.

In Nu. 14 forms occur, that make a transition to E. incisa var. obtusa GRUN.

E. lapponica GRUN. in CLEVES Ms. n. sp. — Pl. I, 29, 30.

Valve almost straight, linear, slightly contracted at the broad, obtuse ends, 0,07 to 0,08 mm. in length, 0.008 mm. in breadth. Striae equidistant, 18—19 in 0,01 mm. End-nodules at some distance from the margin.

Kv. 16, 32, Nu. 5, 18, 19, 37, 41, Jm. 6, 31, Km. 10, 30, Na. 35, Tj. 42, Gl. 43, 47. — Frequent.

This species, common in Lule Lappmark, has some resemblance with E. denticula RABH. in V. H. XXXIII, 14, but never has the dorsal margin denticulated. It occurs in CLEVE & MÖLLER, Diatoms I, 28, 37 under the name of E. (denticulata BRÉB.) var. glabrata GRUN. As it is a smooth, constant form with the ends otherwise shaped than those of all the true E. denticulae I have seen from Lule Lappmark, and is besides of a much larger size than these, I think it preferable to make it a new, distinct species.

E. denticula (BRÉB.) RABH., var. **borealis** A. CL. n. var. — Pl. I, 33, 34.

Valve 0,025 to 0,04 mm. in length, with the ends almost acutely protracted towards the dorsal side. The dorsal margin with small teeth, 9 to 11 in 0,01 mm. Striae 20 in 0,01 mm.

Nu. 3, 18, 27, Kv. 28, Na. 35. — Rather rare.

This little denticulate form has almost the same outline as E. Nymanniana GRUN. and is perhaps a transitional form to this species. I have not seen any specimens from Lule Lappmark like the figure of E. denticula in V. H. XXXIII, 14.

E. suecica A. CL. n. sp. — Pl. I, 31, 32.

Valve somewhat arcuate, 0,025 to 0,03 mm. in length, 0,01 mm. in breadth with broad, truncate ends and two rather acute dorsal ridges of a more or less slight elevation. Striae 14 in 0,01 mm., equidistant and of equal length.

Kv. 1, 28, Nu. 2, 18, Tr. 38. — Rather rare.

This species sometimes resembles in outline E. robusta var. Papilio GRUN. in V. H. XXXIII, 8, but the striation is quite different. It seems to be more akin to E. triodon EHR., which has the same kind of striation.

E. triodon Ehb. — V. H. XXXIII, 9.

Striae 17 in 0,01 mm., equidistant, and reaching both margins.

Kv. 28, Nu. 3, 5, 11, 17, 18, 19, 37, 39, 41, Ks. 20, Jm. 6, 31, S.-K. 7, 33, Na. 35, Tj. 42, Gl. 43, Gl. D. 44. — Frequent.

E. polyglyphis Grun. — V. H. XXXIV, 33. **f. 5-, 6- and 7-glyphis** Ehb.

Striae 14 to 15 in 0,01 mm. End-nodules near the ventral margin at some distance from the ends of the valve.

Kv. 28, Nu. 5, 18, 19, 37, 41, Jm. 6, 31, Ks. 15, 20, V. 12, S.-K. 22, 33, Na. 35, Tj. 42, Gl. D. 47. — Frequent.

Is perhaps but a variety of the following species, from which it differs only by the elevations on the dorsal side.

E. incisa Grég. — V. H. XXXIV, 35 a.

Striae and end-nodules as in E. polyglyphis. Ends acute.

Kv. 1, 9, 16, 26, 32, Jm. 6, Ks. 15, 20, Km. 10, Ll. 21, Na. 35, Tr. 38, Tj. 42. — Frequent.

Var. **obtusiuscula** Grun. — V. H. XXXIV, 35 b.

Valve tapering towards the obtuse ends.

Jm. 6. — Rare.

Var. **obtusa** Grun. — V. H. XXXIV, List of contents.

Ends rounded-obtuse, as broad as the middle of the valve or almost so. Striae 16 to 17 in 0,01 mm.

Nu. 5, 17, 18, 19, 37, Ks. 15, 20, Jm. 6, 31, S.-K. 22, Tr. 38, Tj. 42, Gl. 43. — Frequent.

E. faba Grun. in V. H. XXXIV, 34 has the same outline as this variety, but has more distant striae.

The size of E. incisa var. obtusa is very variable, from 0,017 to 0,065 mm. in length. The larger forms sometimes graduate to E. parallela Ehb.

E. lunaris (Ehb.) Grun. — V. H. XXXV, 3, 4, 6.

Valve arcuate, narrow linear, with obtuse to subacute ends, 0,05 to 0,09 mm. in length, 0,005 mm. in breadth. Striae equidistant, 14 to 16 in 0,01 mm.

Kv. 26, Km. 30, S.-K. 33, Gl. 43, Gl. D. 44, Ke. 49. — Not rare.

Var. **subarcuata** Grun. — V. H. XXXV, 2.

Smaller, with closer striae. Valve 0,016 to 0,04 mm. in length, 0,002 to 0,004 mm. in breadth. Striae 19 to 20 in 0,01 mm.

Kv. 32, 34, Nu. 3, 5, 14, 19, 39, Ks. 15, 20, Jm. 6, Km. 10, V. 12, S.-K. 7, 22, 33, Na. 35, Gl. 43, 47, Gl. D. 45. — Frequent.

f. excisa (GRUN.) — V. H. XXXV, 6 c.

Ventral margin indented in the middle of the valve. Striae 20 in 0,01 mm.

S.-K. 33. — Rare.

E. impressa EHB. var. **angusta** GRUN. — V. H. XXXV, 1.

Valve slightly arcuate, narrower towards the rounded, scarcely capitate ends; with slightly concave dorsal margin; 0,03 to 0,035 mm. in length, 0,004 to 0,005 mm. in breadth. Striae 17 to 19 in 0,01 mm.

Kv. 16, 32, Ks. 15, S.-K. 7, Jm. 6, Km. 30, Tj. 42. — Somewhat frequent.

Though nearly connected with E. pectinalis RABH., especially the var. minor, this form must, I think, constitute a different species, the striae being much closer than in E. pectinalis.

E. pectinalis RABH.

Valve slightly arcuate with rostrate, protracted ends. Striae 10 to 13 in 0,01 mm., inequidistant.

Var. **elongata.** — V. H. XXXIII, 16.

Valve 0,02 to 0,15 mm. in length, 0,008 mm. in breadth. Striae 13 in 0,01 mm.

Kv. 16, 28, Nu. 5, 18, 37, Km. 10, Jm. 6, Na. 35, Tj. 42. — Not rare.

Var. **stricta** RABH. — V. H. XXXIII, 18.

Valve 0,04 to 0,055 mm. in length, 0,006 mm. in breadth. Striae 12 to 13 in 0,01 mm.

Nu. 2, Ll. 21. — Rare.

Var. **compacta** A. CL. n. var.

Valve 0,045 mm. in length, 0,016 mm. in breadth. Striae 13 in 0,01 mm.

Kv. 1. — Rare.

Var. **minor** (KÜTZ.) RABH. — V. H. XXXIII, 20.

Valve 0,025 to 0,03 mm. in length, 0,005 mm. in breadth, sometimes slightly concave on the dorsal side. Striae 11 to 13 in 0,01 mm.

Kv. 1, 9, 32, 34, Km. 10, Nu. 17, Ll. 21, Gl. D. 44, Ke. 49. — Somewhat frequent.

Var. **biconstricta** Grun. — V. H. XXXIII, 19.

The specimens from Lule Lappmark measure 0,05 mm. in length and thus are only half the length of that figured by Grun. in V. H. l. c. The valve sometimes has 2 slight constrictions on the dorsal margin also. Striae 9 to 11 in 0,01 mm.

Kv. 32, Ks. 15, 20, S.-K. 33. — Somewhat rare.

As seen above, the average number of striae in E. pectinalis and its varieties is in Lule Lappmark higher than that of 8 in 0,01 mm., stated by Van Heurck in the Synopsis p. 142. 10 to 12 striae in 0,01 mm. is the number usually occuring.

E. media A. Cl. n. sp. — Pl. I, 38.

Valve gently arcuate with rounded subcapitate ends, 0,045 to 0.065 mm. in length, 0,009 mm. in breadth. Dorsal margin slightly impressed in the middle. Striae 15 to 16 in 0,01 mm., equidistant and of equal length.

Nu. 14, 18. — Rare.

The outline of this species is about the same as that of E. major var. bidens in V. H. XXXIV, 15; but the size and striation of these two forms being quite different, I think they must be specifically distinguished.

E. formica Ehb. — V. H. XXXIV, 1.

Jm. 6, Ks. 15. — Rare.

E. arcus Ehb. — V. H. XXXIV, 2, 3.

As typical I consider forms with broad, obtuse ends, and 10 to 13 almost equidistant striae in 0,01 mm. Valve 0,04 to 0.06 mm. in length, 0,007 to 0,009 mm. in breadth.

Kv. 16, 28, 32, 34, Nu. 17, 18, Km. 10, 30, Ks. 15, 20, Ll. 21, Jm. 31, Tj. 42, Gl. 47, Ke. 49. — Frequent.

Var. **uncinata** Grun. — V. H. XXXIV, 13.

Valve more slender. The lines limiting the ends converge towards the dorsal side of the valve.

Kv. 9, Ks. 15, 20, Jm. 6, Ll. 21, Tr. 38, Nu. 41, Tj. 42, Km. 30. — Moderately frequent.

Of this variable species, a great number of different forms occur in Lule Lappmark, passing into another; thus no limit can be fixed between the typical form and the var. minor Grun. in V. H. XXXIV, 3, for which reason I have

united them. On the other hand this species frequently approaches E. praerupta EHB., from which it is distinguished chiefly by its much closer striae.

E. tenella GRUN. — V. H. XXXIV, 5, 6, 9.

Valve more or less arcuate, 0,012 to 0,025 mm. in length, 0,003 to 0,008 mm. in breadth, with truncate ends. Striae 18 in 0,01 mm.

Nu. 3, 18, 19, 37, 39, V. 12, Na. 35, Gl. 43, Gl. D. 45. — Somewhat frequent.

This small species is very like E. exigua BRÉB. in V. H. XXXIV, 11, but the latter has much closer striae: 27 in 0,01 mm. according to the figure. It is nearly akin to E. arcus EHB. but is much smaller and has closer striae, for which reason it has been made a different species.

E. Nymanniana GRUN. — V. H. XXXIV, 8. — Pl. I, 36.

Valve arcuate to almost straight, linear, 0,025 to 0,035 mm. in length, 0,003 mm. in breadth. Ends of the valve characteristic, acutely protracted towards the dorsal side. Striae 21 in 0,01 mm.

Nu. 2, 3, 5, 11, 18, 19, 39, Kv. 28, S.-K. 22, 33, Jm. 31, Na. 35, Gl. 43, 47. — Frequent.

E. fallax A. CL. n. sp. — Pl. I, 35.

The valve has the same outline and size (0,02 mm. in length) as E. Nymanniana GRUN., but the striae are only 14 to 15 in 0,01 mm.

Nu. 5, 35, 37. — Rather rare.

E. praerupta EHB.

Ends of the valve abruptly truncate. Striae coarse, at unequal distances, 7 to 12 in 0,01 mm.

The typical form has 7 to 8 striae in 0,01 mm. The valve is 0,04 to 0,07 mm. in length, 0,012 to 0,015 mm. in breadth. — V. H. XXXIV, 18, 19.

Kv. 1, 26, 28, 32, Nu. 2, 5, 11, 14, 18, 19, 25, 37, 39, 41, S.-K. 7, 22, 33, Jm. 6, 31, Km. 10, Na. 35, Gl. 43, Gl. D. 44, 45, Ke. 49. — Frequent.

f. curta GRUN. — V. H. XXXIV, 23, 24.

Length of the valve 0,03 mm.

Kv. 26, Nu. 18, 37. — Rather rare.

f. elongata.

Valve elongated, slightly rostrate, 0,08 to 0,1 mm. in length.

Kv. 34, Nu. 2, S.-K. 22. — Somewhat rare.

Var. **bidens** GRUN. — V. H. XXXIV, 20—22.

Striae 12 in 0,01 mm. Elevations low.

Kv. 9, 28, 32, 34, Nu. 3, 5, 11, 14, 17, 18, 25, 37, 39, 41, Ll. 21, Km. 30, Gl. 43. — Frequent.

Var. **bigibba** KÜTZ. — V. H. XXXIV, 26.

Striae 10 to 12 in 0,01 mm. Elevations high, protracted.

Nu. 14, 17, 18, 25, 41, Ll. 21, S.-K. 22, 33, Kv. 32. — Rather frequent.

Var. **laticeps** GRUN. — V. H. XXXIV, 25.

Striae 12 in 0,01 mm.

Kv. 1, 28, 32, Nu. 14, 18, 37, 41, Kk. 48. — Somewhat frequent.

E. gibbosa GRUN. — V. H. XXXV, 13.

Nu. 17. — Rare.

Pseudo-Eunotia GRUN.

P. hemicyclus (EHB.) GRUN. — V. H. XXXV, 23.

Jm. 6. — Rare.

Ceratoneis EHB.

C. arcus (EHB.) KÜTZ. — V. H. XXXVII, 7.

Kv. 9, 32, Nu. 17, 18, Km. 30, Tr. 38, Ke. 49. — Rather frequent.

Synedra EHB.

S. Ulna EHB. — V. H. XXXVIII, 7.

Km. 30, Nu. 41. — Somewhat rare.

Var. **amphirhynchus** EHB. — V. H. XXXVIII, 5.

Kv. 9. — Rare.

Var. **danica** KÜTZ. — V. H. XXXVIII, 14.

Jm. 6. — Rare.

S. minuscula Gr. — V. H. XXXIX, 13.
Striae 16 to 18 in 0,01 mm., delicate.
Kv. 9, 32, Nu. 18, Km. 30, Tr. 38. — Not rare.

S. amphicephala Kütz. — V. H. XXXIX, 14.
Striae 10 to 12 in 0,01 mm.
Nu. 17, 25. — Rare.

Var. **pusilla** A. Cl. S. amphicephala var.? striis teniori-bus V. H. XXXIX, 15. Striae 13 to 14 in 0,01 mm.
Km. 10, S.-K. 7, Ke. 49. — Somewhat rare.

Fragilaria Lyngb.

F. virescens Ralfs. — V. H. XLIV, 1.
Nu. 2, Jm. 6. — Rare.

Var. **producta** Grun. — V. H. XLIV, 8.
Nu. 2, 17, 25, Kv. 32, Gl. D. 44. — Somewhat frequent.

F. undata W. Sm. — V. H. XLIV, 9.
Nu. 5, 19, 41, Kv. 28, S.-K. 22, Na. 35, Gl. D. 45. — Rather frequent.

f. stricta.
Valve shorter than the typical form, not constricted in the middle.
Nu. 19, Na. 35. — Somewhat rare.

f. tetranodis.
Valve elongated, triconstricted, 0,06 mm. in length.
Nu. 5, 19, Gl. D. 45. — Rare.

F. capucina Desm. — V. H. XLV, 4.
Striae 20 in 0,01 mm.
Tr. 38, Gl. D. 44. — Rare.

F. construens Ehb. var. **bigibba** A. Cl. n. var. — Pl. I, 28.
Striae 17 in 0,01 mm. Valve strongly bigibbous, 0,011 mm. in length.
Ke. 49. — Rare.

F. lancettula Schum. — V. H. XLV, 20.
Valve 0,015 mm. in length, 0,006 mm. in breadth. Striae 9 in 0,01 mm. Area narrow, distinct.
Tr. 38. — Rare.

F. minutissima Grun. — V. H. XLV, 14.
Tr. 38. — Rare.

F. intermedia Grun. — V. H. XLV, 10.
The specimens from Lule Lappmark have 16 striae in 0,01 mm. Grunow's figure in V. H. l. c. has 13 in 0,01 mm.
Km. 30. — Rare.

F. lapponica Grun. — V. H. XLV, 35.
Valve 0,035 mm. in length, 0,007 mm. in breadth. Striae 6 in 0,01 mm.
Tr. 38. — Rare.

Var. **minuta** A. Cl. n. var. — Pl. I, 40.
Valve smaller, 0,01 mm. in length, 0,004 mm. in breadth. Striae closer, 10 in 0,01 mm.
Ke. 49. — Rare.

Diatoma De Cand.

D. hiemale (Lyngb.) Heiberg. — V. H. LI. 1, 2.
Tr. 38. — Rare.

Var. **mesodon** Kütz. — V. H. LI. 3, 4.
Nu. 2, 18, 25, Km. 10, Kv. 16, Tr. 38, Gl. D. 44, 45. — Frequent.

Meridion Ag.

M. circulare C. Ag. — V. H. LI, 10—12.
Kv. 16, 32, Nu. 17, 18, Km. 10, Tr. 38, Gl. D. 44, 45. — Frequent.

Var. **constricta** Ralfs. — V. H. LI, 14, 15.
Nu. 2, 18, V. 12, Gl. D. 44. — Somewhat rare.

Tetracyclus (Ralfs.) Grun.

T. lacustris Ralfs. — W. Sm. B. D. XXXIX, 308.
Kv. 1, 32, 34, Jm. 6, Ks. 15, 20, Ll. 21, Km. 30, Tr. 38, Nu. 41. — Frequent.

Var. **emarginata** Ralfs.
Kv. 1, 32, 34, Nu. 9, 41, Ll. 21, Km. 30, Tr. 38. — Somewhat frequent.

Var. **maxima** A. Cl. n. var. — Pl. I, 39.

Valve 0,08 mm. in length, 0,024 mm. in breadth, biconstricted, broadest in the middle.

Ks. 15. — Rare.

This variety comes near to T. tripartita Br. & Pér. in Hér. Auv. VI, 5, but the middle of the valve is relatively broader and the ends are more rounded.

Diatomella Grev.

D. Balfouriana Grev. — W. Sm. B. D. II, LXI, 303.

Kk. 48. — Rare.

Tabellaria Ehb.

T. flocculosa Kütz. — V. H. VII, 10.

Kv. 9, 16, 28, 32, 34. Nu. 3, 5, 17, 18, 19, 25, 37, 39, 41, S.-K. 7, 22, 33, Ks. 15, 20, Km. 10, 30, Jm. 6, 31, Tr. 38, Na. 35, Tj. 42, Gl. 43, 47, Gl. D. 44, Ke. 49. — Very frequent.

T. fenestrata Grun. — V. H. LII, 6.

Kv. 16, 32, 34, Jm. 6, 31, Ks. 15, 20, S.-K. 7, 33, Km. 10, Tr. 38, Tj. 42, Gl. 43, 47, Ke. 49. — Frequent.

III. Cryptoraphideæ.

Stephanodiscus (Ehb.) Grun.

S. astraea var. **minutula** Grun. — V. H. XCV, 7.

Ke. 49. — One specimen only found.

Cyclotella Kütz.

C. Kützingiana Chauv. var. **Schumanni** Grun. — V. H. XCIV, 2, 3.

Jm. 6, Km. 30, Ll. 21, Ke. 49. — Somewhat rare.

C. comta Ehb. var. **radiosa** Kütz. — V. H. XCIII, 1.

Jm. 6, Kv. 32, Ke. 49. — Rather rare.

Melosira Ag.

M. Roeseana Rabh. — V. H. LXXXIX, 1—3.
Kv. 26, 32, Nu. 14, 17, 25, Km. 30. — Somewhat rare.

M. distans Kütz. — V. H. LXXXVI, 21—27.
Kv. 1, 26, 28, 34, Nu. 18, 37, Jm. 6, Na. 35, Gl. D. 45. — Rather frequent.

M. crenulata Kütz. var. **ambigua** Grun. — V. H. LXXXVIII, 12—15, A. S. CLXXXI, 12, 13.
Kv. 9, 32, Nu. 2, 5, 17, Jm. 6, Ks. 15, 20, S.-K. 7, Ll. 21, Km. 10, 30, Gl. D. 44. — Frequent.

If we consider the distribution of genera and species in the above list, we find that the following genera are especially richly represented in Lule Lappmark, both as regards the number of species and the frequency of occurence:

Pinnularia Ehb.
Frustulia (Ag.) Rabh.
Cymbella Ag.
Gomphonema Ag.
Eunotia Ehb.
Tabellaria Ehb.

On the other hand the following genera, of frequent occurence in the freshwater flora of southern parts of Sweden, and of other countries with a similar climate, are not (o), or only sparingly, represented in Lule Lappmark.

Amphora Ehb.
o. *Pleurosigma* W. Sm.
Cocconeis (Ehb.) Grun.
o. *Rhoicosphenia* Grun.
Surirella Turpin.
o. *Cymatopleura* W. Sm.
o. *Campylodiscus* Ehb.
Epithemia Bréb.
Stephanodiscus (Ehb.) Grun.

Several of the 270 forms I have hitherto found in Lule Lappmark are thoroughly boreal or arctic. P. T. Cleve gives a list of such arctic forms in The diatoms of Finland p. 9,

and all the forms he there enumerates, together with some few other arctic species, also occur in Lule Lappmark:

Caloneis obtusa W. Sm. (*Navicula Hebes* Ralfs.)
Semen Ehb.
Cymbella heteropleura Ehb.
borealis Cl.
incerta var. *naviculacea* Grun.
lapponica Grun.
norvegica Grun.
cistula var. *arctica* Lagst.
Achnanthes marginulata Grun.
Eunotia lapponica Grun.
triodon Ehb.
Diatomella Balfouriana Grev.

and of a less decided arctic character:

Pinnularia mesogongyla (Ehb.) Cl.
divergentissima Grun.
lata Bréb.
Neidium bisulcatum Lagst.
Anomoeoneis serians Bréb.
exilis Grun.
Cymbella hybridica Grég.
Denticula tenuis Kütz.
Melosira distans Kütz.

There is also a great number of forms which, though now frequent in temperate regions, such as the southern part of Sweden, Belgium etc., are not yet found in Lule Lappmark. They are:

Navicula gracilis (Kütz.) Grun.
oblonga Kütz.
viridula Kütz.
cryptocephala Kütz.
gastrum (Ehb.) Donkin.
cuspidata Kütz.
v. *ambigua* Ehb.
Stauroneis acuta W. Sm.
Caloneis amphisbaena Bory.
Anomoeoneis spaerophora Kütz.

Pleurosigma attenuatum W. Sm.
acuminatum (Kütz.) Grun.
Cymbella Ehrenbergii Kütz.
affinis Kütz.
prostrata Ralfs.
Roicosphenia curvata Grun.
Cocconeis Pediculus Ehb.
Achnanthes exilis Kütz.
lanceolata (Bréb.) Grun.
Amphora ovalis Kütz.
Surirella elegans Ehb.
ovalis Bréb.
spiralis Kütz.
biseriata Bréb.
Cymatopleura elliptica W. Sm.
Solea W. Sm.
Campylodiscus hibernicus Ehb.
Nitzschia Tryblionella Hantzsch.
dubia W. Sm.
dissipata (Kütz.) Grun.
sigmoidea (Ehb.) W. Sm.
linearis (Ag.) W. Sm.
Epithemia turgida Kütz.
var. *granulata* Grun.
Hyndmanii W. Sm.
Synedra Vaucheriae Grun.
radians Grun.
capitata Ehb.
Fragilaria construens v. *venter* Grun.
mutabilis Grun.
Diatoma elongatum Lyngb.
vulgare Bory.
tenue Kütz.
Cyclotella Meneghiniana Kütz.
Melosira varians Ag.
arenaria Moore.
granulata (Ehb.) Ralfs.

It is of special interest to compare the recent flora of Lule Lappmark, so far as known at present, with that of the Ancylus-sea, which, during a certain postglacial period filled

with fresh water the basin of the Baltic sea and covered parts of Sweden. The lists of diatoms found in Ancylus-deposits and published in the works mentioned below[1] by MUNTHE, NATHORST and HOLST amount altogether to 75 species and varieties, gathered in Lärbro (Gotland) Heby, Skattmansö (Upland) Ryssby (Småland) and Viborg (Finland). In this number are not included the forms found in Ancylus-deposits from Norrland and published in G. ANDERSSON: »Om senglaciala och postglaciala aflagringar i mellersta Norrland» (Geol. Fören. i Stockholm förhandl. n:r 161, Bd. 16, h. 7), because a great number of them have certainly been carried by streams, coming from high parts of the country, and thus do not properly belong to the flora of the Ancylus-sea.

Of those 75 forms, the following are frequent in and characteristic of the Ancylus-sea. Those which are rare in Lule Lappmark are marked r and those entirely absent o.

r. *Navicula tuscula* EHB.
o. *Caloneis latiuscula* KÜTZ.
o. *Pleurosigma attenuatum* W. SM.
r. *Diploneis domblittensis* GRUN.
r. *elliptica* KÜTZ.
o. *Cocconeis Pediculus* EHB.
Cymbella aspera EHB. (*gastroides* KÜTZ.)
o. *Ehrenbergii* KÜTZ.
r. *lanceolata* EHB.
o. *Cymbella prostrata* (RALFS).
Gomphonema geminatum AG.
o. *Amphora ovalis* KÜTZ.
o. *Surirella spiralis* KÜTZ.
o. *Cymatopleura elliptica* W. SM.
o. *Campylodiscus hibernicus* EHB.
o. *noricus* EHB.
o. *Epithemia turgida* KÜTZ.
o. *Hyndmanii* W. SM.

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[1] MUNTHE: Über die sogenannte »Undre grålera» und einige darin gefundene fossilien. Bull. of the geolog. Instit. of Upsala 1894.

NATHORST: Om en fossilförande leraflagring vid Skattmansö i Upland. Geol. Fören. i Stockholm förhandl. N:r 154, Bd 15, H. 7.

NATHORST: En växtförande lera från Viborg i Finland. Geol. Fören. i Stockholm förhandl. N:r 158, Bd 16, H. 4.

HOLST: Om ett fynd af uroxe i Råkneby, Ryssby socken, Kalmar län. Geol Fören. i Stockholm förhandl. Bd 10, H. 7.

r. *Epithemia Zebra* Kütz.
o. *Eunotia Clevei* Grun.
r. *Stephanodiscus astraea* Grun.
o. *Melosira arenaria* Moore.

Thus only 8 of these 22 forms occur at all in Lule Lappmark, and only 2 in any abundance.

If now the flora of the Ancylus-sea be compared with that of a country enjoying a temperate climate, as for instance southern Sweden, and Belgium, of which the diatomaceous flora is comparatively well known, the result obtained is as follows: (f = frequent, r = rare, o = absent in Belgium).

f. *Navicula tuscula* Ehb.
r. *Caloneis latiuscula* Kütz.
f. *Pleurosigma attenuatum* W. Sm.
o. *Diploneis domblittenensis* Grun.
f. *elliptica* Kütz.
f. *Cocconeis Pediculus* Ehb.
f. *Cymbella aspera* Ehb.
f. *Ehrenbergii* Kütz.
f. *lanceolata* Ehb.
f. *prostrata* Ralfs.
o. *Gomphonema geminatum* Ag.
f. *Amphora ovalis* Kütz.
f. *Surirella spiralis* Kütz.
f. *Cymatopleura elliptica* W. Sm.
f. *Campylodiscus hibernicus* Ehb.
f. *noricus* Ehb.
f. *Epithemia turgida* Kütz.
r. *Hyndmanii* W. Sm.
f. *Zebra* Kütz.
o. *Eunotia Clevei* Grun.
o. *Stephanodiscus astraea* Grun.
f. *Melosira arenaria* Moore.

This list shows that there is a great resemblance between the diatomaceous flora of the Ancylus-sea and that of Belgium.

Finally, some statistical statements may be permitted, though the percentages will probably be somewhat altered when further investigations have increased the number of diatom-forms known as living in Lapland.

Of the 270 forms (species and varieties) living in Lule Lappmark 34 (including 5 very rare ones) are found in the Ancylus-deposits, or 12,6 %. Of the 250 forms living in Belgium (according to V. H. Syn.) 58 are found in the Ancylus-deposits; or 23, 2 %. Of the 75 forms belonging to the flora of the Ancylus-sea, 34 now live in Lule Lappmark. where five of them are very rare; or 45,3 %, and 58 now live in Belgium; or 77,4 %. Of the 75 forms belonging to the flora of the Ancylus-sea, 27 are common to Lule Lappmark and Belgium Now 34 of the forms I have found in Lule Lappmark belong to the flora of the Ancylus-sea, thus $^{27}/_{34}$ or 80 % of the Ancylus-forms living in Lapland are cosmopolitan diatoms occuring in Belgium as well as in Lapland.

These figures tend, I think, to show that an examination of the diatomaceous remains found in a deposit may furnish valuable indications of the nature of the climate which prevailed during the formation of that deposit.

The diatomaceous flora of Lule Lappmark proves to be relatively very rich, no less than 270 forms being already found. As it is of a decidedly boreal character, I have compared it with the diatomaceous freshwater flora of Spetsbergen and Russian Lapland, described in LAGERSTEDT, »Sötvattens-diatomacéer från Spetsbergen och Beeren Eiland», and P. T. CLEVE, »The diatoms of Finland». It may be observed then, that of about 100 species and varieties, stated by LAGERSTEDT, l. c., as occuring in Spetsbergen and Beeren Eiland, only 50 % have been found in Lule Lappmark. On the other hand 55 species found by me in Lule Lappmark, are not mentioned by P. T. CLEVE, l. c., as now living in Russian Lapland, which thus either has a scantier flora in this regard, or is in want of being further investigated.

In order to compare the recent flora with the past, I have studied 2 samples of subfossil diatom-earths from peat-bogs in Lule Lappmark, the one from Muddas Ape, the other from Ripas near Gellivara. Both these gatherings have been issued in CLEVE and MÖLLER, Diatoms, I, 37 and V, 270, 271 where GRUNOW gives a list of some of the forms which they contain. As might be supposed, this list shows a great resemblance with the recent flora of the country in question. All the forms found in the sample from Muddas Ape live at precent in Lule Lappmark in some abundance, for instance:

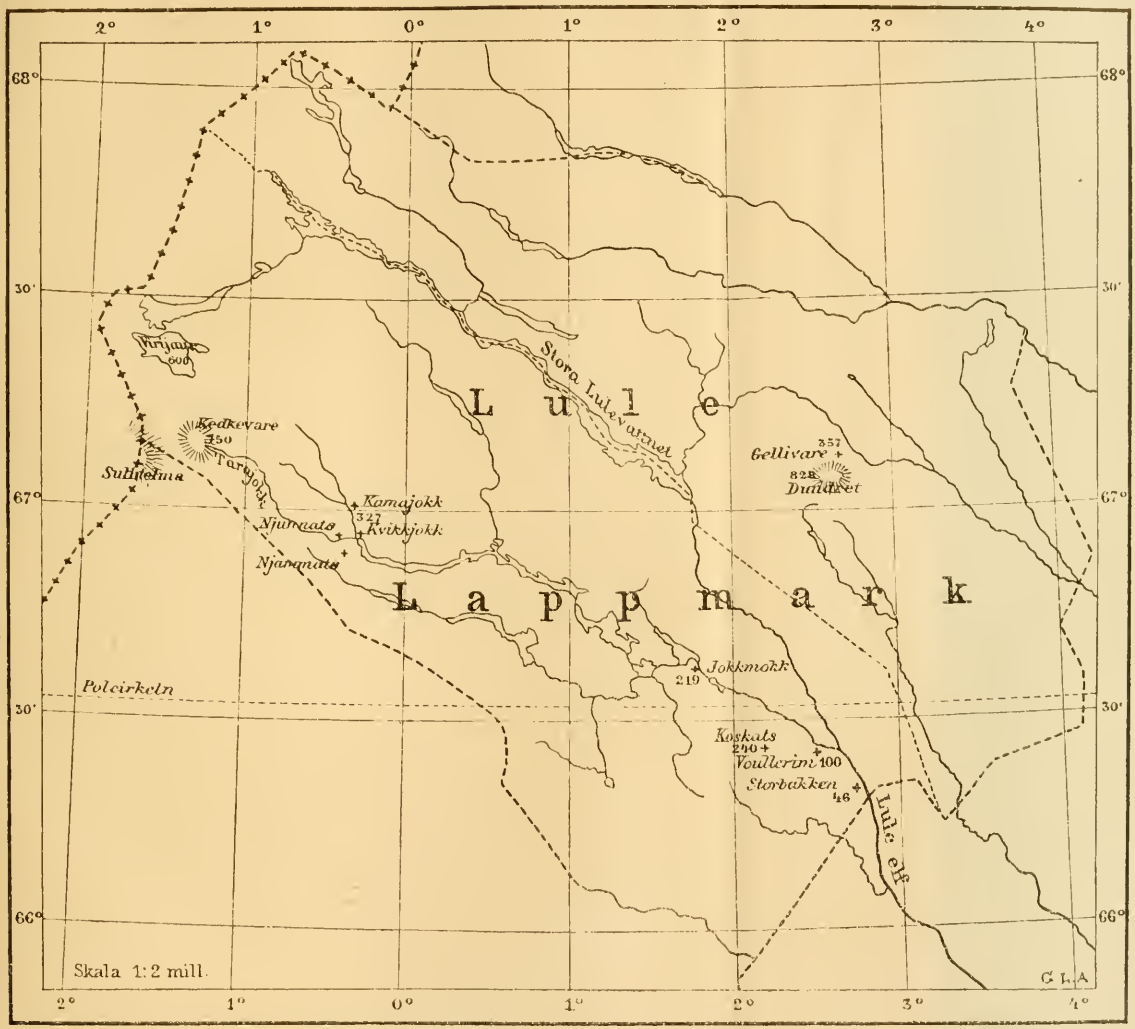
Pinnularia stauroptera Grun., *microstauron* Ehb., *stomatophora* Grun., *viridis* Ehb., *nobilis* Ehb., *Anomoeoneis brachysira* Bréb., *Stauroncis phoenicenteron* Ehb., *Cymbella hebridica* (Grég.) Grun., *naviculacea* Grun., *heteropleura* Ehb., *Eunotia major* (W. Sm.) Rabh., *robusta* Ralfs, *pentaglyphis* Grun., *lapponica* Grun., *praerupta* Ehb., *lunaris* (Ehb.) Grun., *Fragilaria undata* W. Sm., *Tabellaria fenestrata* Kütz., *Melosira distans* var. *nivalis* W. Sm.

The sample from Ripas also contains for the most part recent species not rare in Lule Lappmark in addition to a few forms which I have not, yet at least, found living there now. These are: *Pinnularia gentilis* Donk., of which I have measured specimens 0,18 mm. in length, 0,03 mm. in breadth, with 8 to 8,5 striae in 0,01 mm. (7 striae in 0,01 mm. being the number stated by Cleve in Finl. p. 21); *P. distinguenda* Cl. (striae 8 in 0,01 mm., instead of 5, as stated by Cleve l. c. p. 22); *Cymbella Ehrenbergii* Kütz. (frequent); *Cymatopleura Solea* (Bréb.) W. Sm., which is of special interest as belonging to a genus which is not represented in the recent flora either of Lule Lappmark, or of Russian Lapland, but has been found in a fossil deposit of the latter country (Cl. Finl. p. 58); *Synedra capitata* Ehb. (rare); *Fragilaria virescens* var. *exigua* Grun. V. H. XLIV, 2, 3; *F. mutabilis* var. *elliptica* Schumm. V. H. XLV, 15, 17 (frequent) and *Cyclotella antiqua* Sm. (rare).

Description of the plate.

Figures 1000 times magnified, when not otherwise stated.

Fig. 1. *Pinnularia streptoraphe* var. *gibbosa* A. Cl. n. var. × 500.
» 2. » *Lagerheimii* A. Cl. n. sp. × 500.
» 3. » *stomatophora* Grun. var. *ornata* A. Cl. n. var.
» 4. » *brevicostata* Cl. var. *tenuis* A. Cl. n. var. × 500.
» 5. » *divergentissima* Grun. var. *subrostrata* A. Cl. n. var.
» 6. *Stauroneis obtusa* Lagst. f.
» 7. » *anceps* var. *leiostauron* A. Cl. n. var.
» 8. » *lapponica* A. Cl. n. sp.
» 9. *Caloneis Silicula* Ehb. var. *alpina* Cl.
» 10. *Diploneis domblittensis* Grun. var. *subconstricta* A. Cl.
» 11. *Cymbella heteropleura* var. *lanceolata* A. Cl. n. var. × 500.
» 12. » n. sp.? (p. 20) × 500.
» 13. » *perpusilla* A. Cl. n. sp.
» 14. *Gomphonema olivaceum* var. *pusilla* A. Cl. n. var.
» 15. » *Lagerheimii* A. Cl. n. sp.
» 16. » *gracile* Ehb. var. *cymbelloides* Grun.
» 17. » *acuminatum* Ehb. f. *hastata*.
» 18. » *parvulum* Kütz. var. *undulata* A. Cl. n. var.
» 19. *Pinnularia divergens* W. Sm. f. *monstrosa* × 500.
» 20. *Gomphonema angustatum* var.? *lapponica* A. Cl. n. var.
» 21. » » »
» 22. *Achnanthidium maximum* A. Cl. n. sp. Lower valve.
» 23. » Upper valve.
» 24. *Achnanthes borealis* A. Cl. n. sp. Upper valve.
» 25. » » Lower valve.
» 26. *Surirella lapponica* A. Cl. n. sp.
» 27. » *Lagerheimii* A. Cl. n. sp.
» 28. *Fragilaria construens* Ehb. var. *bigibba* A. Cl. n. var.
» 29. *Eunotia lapponica* Grun.
» 30. » »
» 31. » *suecica* A. Cl. n. sp.
» 32. » »
» 33. » *denticula* Bréb. var. *borealis* A. Cl. n. var.
» 34. » » »
» 35. » *fallax* A. Cl. n. sp.
» 36. » *Nymanniana* Grun.
» 37. » *major* Rabh. var. *ventricosa* A. Cl. n. var.
» 38. » *media* A. Cl. n. sp.
» 39. *Tetracyclus lacustris* Ralfs. var. *maxima* A. Cl. n. var. × 500.
» 40. *Fragilaria lapponica* Grun. var. *minuta* A. Cl. n. var.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Stora Lulevattnet
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Sulitelma
Kamajokk
327
Kvikkjokk
Njunnats
Njarrnats
Gellivare
357
828
Dundret
Jokkmokk
219
Koskats
240
Voulkerim
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Storbakken
46
Lule elf
Skala 1:2 mill.
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