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Halle, Th. G., Some Mesozoic Plant-bearing deposits in Patagonia and Sierra del Fuego and their Floras. — Band 51 n:o 3. 1913. 58 pg. 5 Pl.

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Murbeck, R., Über die Blütenbau der Papaveraceen. — Band 50 n:o 1. 1912. 168 pg. 28 Tafl.

Nathorst, A. G., Palæobotanische Mittoilungen. 1—11. — Band 42 n:o 5. 1907 16 pg. 3 Taf.; — Band 43 n:o 3. 1908. 14 pg. 2 Taf.; — Band 43 n:o 6. 1908. 32 pg. 4 Taf.; — Band 43 n:o 8. 1908. 20 pg. 3 Taf. — Band 45 n:o 4. 1909. 38 pg. 8 Taf. — Band 46 n:o 4. 1911. 33 pg. 6 Taf. — Band 46 n:o 8. 1911. 11 pg. 1 Taf. — Band 48 n:o 2. 1912. 14 pg. 2 Taf.

Schuster, J., *Weltrichia* und die Bennettitales. — Band 46 n:o 11. 1911. 57 pg. 7 Tafl.

Skottsberg, C., Botanische Ergebnisse der schwedischen Expedition nach Patagonien und dem Feuerlande 1907—1909. 1. Uebersicht über dio wichtigsten Pflanzenformationen Südamerikas, s. von 41°, ihre geographische Verbreitung und Beziehungen zum Klima. — Band 46 n:o 3. 1911. 28 pg. 1 Karte. — 2. Die Lebermoose von T. Stephani. Band 46 n:o 9. 1911 92 pg. — 3. A botanical Survey of the Falkland Islands. Band 50 n:o 3 1913. 129 pg. 15 pl.

——, Morphologische und embryologische Studien über die Myzodendraceen. — Band 51 n:o 4. 1913. 34 pg. 1 Taf.

ARKIV FÖR BOTANIK.
BAND 14. N:o 9.

New contributions to the Diatomaceous Flora of Finland.

By

ASTRID CLEVE-EULER.

With four plates.

Communicated February 24th by G. LAGERHEIM and C. LINDMAN.

Since my late father, Professor P. T. CLEVE, more than twenty years ago, in 1891, published his list of Finlandian diatoms known up to that date, several other forms of these algae, fossil or living, have on different occasions been observed in Finland and partly registered. Thus P. T. CLEVE himself, soon after his first publication, in 1894 investigated a clay-deposit from Viborg, that was found to contain, besides some diatoms considered typical for deposits from the *Ancylus*-epoch, also a few marine species, and consequently proved to be an interesting pendant to the deposit of Skattmansö in Uppland, Sweden. Among the Viborg-forms, nine were new to Finland and will be quoted in this paper.

The plankton-investigations, that have at a later date been carried out by Mr K. M. LEVANDER, have also enriched the flora of Finland with several forms, partly new to science.

I myself have had the opportunity, repeatedly, to examine numerous samples of earth, clay and turf from Finland, sent

to me partly from the Geological Commission of that country, but especially by Mr HARALD LINDBERG. There ought to be mentioned on the first hand some rich series of consecutive samples from different levels, taken by Mr LINDBERG at Hindersmossen, in the parish of Karis, and at Kyrkslätt in the parish of Västerkulla, both localities situated in Nyland. Furthermore a series from Panelia in Satakunta.

The largest contribution, however, is due to a collection of chiefly marine remains, sent to me last year by Mr LINDBERG and labelled Knjäsha and Koudajärvenpää, two places situated in Russian Karelen, at the bottom of the bay of Kandalaks.[1]

The Knjäsha-material is of no little interest, as it proves to contain not only such marine species, as are previously known from the Fennoscandian deposits of the *Litorina*-epoch, but also rather large quantities of numerous forms, missing in the latter strata, but living in and characteristic to the Arctic Sea. Many of these species and varities have been described in earlier works by P. T. CLEVE and A. GRUNOW, as well as in the later works by Mr E. ØSTRUP concerning marine, arctic diatoms (cfr the list of literature). Another number of forms, common to the Arctic Sea and the North Sea, have already at a much earlier date been described and figured by mainly British naturalists, such as GREGORY, W. SMITH and DONKIN.

As Mr LINDBERG will speak elsewhere of the Knjäsha-deposit, I shall not enter upon the subject from a geological point of view, but confine myself to an illustration of its biological contents. The following descriptions and drawings are made from a series of slides, that belong to the Riksmuseum of Stockholm, where they are kept together with the collections of P. T. CLEVE.

Of the numerous marine species, found at Knjäsha, all hitherto known to science have also been registered from

[1] The two localities quoted above are not situated within the political confines of Finland, accordingly, though they belong to the naturally better limited boundary of Finland together with Russian Karelen and the peninsula of Kola, over which CLEVE's researches expanded. The present contributions just are from a section of Karelen, the *Karelia keretina*, that was not at all represented in the collection of samples, upon which CLEVE based his work.

the Arctic Sea, except *Caloneis fossilis* and *Nav. Libellus*. Several of the species may even be considered characteristic to that sea, viz. *Navicula distans*, *Achnanthes arctica*, *Synedra kamtschatica*, *Coscinodiscus curvatulus*, *Podosira glacialis*, and others. It is thus obvious that the strata in question have been deposited by the Arctic Sea at an epoch, when that basin spread over parts of the present Karelen, which epoch probably was that of the old Ancylus-Sea.

In the introduction of his »Diatoms of Finland», P. T. Cleve enumerates the leading forms of some natural associations of diatoms, characterising different conditions of climate and water, especially waters of more or less salinity. We there find the association of brackish water, now living along the Baltic coasts of Finland, which proves to have some species, such as *Epithemia turgida* var. *Westermannii*, *Melosira Borreri*, *Coscinodiscus balticus*, *Campylodiscus Clypeus* and *C. Echineis* in common with the fossil flora of the *Litorina*-deposits. By the rich development of other species, such as *Rhabdonema arcuatum* and *minutum*, *Grammatophora oceanica*, *Hyalodiscus scoticus*, *Coscinodiscus asteromphalus* a. o., the latter, however, bears appearence of having lived in a water of greater salinity, such as is now present in the most southern part of the Baltic.

To those ecological associations, we can now add one, that may be called the *marine-arctic formation*. It contains, among many other species of diatoms, the following more abundantly:

Diploneis splendida Greg.
D. Entomon Ehb.
D. subcincta A. S.
D. borealis Grun.
D. major Cl.
D. Smithii var. *permagna* n. var.
Trachyneis aspera Ehb.
Pinnularia quadratarea A. S.
Amphora Proteus Greg.
A. Terroris Ehb.
Rhoicosphenia curvata (Kütz.) Grun.
Cocconeis Scutellum Ehb.
C. speciosa Greg.
C. costata Greg.
C. pinnata Greg.
Achnanthes arctica Cl.
A. septata n. sp.
Campylodiscus angularis Greg.
C. Thuretii Bréb.
Nitzschia marginulata Grun.
N. polaris Grun.
N. Sigma W. Sm.
Synedra affinis Kütz.

Plagiogramma Gregorianum GREV.
Grammotophora arcuata EHB.
G. marina v. macilenta W. SM.
G. hyalina n. sp.
Rhabdonema arcuatum (AG.) KÜTZ.
R. minutum KÜTZ.
Hyalodiscus stelliger BAIL.
H. scoticus (KÜTZ.) GRUN.
Melosira Borreri GRUN.
Paralia sulcata HEIB.
Biddulphia aurita (LYNGB.) BRÉB.
Podosira glacialis GRUN.
Coscinodiscus asteromphalus (EHB.) GRUN.
C. curvatulus GRUN.
C. subbulliens JÖRG.
C. (*lacustris* var.?) *septentrionalis* GRUN.

Moreover, a number of forms clearly illustrate the arctic origine, though usually present only in a few, scattered or isolated specimens. These species may have been introduced with the arctic water, either scantily represented from the beginning, or later on decimated on account of not having found the conditions necessary for further development. Such are:

Caloneis aemula (A. S.).
Navicula directa W. SM.
N. kariana GRUN.
N. gelida GRUN.
N. distans (W. SM.).
N. glacialis CL.
N. glacialis var. *septentrionalis* CL.
Amphora polaris ØSTR.
Achnanthes polaris ØSTR.
A. septentrionalis ØSTR.
Synedra kamtschatica GRUN.
Grammatophora arctica CL.
Sceptroneis gemmata GRUN.
Coscinodiscus hyalinus GRUN.
C. subtilis var. *glacialis* GRUN.

There is, on the whole, a great resemblance between this formation and the flora of the Arctic Sea, enumerated in the respective works by CLEVE, GRUNOW and ØSTRUP.

If we now compare these old, arctic deposits with the saltwaterflora, that immigrated to the northern Baltic from the south during the *Litorina*-epoch, we find that the following species occur abundantly in *both:*

Rhoicosphenia curvata.
Cocconeis Scutellum.
Nitzschia Sigma.
Synedra affinis.
Rhabdonema arcuatum.
Rh. minutum.

Hyalodiscus scoticus.
Melosira Borreri.
Coscinodiscus asteromphalus.
C. (*lacustris* var.?) *septentrionalis.*

Besides, some species, frequent in *Litorina*-deposits, have been met with in some of the marine gatherings from Knjäsha in a few specimens only, and generally in the uppermost part of the marine strata, where also some freshwater species, such as for instance *Cyclotella bodanica* EULENST., occur. I therefore do not consider them as belonging to the genuine marine-arctic association. They are:

Nitzschia punctata (W. SM.) GRUN.
Surirella striatula TURP.
Campylodiscus Clypeus EHB.
C. Echineis EHB.

There are to be noticed several cases of vicariating exchange between related forms in the association coming from the Arctic Sea and that one, that arrived later with the waters of the *Litorina*-Sea.

We thus find, among others,

only in the *Arctic Sea*-deposits	only in the deposits of the *Litorina*-Sea
Diploneis Smithii var. *permagna.*[1]	*Diploneis Smithii* var. *rhombica.*
Cocconeis speciosa.	*Cocconeis Pediculus.*
Achnanthes arctica.	*Achnanthes brevipes f. genuina.*
	A. longipes.
Amphora Proteus.	*Amphora impressa.*
	A. mexicana var. *major.*
	A. robusta.
Coscinodiscus subtilis var. *glacialis.*	*Coscinodiscus balticus.*

As regards the marine-arctic diatoms, their development in large and conspicuous forms seems to be a feature of frequent occurrence, while on the contrary rather small, sturdy forms are dominating in the remains from the *Litorina*-Sea. For instance *Navicula latissima, N. Hennedyi,*

[1] Concerning this and other new names, cfr the following, special part of this paper.

Diploneis Smithii and *Mastogloia elliptica* have been found in new, very large varieties. The fossil, arctic forms of *Hyalodiscus stelliger* and of *Rhabdonema arcuatum* are considerably larger than the same species in the *Litorina*-Sea, or now living at the West coast of Sweden. Together with *Rhabdonema minutum*, we have the gigantic *Rh. Oestrupii* in the same association.

By the richer flora, by the occurrence of many species lacking in deposits from the *Litorina*-epoch, by the absence of some characteristic »*Litorina*»-forms and, finally, by the often luxuriant development of the species, it does not generally offer any difficulties to distinguish associations of fossil, marine diatoms, deposited in the Finland of to-day during an early-quaternary transgression of the Arctic Sea, from the flora, imported at a later period by the waters of the *Litorina*-Sea.

As to the systematic arrangement I have followed, for the naviculoid forms, CLEVE's Synopsis, and for the rest SCHÜTT's monography in »Die Natürlichen Pflanzenfamilien» by ENGLER & PRANTL, part I, 16, p. 55—57, with the alterations, proposed by ØSTRUP in Danske Diatoméer.

The geographical distribution of the species and varieties being of great importance for the elucidation of the geological conditions under which the diatomaceous strata have been deposited, I have endeavoured to give an account of the habitat and the area of each form. The datas used have been furnished, as to the Naviculoid forms, by CLEVE's Synopsis, completed with statements, given in the later papers by Mr ØSTRUP. As to the remaining *Pennatae* and the *Centricae*, my data are, no doubt, very incomplete, since I have been prevented from lack of time to gather all the notices scattered in numerous papers on the subject. As far as the pelagic forms are concerned, however, the treatise given by Mr GRAN in »Nordisches Plankton» III, p. 19, has been consulted. I have also noticed the indications given in the various works by CLEVE, GRUNOW ard ØSTRUP, mentioned above.

Abbreviations of localities, used in the following:

Ab. — Regio aboensis.
Ok. — Ostrobottnia kajanensis.
Sat. — Satakunta.
Ka. — Karelia australis.
Nyl. — Nylandia.
Ob. — Ostrobottnia borealis.
Kk. — Karelia keretina.

Pennatae.

Diraphideæ.

Amphiprora Ehb.

Amphiprora aboensis n. sp. — Pl. 1, f. 1.

Frustule silicious, slightly constricted, 42 μ in length; half of its breadth 12 μ.

Valve with a rather low keel; junction-line straight. Striation of the keel and valve equal; striae 9 in 10 μ, strong, indistinctly punctate.

Foss.: Ab. Hindersmossen[1]; rare.

As I have seen only a half frustule, the diagnosis must be incomplete. Still, this species seems well distinguished, especially by the strong striation, from other forms of the genus *Amphiprora*.

Tropidoneis Cl.

Tropidoneis vitrea (W. Sm.). — V. H. Syn. T. 22, f. 7—9.

Foss.: Ab. Hindersmossen.

Distr. (*mar.*): North Sea, Atlantic and Pacific coasts of N. America.

Pleurosigma W. Sm.

Pleurosigma angulatum Quek. — V. H. Syn. T. 18, f. 1—4.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Arctis; ubiquist.

[1] Though situated in the province of Nyland, this moor geologically belongs to *Regio aboensis*.

Caloneis Cl.

Caloneis furcata n. sp. — Pl. 1, f. 2.

Valve linear, slightly gibbous in the middle, with subrostrate, broad ends, 50 μ in length, 8 μ in breadth. Axial area narrow; central area a broad, transverse fascia. Striæ fine, parallel, about 22 in 10 μ, longitudinal lines indistinct. On each side of the valve, there is a long and narrow marking or furrow.

Foss.: Kk. Knjäsha, rare. Marine?

Caloneis alpestris (Grun.) — V. H. Syn. Tab. 12, f. 30.

Foss.: Sat. Panelia.

Distr. (*fresh w.*, alp. reg.): Sweden(foss.), Bornholm, Faenö; Austrian alps, Savoy. Austr.

Caloneis permagna Bail. — V. H. Syn. Tab. 11, f. 1.

Foss.: Nyl. Kyrkslätt.

Distr. (*brack. w.*): Belgium, N. America.

Caloneis Liber (W. Sm.) var. **genuina** Cl. Syn. Nav. D. I, p. 55. — Donkin B. D. Tab. 9, f. 5. Greg. D. of Clyde, Tab. 9, f. 18.

Foss.: Ka. Viborg-dep. (Cleve 1894); Kk. Knjäsha.

Distr. (*mar.*): Greenland, East Arctic Sea, North Sea, Mediterranean, Indian and Pacific Oceans, Antarctis.

Caloneis Liber (W. Sm.) v. **transitans** n. var. — Pl. 1, f. 3.

Valve broadly linear, with rounded ends, 75 μ in length, 15 μ in breadth. Axial area narrow, suddenly dilated in the middle to a rather large, orbicular space. Striae c. 15 in 10 μ, crossed in the middle by a distinct longitudinal line.

Foss.: Kk. Knjäsha (*mar.*).

This variety comes near to *Caloneis brevis f. angustior* Grun. A. D. Tab. 1, f. 26, but is still more slender, thus making a transition from *Caloneis Liber* to *C. brevis*. The central area is larger than in the former, but smaller than in the latter. As the longitudinal lines are distinct, I have put it to *C. Liber*, though the elongated variety of *C. brevis*, quoted above, also has been delineated with distinct lines. In the genuine *C. brevis*, no traces of such lines appear.

Caloneis brevis (GREV.). — *Syn. Navicula brevis* GREG. D. of Clyde, Tab. 9, f. 4. V. H. Syn. Tab. 11, f. 19.

Foss.: Sat. Panelia (*Litorina*-dep.); Kk. Knjäsha, rare (Arctic Sea-dep.).

Distr. (*mar.*): Greenland, East Arctic Sea, interglacial dep. in Ångermanland, Sweden; ubiquist.

Caloneis brevis var. **vexans** GRUN. — *Syn. Navicula brevis* var. *elliptica* V. H. Syn. Tab. 11, f. 18.

Foss.: (locality unknown). (Geol. Commission 1905.)

Distr. (*mar.*): East Arctic Sea, Danmark, Japan.

Caloneis fossilis n. sp. — Pl. 1, f. 4. — *Syn.* »*Navicula consimilis A. S.*» Perag. D. France Tab. 9, f. 2.

Valve linear with cuneate, acute ends, about six times longer than broad. Length 75 μ, breadth 13 μ. Axial area broad, about $^1/_3$ of the breadth of the valve, attenuated towards the ends. Central area a broad, transverse fascia with two faint, corroded, elongated markings on both sides of the central nodule. Striae parallel, 14 in 10 μ, crossed by an indistinct, marginal, longitudinal line.

Foss.: Kk. Knjäsha, rare. (*mar.*)

Distr. Balearic Isl.

This species is well characterised and different from *C. consimilis* by the broad axial area. It comes probably near to *Caloneis latefasciata* GRUN. (A. D. Tab. 1, f. 21) from the Arctic Sea, a form that has similar markings round the central nodule, but differs by the lateral areas and the broad rounded ends. There is also a general resemblance with *Navicula* (*Pinnularia?*) *mesoleia*, drawn by CLEVE in N. R. D. Tab. 2, f. 26 b. This species, however, is stated by CLEVE himself to be identical with *Pinnularia molaris* GRUN. (Syn, Nav. D. II. p. 74). Nevertheless, the original drawing shows rather divergent striae in the ends of the valve and a broad axial area, while *Pinn. molaris* ought to have convergent end-striae and a narrow or indistinct axial area (CLEVE, Syn. Nav. D. II, p. 74).

Caloneis aemula (A. S.) — CLEVE Syn. Nav. D. I, p. 57. — *Syn. Navicula subdivisa* GRUN. A. D. Tab. 1, f. 20. — Icon. nost. Pl. 4, f. 75.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): W. and East Arctic Sea, Baltic, Atlantic.

Scoliotropis Cl.

Scoliotropis septentrionalis n. sp. — Pl. 1, f. 5.

Valve broadly linear with cuneate ends. Median line curved towards both ends in the same direction. Axial area indistinct, slightly dilated round the small central nodule. Close to the median line there is on both sides a longitudinal line or keel, and between these lines a furrow. Structure: costae, 7 in 10 μ, parallel to the ends, where they are slightly curved upwards. Between the costae double rows of minute puncta or lineolae, forming in appearance obscurely pearled striae. Between the keels, the double rows of lineolae continue as stronger pearls or puncta. Length of the valve 180—200 μ; breadth?

Foss.: Kk. Knjäsha, rare. (*mar.*)

Of this large and interesting species, obviously akin to *Scoliotropis latestriata* Bréb. var. *Amphora* Cl. (Syn. Nav. I, p. 72), I unfortunately have found only a few broken valves, that do not allow me to give a complete description. As I have not seen the dorsal side at all, I do not know if it has the same breadth as the ventral, that is 30—35 μ broad.

Diploneis Ehb.

Diploneis coffaeiformis A. S. Atl. Tab. 8, f. 7.

Foss.: Nyl. Kyrkslätt (*Clypeus*-strata).

Distr. (*mar.*): North Sea, Mediterr., Macassar Str.; California (foss.).

Diploneis subcincta (A. S.). — *Syn. Navicula subcincta* A. S. Atl. Tab. 13, f. 41, Tab. 69, f. 32. Grunow, Franz Jos. L. D. Tab. 1, f. 38.

Foss.: Kk. Knjäsha, Koudajärvenpää, frequent.

Distr. (*mar.*): East Greenland, East Arctic Sea, Adriatic, Atlantic, Pacific Ocean, Antarctis. (Foss.) Japan, Aegina, Maryland, California.

Diploneis Entomon (Ehb.) A. S. — Cleve, Syn. Nav. D. I, p. 87 (not Donkin). *Syn. Navicula bomboides* var. *media* Grun. A. D. Tab. 3, f. 54, »*Navicula subcincta* Schm.» Grunow Franz-Jos. L. D. Tab. 1, f. 39 (fig. *38* is a true *subcincta*).

Foss.: Kk. Knjäsha, Koudajärvenpää, frequent.

Distr. (*mar.*): East and W. Arctic Sea, Mediterranean, Pacific. (Foss.) Brünn; Tegel; Hungary.

A monstruous form with two central nodules (*f. dinodosa*) has been delineated in Pl. I, f. 6. An other very curious indivudual, perhaps a sporangial form, is represented in fig. 7.

Diploneis splendida (Greg.). — *Syn.? Navicula Entomon* Donk. B. D. Tab. 7, f. 5. *Navicula splendida* A. S. Atl. Tab. 13, f. 31—34 (adequate figures). The form figured in V. H. Syn. Tab. 9, f. 4 is not typical.

Foss.: Kk. Knjäsha, frequent.

Distr. (*mar.*): West a. East Arctic Sea, North Sea, ubiq.

Diploneis chersonensis (Grun.). — A. S. Atl. Tab. 12, f. 40, Tab. 69, f. 21.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): Faeroes (Østrup), North Sea etc., ubiquist.

Diploneis chersonensis v. **diminuta** n. var. Pl. 4, f. 76.

Valve 30 μ in length, 12 μ in breadth, with 21 distinctly punctate striae in 10 μ.

Foss.: Kk. Knjäsha, rare. (*mar.*)

Pantocsek has figured a similar little *Diploneis*, named *borostelekiana*, that however has twice as distant rows of puncta.

Diploneis domblittensis (Grun.) — Cleve Syn. Nav. D. I, Tab. 2, f. 2.

Foss.: Ka. Viborg-dep. (Cleve 1894); Sat. Panelia; Nyl. Hindersmossen, Kyrkslätt.

Distr. (*fresh* or slightly *brack. w.*): Sweden, Gulf of Bothnia, Danmark. (Foss.) Baltic dep. from the *Ancylus*-epoch.

Diploneis domblittensis (Grun.) var. **subconstricta** A. Cl. Lule Lpmk D. Pl. 1, f. 10. Østrup, Danmarks Geol. Und. II R. n:o 9, Tab. 2, f. 2.

Foss.: Nyl. Kyrkslätt.

Distr. (*fresh w.*): (Foss.) Sweden, Danmark.

Diploneis Boldtiana Cl. var. **robusta** n. var. Pl. 1, f. 8.

Valve linear-elliptical with rounded ends, 28—40 μ in length, 14—16 μ in breadth. Furrows narrow, slightly bent round the large, elliptical central nodule. Costae 8—9 in 10 μ. Alveoli obsolete, rounded.

Foss.: Ab. Hindersmossen.

This form resembles *D. Boldtiana* Cl., but has a larger central nodule and more distant costae. An intermediate form with smaller nodule and 11 smooth costae in 10 μ was observed in samples from Sat., Panelia.

Diploneis aestiva (Donk.) B. D. Tab. 1, f. 3. Cleve, Syn. Nav. D. I, p. 94.

Foss.: Kk. Knjäsha, rare (*forma* 3).

Distr. (*mar.*): Arctic Sea, ubiquist.

A few large specimens, fully agreeing with Donkin's figure.

Diploneis littoralis (Donk.) B. D. Tab. 1, f. 2. — V. H. Syn. Suppl. B. f. 25. f. **hybrida** nob.

As an intermediate form between this species and *D. aestiva* I might consider a *Diploneis*, that is 40 μ in length, 20 μ in breadth, and has narrow furrows, very slightly widened round the central nodule, that is elongated. The costae are 9 in 10 μ and alternate with apparently single rows of very fine lineolae.

Foss.: Kk. Knjäsha, rare.

Distr. of the main form (*mar.*): Arctic Sea, ubiquist.

Diploneis Smithii (Bréb.) — *Syn. Navicula elliptica* W. Sm. B. D. Tab. 17, f. 152 a. The main form is stated by Cleve to be 27—50 μ in length (Syn. Nav. D. I, p. 96).

A specimen, 60 μ in length and thus graduating to the following variety, was met with in Hindersmossen.

Distr. (*mar.*): Greenl., East Arctic Sea, ubiquist.

Diploneis Smithii (Bréb.) var. **permagna** n. var. — Pl. 1, f. 9. — *Syn. Navicula Smithii Bréb. typ.* A. S. Atl. Tab. 7, f. 10 (according to Cleve = *Diploneis major*).

Valve elongated-elliptical, 60—120 μ in length, 40—45 μ in breadth. Furrows rather narrow, dilated round the central nodule, that is large and a little elongated. Costae 8—11 in 10 μ, alternating with double rows of exceedingly fine puncta.

Foss.: Kk. Knjäsha, Koudajärvenpää, frequent. Doubtless *marine*.

This large and beautiful form, that has the fine structure of a true *Diploneis Smithii*, recalls as well *D. borealis* GRUN. as *D. aestiva* DONK., but is distinguished from the former by the much closer furrows and from the latter by the larger central nodule, round which the furrows are bent outwards.

Diploneis Smithii (BRÉB.) var. **rhombica** n. var. — Pl. 1, f. 10. *Syn. Navicula Smithii* BRÉB. A. S. Atl. Tab. 7, f. 18.

Valve rhombic in outline, 45 μ in length, 25 μ in breadth.

Foss.: Ab. Hindersmossen (*Litorina*-dep.); Sweden.

This characteristic variety is the one, that usually occurs in Baltic deposits from *Litorina*-epoch. It is not present among the numerous marine species of *Diploneis* in the Knjäsha-deposit.

Diploneis borealis (GRUN.). CLEVE, Syn. Nav. D. I, p. 96, non ØSTRUP, Danske D. Tab. 1, f. 17. *Syn. Navicula Smithii* var. *borealis* f. *major* GRUN. Franz.-Jos. L. D. Tab. 1, f. 40.

Foss.: Kk. Knjäsha, Koudajärvenpää, not rare.

Distr. (*mar.*): Greenland, Arctic Sea, Gullmarefjord.

Quite typical specimens, perfectly similar to GRUNOW's figure.

Diploneis major CL. Syn. Nav. D. I, p. 96. — *Syn. Navicula Smithii var.* V. H. Suppl. Pl. B, f. 23.

Foss.: Sat. Panelia; Kk. Knjäsha, Koudajärvenpää, frequent.

Distr. (*mar.*): Greenl., Faeroes (ØSTRUP), North Sea, Mediterranean, Madagascar, Indian and Pacific Oceans.

Diploneis major CL. var. **cuneata** n. var. — *Syn. Navicula Smithii* BRÉB. V. H. Syn. Tab. 9, f. 12.

Valve elliptical, with parallel margins and broad, cuneate ends. In other respects as the type.

Foss.: Kk. Knjäsha, mixed with the typical form.

I think these two forms may be distinguished from one another, though CLEVE has united them.

Diploneis decipiens n. sp. — Icon. nost. Pl. 1, f. 11.

Valve elongated elliptical, 30—35 μ in length, 12—18 μ in breadth. Costae 9 in 10 μ, alternating with coarsely, but obscurely pearled striae. Furrows close to the horns, slightly widened round the central nodule, that is small.

Foss. (*mar.*): Kk. Knjäsha, not rare; Koudajärvenpää.

This *Diploneis*, occurring in a purely marine society, is certainly closely connected with *Dipl. elliptica*, from which it is difficult to distinguish by any other character than the obsolete punctuation. I first thought it possibly identic with a *Diploneis*, figured by Mr ØSTRUP in Danske D. Tab. 1, f. 17 (p. 24) and determined to *D. borealis* GRUN. But the striation of the latter being that of *D. Smithii*, the two forms must be different. The form of Mr ØSTRUP is also rather different from the large and typical *D. borealis* GRUN., that is present in some Knjäsha-samples.

Diploneis decipiens n. sp. var. **parallela** n. var. — Pl. 1, f. 12.

Differs from the main form by a more delicate central nodule and perfectly parallel furrows.

Foss.: Kk. Knjäsha, sparingly among the type.

Diploneis Mauleri BRUN. D. Esp. nouv. Tab. 15, f. 7. — CLEVE, Syn. Nav. D. I, p. 98.

Foss.: Ka. Viborg-dep. (CLEVE 1894), Nyl. Hindersmossen, Kyrkslätt (Deposits from the *Ancylus*-epoch).

Distr. (*fresh* or slightly *brackish w.*): Vettern, Gulf of Bothnia, Leman, Rammer moor, Sahara. (Foss.) Baltic deposits from the *Ancylus*-epoch.

Naviculae Orthostichae CL.

Navicula halophila GRUN. var. **subcapitata** ØSTR. Danske D., p. 29, Tab. 1, f. 22.

Foss.: Ab. Hindersmossen (*Litorina*-dep.); Kk. Knjäsha (marine dep.), rare.

Distr. (*mar.*): Jutland (ØSTRUP).

A few specimens seen, that resemble ØSTRUP's figure, but are a little larger (L. 40 μ, Br. 9 μ) and have 14 instead of 18 striae in 10 μ.

Gyrosigma HASSALL.

Gyrosigma Fasciola (EHB.). — V. H. Syn. Tab. 21, f. 8.

Foss.: Ab. Hindersmossen. (Mixed strata from the *Ancylus*- and *Litorina*-epochs!)

Distr. (*mar.*): West and East Arctic Sea, North Sea, Atlantic and Pacific oceans.

Naviculae Decipientes GRUN.

Navicula Crucicula W. SM. var. **minor** n. var. Pl. 1, f. 13.

Valve elliptic-lanceolate, with broad, truncate, sometimes more protracted ends. Length 30—50 μ, breadth 10—13 μ. Axial area undistinct, central nodule transversely dilated as in *N. Crucicula*. Striae slightly radiate, not distinctly punctate, very fine except the three or four median ones, that are strong, more distant and shortened.

Foss.: Ab. Hindersmossen (*fresh w.*).

This form, that is smaller than the typical *Nav. Crucicula*, seems to connect that species with *Nav. subinflata* GRUN. (CLEVE Vega-Exp. D. Tab. 37, f. 50). There is some confusion in literature about *Navicula Crucicula*. If the remarkable, transversely dilated central nodule, that is very distinct in DONKIN's figure (B. D. T. 6 f. 14) be considered a dominating feature of this species, neither the valve, figured in V. H. Tab. 10, f. 15, nor a variety, drawn by ØSTRUP in Danske Diat. Tab. 1, f. 30 ought to be referred to DONKIN's species. The Danish form is perhaps identical with *Navicula Lundströmii* var. *Frieseana* GRUN., cfr. CLEVE Syn. Nav. D. I, Tab. 5, f. 18.

Navicula gibbula CL. var. **elliptica** n. var.

Valve linear-elliptic with rounded ends, not truncate as in the main form, described and figured by CLEVE in Syn. Nav. D. I, p. 140, Tab. 5, f 17.

Foss.: Kk. Niemenkönkään alus; rare (*fresh w.*).

Naviculae Microstigmaticae Cl.

Stauroneis (Pleurostauron) parvula Grun. var. **prominula** Grun. — Cleve, Syn. Nav. D. I, p. 149. Østr., Danske D. Tab. 2, f. 33.

Foss.: Ab. Hindersmossen.

Distr. (*fresh* or slightly *brack. w.*): Greenland, Finmark, Gulf of Bothnia, Danmark.

Stauroneis septentrionalis Grun. Franz-Jos. L. D. Tab. 1, f. 48.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Franz-Josefs land.

Some minute specimens, only 15 μ in length and 2 μ in breadth, with about 18 distinct, smooth, subradiate striae in 10 μ.

Navicula (Schizonema) Grevillei Ag. var. **apiculata** (Ag.) — V. H. Syn. Tab. 16, f. 4—8.

Foss.: Ab. Hindersmossen.

Valve 24 μ in length, 6 μ in breadth.

Though Cleve (Syn. Nav. D. I, p. 153) does not distinguish this small form from *Navicula Grevillei*, I think it preferable to do so, as it is notably smaller than the main species, for which Cleve states a length of 30—70 μ and a breadth of 16 μ. Van Heurck's figures of *Schizonema apiculatum* are equally drawn from very small forms.

Navicula (Libellus) rhombica Greg. M. J. III. Tab. 4. f. 16. Cleve, Syn. Nav. D. I, p. 152.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Greenland, North Sea, Sumatra, Japan (foss.).

Navicula Libellus Greg. D. of Clyde, Tab. 14, f. 101. — *Syn. Navicula rhombica* Donk. B. D. Tab. 9, f. 1.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): North Sea; ubiquist, though not recorded from the Arctis.

Libellus? septentrionalis Østr. Mar. D. Øst-Grønl., p. 439, Tab. 8, f. 97.

Foss.: Kk. Knjäsha.

Some small, hyaline valves with a stauroid marking across the middle are possibly identical with this species.

Navicula (Libellus) plicata Donk. B. D. Tab. 9, f. 2. Cleve, Syn. Nav. D. I, p. 154.

Foss.: Sat. Panelia, rare.

Distr. (*mar.*): East Arctic Sea, North Sea, Baltic, Mediterranean, Labuan, Brezil.

Navicula (Libellus?) Klavsenii Östr. var. **turgida** n. var. — Pl. 1, f. 14 a, b.

Valve lanceolate, fusiform, gradually tapering towards the narrow, rounded ends, very convex. Length 70 μ., breadth 15 μ. Striae fine, apparently smooth, parallel, equidistant, 17 in 10 μ. Axial area indistinct, central area small, circular.

Foss.: Kk. Knjäsha, rare.

Distr. of the main form (*mar.*): E. Greenland (Østrup, Färskv. D. Øst-Grønl., p. 281, Tab. 1, f. 13).

The Finlandian form, of which I give a figure in as well valvar as zonar view, agrees in all respects, except in the breadth of the valve being twice as large, with the *Navicula Klavsenii* described by Østrup from East Greenland. As to the nearest affinities of this species, I have been hesitating between the groups of the *Naviculae Entoleiae* Cl. and the *Libelli*. The convex, fusiform shape of the valve and the fine, parallel striae recall *Navicula inornata* Grun. among the former, but there is no lanceolate axial area as in this species. On the other hand, though the convex valves resemble those of a *Libellus*, the striation is rather different, no puncta being visible. Were it not for the smooth striae, it would seem closely allied to *Libellus plicata*. Perhaps the nearest relations, thus, are to be found elsewhere, or among the *Naviculae Fusiformes* Cl. (Syn. Nav. D. I, p. 105), though the species of this group have no central area.

Navicula (Scoliopleura) tumida Bréb. — V. H. Syn. Tab. 17, f. 11, 13.

Foss.: Sat. Panelia (rare); Kk. Knjäsha, Koudajärvenpää, frequent.

Distr. (*mar.* and *brack.*): Franz-Josefs Land, North Sea, Indian and Pacific Oceans, Antarctis.

The outline varies between elliptic-lanceolate and broadly-linear.

Cymbella Ag.

Cymbella hyalina n. sp. — Pl. 4, f. 77.

Valve asymmetrical, lanceolate with protracted-subcapitate ends. Ventral margin slightly indented in the middle. Length 17 μ, breadth 4 μ. No striation visible.

Foss.: Ab. Hindersmossen, rare (*fresh w.*).

Comes near to the more symmetrical little *Cymbella minuscula* Grun. A. S. Atl. Tab. 9. f. 58—61, that Cleve has united with the following.

Cymbella microcephala Grun. — V. H. Syn. Tab. 8, f. 36—39.

Foss.: Ab. Hindersmossen.

Distr. (*fresh w.*) Greenland. Sweden, Danmark, Scotland, Belgium, S. America.

Cymbella lata Grun. Syn. Nav. D. I, p. 165, Tab. 4, f. 27. — *Syn. Cymbella Ehrenbergii* var. A. S. Atl. Tab. 71, f. 74.

Foss.: Nyl. Kyrkslätt, Hindersmossen.

Distr. (*fresh* or slightly *brack. w.*): Sweden, Danmark, Ladoga, N. Germany; Antarctis.

Cymbella Ehrenbergii Kütz. var. **delecta** A. S. — *Syn. Cymbella Ehrenbergii* var. *minor* V. H. Syn. Tab. 2, f. 2.

Foss.: Pahanajoki (Cleve); Ab. Hindersmossen.

Distr. (*fresh w.*): Greenland etc., ubiquist.

Probably identical with the »*f. minor*» quoted in Cleve's D. of Finl., p. 45.

Cymbella (Encyonema) lacustris (Ag.). — Syn. *Schizonema lacustre* Ag. V. H. Syn. Tab. 15, f. 40. *Colletonema subcoherens* Thwaites in W. Sm. B. D. II, Tab. 56, f. 353.

Foss.: Ab. Hindersmossen.

Distr. (*fresh* or slightly *brack. w.*): Gulf of Bothnia, Danmark, England, Balaton-lake.

Cymbella (Encyonema) fennica n. sp. — Pl. 1, f. 15.

Valve elongated rhombic—elliptical, scarcely unsymmetrical, obtuse, 44 μ in length, 13 μ in breadth. Areas small. Terminal fissures distant from the ends. Striae 10 in 10 μ, radiate throughout, distinctly lineate.

Foss.: Ob. Pelso (*fresh w.?*).

This small species is no doubt closely connected with *Cymbella lacustris*, from which it is distinguished by the broader shape and by the striae being divergent also at the ends. This feature is shown also by *Cymbella Mölleriana* Grun. (Cleve, Syn. Nav. D. I, p. 167) that, however, has a large, orbicular central area.

Cymbella (Encyonema) recta n. sp. Pl. 1, f. 16.

Valve strongly asymmetrical, semielliptical, centrally gibbous on both sides. Ends slightly protracted and inclined downwards, subacute. Terminal nodules at a distance from the ends, terminal fissures inclined downwards. Length 40 μ, breadth 18 μ. Striae 8 in 10 μ, punctate.

Foss.: Ab. Hindersmossen, rare (*fresh w.?*).

This species seems to be allied to *Cymbella prostrata*, as well as *C. Jordani* Grun. (Cleve, Syn. Nav. D. I, p. 169), and also to a dorsally more arcuate form, intermediate between *Encyonema prostratum* and *E. caespitosum*, drawn in A. S. Atl. Tab. 11, f. 36, that perhaps is identical with *Cymbella* (*Encyonema*) *turgida* var. *obtusa* O. M. Bac. aus Süd-Patag. Tab. 1, f. 19.

Cymbella lanceolata Kütz. var. **inflata** n. var. — Pl. 1, f. 17.

Valve 110 μ in length, 25 μ in breadth in the strongly gibbous middle. Striae parallel to the ends, 7,5 (middle)—9 (ends) in 10 μ, punctate.

Foss.: Ab. Hindersmossen, rare.

This form has the same number of striae as the var. *cornuta* Ehb. (Østrup, Danske D. Tab. 2, f. 43), but is shorter and more gibbous. A very similar, perhaps identical form is *Cymbella Cistula* var. *gibbosa* Brun from Switzerland (Diatomiste II, Tab 14, f. 27).

Gomphonema Ag.

Gomphonema exiguum Kütz. var. **septentrionale** (Østr.). — *Gomphonema septentrionale* Østr. Mar. D. Øst-Grönl., p. 414, Tab, 3, f. 9.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): West Arctic Sea.

Cleve considers this variety to be identical with *G. exiguum* var. *pachyclada* Bréb. (V. H. Syn. Tab. 25, f. 31, 32), though the latter is recorded to have 16 striae in 10 μ (D. Baff. Bay, p. 19). But as both Østrup's form and mine have considerably coarser striae, viz. 12 and 10 resp. in 10 μ, I still believe it correct to distinguish them from the Normandian var. *pachyclada*.

Trachyneis Cl.

Trachyneis aspera (Ehb.) var. **vulgaris** Cl. Syn. Nav. D. I, p. 191. A. S. Atl. Tab. 48, f. 2—6.

Foss.: Kk. Knjäsha, Koudajärvenpää, not rare.

Distr. (*mar.*): Greenland, Faeroes (Østrup), Arctic America, North Sea etc.; ubiquist.

Trachyneis aspera (Ehb.) var. **pulchella** W. Sm. — Donk B. D. Tab. 10, f. 10.

Foss.: Kk. Knjäsha, Koudajärvenpää, frequent.

Distr. (*mar.*): Greenland, Faeroes (Østrup), North Sea etc.; ubiquist.

Trachyneis aspera (Ehb.) var. **intermedia** Grun. Franz-Jos.-L. D. Tab. 1, f. 20.

Foss.: Kk. Knjäsha, not rare.

Distr. (*mar.*): Greenland (Østrup), East Arctic Sea, North Sea. (Foss.) Hungary, Brünn, Japan.

Naviculae Minusculae Cl.

Navicula problematica n. sp. — Pl. 4, f. 78.

Valve lanceolate, obtuse, hyaline, 24 μ in length, 6 μ in breadth. Central nodule distinct.

Foss: Kk. Knjäsha (*mar.*), rare.

Navicula pelliculosa (Bréb.) Hilse. — V. H. Syn. Tab. 14, f. 32.

Valve broadly elliptical, 8—10 μ in length, 5—6 μ in breadth, hyaline. Central nodule distinct.

Foss.: Ab. Hindersmossen, among fresh-water species.

Distr. (*fresh w.*) Continent of Europe.

Navicula Pediculus Cl. D. Baff. Bay, p. 20. Tab. 1, f. 14.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): West Arctic Sea.

Finlandian specimens closely resemble the original form, drawn by Cleve, with regard to the outline and fine, but distinct striation of the valve; only they are a little larger — 25 μ in length, 8 μ in breadth — and more coarsely striate, with c. 20 striae in 10 μ. Cleve gives the numbers of 12 μ in length, 6,5 μ in breadth, and 27 striae in 10 μ.

Navicula bahusiensis Grun. — *Syn. Navicula minuscula* var. *bahusiensis* V. H. Syn. Tab. 14, f. 2. — Icon. nost. Pl. 4, f. 79.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): W. coast of Sweden; Arctis, Eur., Asia.

The striae being parallel, it must be the main form, and not the var. *arctica* Grun., that is present in the Knjäsha-deposit.

Navicula (Diadesmis) truncata n. sp. Pl. 4, f. 80 a, b, c.

Valve delicate, elliptical to elliptic-lanceolate with broad, truncate, sometimes subrostrate ends, 9—13 μ in length, 4—5 μ in breadth. Striae faint, sligthly radiate, about 20 in 10 μ.

Foss.: Ab. Hindersmossen (*fresh w.*-deposit), frequent.

The frustules of this minute species occur in large, probably mucous masses, that keep together during the chemical preparation of the sample.

Anomoeoneis Pfitzer.

Anomoeoneis sculpta Ehb. — V. H. Syn. Tab. 12, f. 1. A. S. Atl. Tab. 49, f. 46—48.

Foss.: Ab. Hindersmossen. Nyl. Kyrkslätt.
Distr. (*brack. w.*): Baltic, Europe, Ecuador, Australia.

Anomoeoneis polygramma Ehb. — A. S. Atl. Tab. 49, f. 43—45.
Foss.: Ab. Hindersmossen.
Distr. (*brack. w.*): Sweden, Europe, Cuba, Utah.

Naviculae Lineolatae Cl.

Navicula cincta Ehb. — V. H. Syn. Tab. 7, f. 13—14.
Foss.: Ab. Hindersmossen; Finl. (without locality), Cleve, Syn. Nav. D. II, p. 16.
Distr. (*fresh* and *brack. w.*) ubiquist.

Navicula peregrina Ehb. var. **kefvingensis** Ehb. Cl., Syn. Nav. D. II, p. 18. — *Pinnularia kefvingensis* Ehb. — *Navicula kefvingensis* A. S. Atl. Tab. 17, f. 61, 62, 352?
Foss.: Ab. Hindersmossen, not rare.
Distr. (*brack. w.*): Firth of Tay; (Foss.) Franzenbad, (Sweden?).
To this variety of *Navicula peregrina* I refer subrostrate specimens 50—60 μ in length, 10—12 μ in breadth and with a distinctly transverse, subrectangular central area, though the striae are about 10 in 10 μ and thus somewhat closer than in the original form.

Navicula digito-radiata Greg. — V. H. Syn. Tab. 7, f. 4.
Foss.: Kk. Knjäsha.
Distr. (*mar.* and *brack.*): Greenland, East Arctic Sea, North Sea, Caspian Sea, ubiquist.

Navicula digito-radiata Greg. var. **Cyprinus** (Ehb.) W. Sm. — V. H. Syn. Tab. 7, f. 3.
Foss.: Kk. Knjäsha.
Distr. (*mar.*): Greenland (Ostrup), North Sea.

Navicula dicephala (Ehb.?) W. Sm. var. **elginensis** Greg. M. J. Tab. 1, f. 33.
Foss.: Ob. Pudasjärvi (Cleve, Syn. Nav. D. II, p. 21).
Distr. (*fresh w.*): Scotland (foss.).

N. directa var. **genuina** CLEVE, Syn. Nav. D. II, p. 27. — *Navicula directa* W. SM. B. D. I, Tab. 18, f. 172.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): East and West Arctic Sea, North Sea, Yokohama, Antarctis.

Navicula directa W. SM. var. **subtilis** GREG. D. of Clyde. Tab. 1, f. 19.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): East Arctic Sea, North Sea.

Navicula directa W. SM. var. **cuneata** ØSTR. Mar. O. Øst-Grønl., p. 428. Tab. 4. f. 42.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): East Greenland.

The specimens I have seen are perfectly similar to ØSTRUP's Greenlandian form. Valve 42—64 μ. in length, 7—11 μ. in breadth, with 9—10,5 striae in 10 μ..

Navicula Kariana GRUN. var. **frigida** GRUN. Franz-Jos. L. D. Tab. 1, f. 25.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): Greenland (ØSTRUP), East Arctic Sea.

Navicula gelida GRUN. Franz-Jos. L. D. Tab. 1, f. 27, 28.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): East and West Arctic Sea.

Typical specimens, varying in length between 25 and 50 μ., in breadth between 10 and 12 μ.

Navicula ammophila GRUN. var. **intermedia** GRUN. — CLEVE, Syn. Nav. D. II, p. 30. *Syn. Navicula cancellata* f. *minuta* GRUN. A. D. Tab. 2, f. 41. — Icon. nost. Pl. 4, f. 82.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Greenland (ØSTRUP), East Arctic Sea. (Foss.) Hungary.

Navicula ammophila GRUN. var. **Oestrupii** n. var. — Pl. 4, f. 81.

Valve broadly lanceolate with attenuated, acute ends,

20 μ in length, 6 μ in breadth. Areas indistinct. Striae slightly radiate, at the ends transverse, c. 18 in 10 μ.

Foss.: Kk. Knjäsha (*marine* dep.).

Østrup gives in Mar. D. Øst-Gronl. Tab. 4, f. 30 a figure of a small form, that I believe identical with the present one. Mr Østrup refers it, with hesitation, to *Navicula bahusiensis* Grun., but I cannot join him in this determination, as the latter is a broad, obtuse species. I believe in contrary *Navicula ammophila* to be the nearest relation, as this species has acute ends and a similar striation.

Navicula cancellata Donk. var. **subapiculata** Grun. — A. S. Atl. Tab. 46, f. 66—68. Icon. nost. Pl. 1, f. 19.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Greenland (Østrup), East Arctic Sea, Baltic, Firth of Tay.

In Pl. 1, f. 25 b I have drawn a frustule in zonar view, showing the convex valves and the very narrow connecting zone.

Navicula cancellata Donk. var. **retusa** Bréb.? — V. H. Syn. Suppl. A, f. 9. — Icon. nost. Pl. 1, f. 20.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Greenland (Østrup), East Arctic Sea, North Sea; ubiquist.

Some Finlandian specimens (cfr. the fig.) have are markably large, circular area.

I have also observed a frustule with very convex valves, that in zonar view is exactly similar to Donkin's figure of *Navicula fortis* Greg. (B. D. Tab. 8, f. 8 c), but as I have not seen the valves in front view, I cannot warrant the identity.

Navicula distans (W. Sm.) B. D. Tab. 18, f. 169. V. H. Syn. Suppl. A, f. 18.

Foss.: Kk. Knjäsha, Koudajärvenpää, not rare.

Distr. (*mar.*): Greenland, East Arctic Sea.

According to Cleve (Syn. Nav. D. II, p. 35), this species is characteristic to the Arctic Sea and Northern Atlantic.

Naviculae Punctatae Cl.

Navicula glacialis Cl. — Syn. Nav. D. II. Tab. 1, f. 28.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): Greenland, East Arctic Sea, Cape Horn, Antarctis.

Navicula glacialis Cl. var. **septentrionalis** Cl. — A. S. Atl. Tab. 6, f. 37.

Foss.: Kk. Knjäsha, more frequent than the main form.

Distr. (*mar.*): West and East Arctic Sea, Cape Horn.

Navicula humerosa Bréb. var. **densestriata** n. var.

Like the type in outline and dimensions, but with closer, finely punctate striae, 15 in 10 μ. Cleve states 9—10 in 10 μ. for the typical form.

Foss.: Sat. Panelia (*brack. w.*).

Navicula latissima Greg. var. **grandis** n. var. — Pl. 1, f. 21.

Valve very large, elliptic-lanceolate with subrostrate ends, 150—170 μ in length, 64—68 μ in breadth. Striae about 8 in 10 μ, as in the main form.

Foss.: Kk. Knjäsha, rare (*mar.*).

Of this very conspicuous variety, I have seen only a few, damaged valves. It depasses in length the largest form of *N. latissima* hitherto known, viz. the var. *elongata*, found by Pantocsek in Hungarian fossil strata. The striae are also more distant than in this variety.

Naviculae Lyratae Cl.

Navicula Hennedyi W. Sm. var. **luxuosa** n. var. — Pl. 1, f. 22.

Valve elliptical, 85—100 μ in length, 50—55 μ in breadth. Lateral areas moderately broad, semilanceolate, not or very slightly narrowed in the middle. Striae 6—7,5 in 10 μ at the outer margin, 10—11 at the inner margin, composed of small puncta. Axial striae 10 in 10 μ.

Foss.: Kk. Knjäsha (*mar.*).

By the distant rows of very small puncta, this big form recalls the var. *minuta* CL., which, however, is only half as long and broad.

Navicula spectabilis GREG. D. of Clyde. Tab. 9, f. 10.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Greenland, North Sea; ubiquist.

Navicula abrupta (GREG.). — *Navicula Lyra* β *abrupta* GREG. D. of Clyde, Tab. 9, f. 14. *N. abrupta* DONK. B. D. Tab. 2, f. 6. V. H. Syn. Tab. 10, f. 4.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): East Arctic Sea, North Sea, Mediterranean etc.; ubiquist.

Navicula Lyra EHB. var. **arctica** ØSTR. D. N.-E. Greenl. p. 209. Tab. 13 f. 9.

Foss.: Kk. Knjäsha, Koudajärvenpää.

Distr. (*mar.*): W. Arctic Sea.

Navicula pygmaea KÜTZ. — DONK., B. D. Tab. 1, f. 10. V. H. Syn. Tab. 10, f. 7.

Foss.: Kk. Knjäsha, rare. Ab. Hindersmossen, very rare.

Distr. (*mar.*): East Greenland, East Arctic Sea, Baltic, North Sea, ubiquist.

Navicula pygmaea KÜTZ. var. **linearis** n. var.

Valve linear-elliptical, with broad, rounded ends, 17 μ in length, 8 μ in breadth. Lateral areas close to the median line. Striae very fine.

Foss.: Ab. Hindersmossen, rare (*brack. w.*).

Navicula forcipata GREV. — DONK., B. D. Tab. 2, f. 4. V. H. Syn. Tab. 10, f. 3.

Foss.: Kk. Knjäsha; Ab. Hindersmossen (rare).

Distr. (*mar.*): Greenland, North Sea; ubiquist.

Naviculae Laevistriatae Cl.

Navicula angulosa Greg. — Donk. B. D. Tab. 4, f. 4. *Syn. Navicula solida* Cl. A. D. Tab. 1, f. 24. — Icon. nost. Pl. 1, f. 23.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): Finmark, North Sea, Mediterranean.

In Cleve's Synopsis, *Navicula angulosa* is considered to be a mere variety of *N. palpebralis*, but *N. solida* to be a distinct species, recognised at the median striae being alternately longer and shorter. As Donkin's original figure of *N. angulosa* just shows that kind of striation, I think Gregory's and Cleve's forms must be united and specifically distinguished from *Navicula palpebralis*. The fossil specimen I have seen being distinctly apiculate, I have drawn it in f. 23.

Pinnularia Ehb.

Capitatae Cl.

Pinnularia interrupta W. Sm. var. **amphirhynchus** n. var. — Pl. 1, f. 24.

Valve with protracted, narrow, rostrate, not capitate ends, in other respects as the f. *biceps*. Length 63 μ, breadth 15 μ, striae 10 in 10 μ.

Foss.: Ab. Hindersmossen, rare (*fresh w.*).

Pinnularia mesolepta Ehb. var. **angusta** Cl. Syn. Nav. D. II, p. 76. A. S. Atl. Tab. 45, f. 62.

Foss.: Ab. Hindersmossen.

Distr. (*fresh w.*): Sweden, Danmark, Germany, America.

Divergentes Cl.

Pinnularia Legumen Ehb. var. **longa** n. var. — Pl. 1, f. 25.

Valve slender, lanceolate-linear, slightly triundulate; 100—120 μ in length, 17 μ in breadth. Ends broad, subcapitate. Axial area rather broad, somewhat dilated in the middle.

Striae divergent in the middle, convergent at the ends, 8½—9 in 10 μ.

Foss.: Ab. Hindersmossen.

This form is most closely allied to *P. Legumen*, though the long and slender valves recall *P. stauroptera*. It cannot be referred to this species because of the inflations near the ends. I have also found it, in P. T. CLEVE's notes, from Lake Rosslängen in Sweden and from Loch Kinnord in Scotland.

f. interrupta. — Pl. 1, f. 26.

Striae interrupted in the middle.

Together with the preceding variety.

Pinnularia Legumen EHB. var. **florentina** GRUN. — A. S. Atl. Tab. 44, f. 8. — *Syn. Navicula divergens* W. SM. var. *undulata* HÉRIB. & PERAG., Diat. d'Auvergne, Tab. 4, f. 2. — Icon. nost. Pl. 1, f. 27.

Valve almost linear, slightly triundulate, with broad, capitate ends, 80 μ in length, 16 μ in breadth. Area less broad than in the preceding variety.

Foss.: Ab. Hindersmossen (*fresh w.*).

Distr. (*fresh w.*): Italy.

Seems to graduate to the var. *longa*. Shorter, typical specimens have a great resemblance to *Pinnularia platycephala* (EHB.) CL. from which species they, however, differ by the end-fissures being turned in the same direction.

Pinnularia divergens W. SM. var. **truncata** n. var. — Pl. 2, f. 29. — *Syn.? Pinnularia Karelica* CL. var. *stauroneiformis* HUST. A. S. Atl. Tab. 311, f. 13.

Valve linear-lanceolate, gradually tapering from the middle to the broad, obtuse-truncate ends, very slightly triundulate. Striae, 11 in 10 μ, interrupted in the middle of the valve, where there is a large, rhomboid area. Length 67 μ, breadth 13 μ.

Foss.: Ab. Hindersmossen, Ok. Paltamo (*fresh w.*).

This form has much the same outline as *Pinnularia karelica* CL., but is a little more coarsely built throughout and has a broader axial area. It comes perhaps as near to *P. microstauron* as to *P. divergens*.

Pinnularia rangoonensis GRUN. — CLEVE, Syn. Nav. D. II, p. 83. — Icon. nost. Pl. 2, f. 30. *Syn. Pinnularia sp.* A. S. Atl. Tab. 44, f. 26.

Foss.: Ab. Hindersmossen, Ok. Paltamo, rather frequent.

Distr. (*fresh w.*): Rangoon (?); ubiquist.

Finlandian specimens are 60—70 μ in length and 9—12 μ in breadth.

In his work Danske Diatoméer ØSTRUP has figured a similar, but larger form, named *Pinnularia stauroptera* var. *linearis*. It is 130 μ in length, 17 μ in breadth, and comes by the shape and semicircular endfissures doubtless nearer to *P. rangoonensis* than to *P. stauroptera*. CLEVE states for the former species a length of 70—100 μ and a breadth of 12—14 μ.

Pinnularia rangoonensis GRUN. var **förarmensis** (GRUN.). — Pl. 2, f. 31. *Syn. Pinnularia sp.* A. S. Atl. Tab. 44, f. 28. *Navicula decurrens?* A. S. Atl. Tab. 44, f. 29.

Valve linear, gibbous in the middle, 60—75 μ in length, 9 (ends) to 12 (middle) μ in breadth, with rounded-subrostrate ends. Axial area $^1/_4$—$^1/_3$ of the breadth of the valve, dilated in the middle to a large, elliptic space. Striae strongly radiate at the middle, convergent at the ends of the valve, 9—10 in 10 μ, the median ones more distant and frequently stronger.

Foss.: Ab. Hindersmossen, frequent.

This gibbous form graduates to the preceding, but is very distinct in more inflated specimens. In P. T. CLEVE's notes, I have seen an exactly similar figure from Förarm in Småland, Sweden; I thus suppose that GRUNOW's *Navicula förarmensis* denotes this variety, that has not been distinguished from *P. rangoonensis* in CLEVE's Synopsis.

Brevistriatae CL.

Pinnularia hybrida (PERAG. & HÉRIB.). Diat. d'Auvergne, p. 85, Tab. 4, f. 9. — *Syn. Navicula hemiptera* KÜTZ. var. *Bielawski* HÉRIB. & PERAG. l. c. p. 85, Tab. 4, f. 10. — Icon. nost. Pl. 2, f. 32, 33 (f. *acuminata*).

Valve linear-lanceolatae, attenuated towards the rounded, obtuse, sometimes subacute ends, 75—215 μ in length, 13—30 μ in breadth. Area large, lanceolate, a third to a half

(middle) of the breadth of the valve. Striae almost parallel, slightly convergent at the ends, 10 in 10 μ.

Foss.: Ab. Hindersmossen; Sat. Panelia (*fresh w.*).

P. T. CLEVE does not distinguish this species, that has the general aspect of *Pinnularia paulensis* GRUN. (a more closely striate, American species), from *P. hemiptera* KÜTZ., probably for the reason that both species have the same number of striae. Nevertheless, they are certainly different, as I could satisfy myself by studying the samples from Hindersmossen, where both occur together. The true *Pinnularia hemiptera* is a coarsely built, rather short, linear-cuneate species, sometimes with a more or less visible band across the strong striae, as in the *Pinnulariae majores* CL. I have drawn two specimens in Pl. 1, f. 28, a, b. *P. hybrida* has finer striae, though the valves are larger and sometimes reach the remarkable dimensions of 30 × 215 μ; besides it is more gently tapering from the middle, less cuneate than *P. hemiptera*.

In have found in CLEVE's manuscripts drawings, evidently representing *P. hybrida*, from Rosslängen in Sweden (»*P. hemiptera* var.?») and from S:ta Fiora (»*P. instabilis* A. SCHM.?»).

Pinnularia nodosa EHB. f. **capitata** CL. Syn. Nav. D. II, p. 87. — Icon. nost. Pl. 2, f. 35.

Foss.: Ab. Hindersmossen.

Distr. (*fresh w.*): Sweden, lake Rosslängen (Kalmar län); America.

As there is no authentic figure of this strongly triundulate, capitate form, I have drawn it in Pl. 2, f. 35. Specimens from Finland often have the area punctate, as stated in CLEVE's diagnosis. The median inflation is frequently larger than the two others (as in the var. *Formica* EHB., from America). The punctate form comes near to *P. acrosphaeria* BRÉB.

Pinnularia brevicostata CL. var. **subcapitata** n. var. — Pl. 2, f. 34.

Valve linear, with broad, subcapitate, somewhat cuneate ends. Length 63 μ, breadth 10 μ (middle). Axial area broad, about a third of the breadth of the valve. Central area a transverse fascia. Striae parallel, 10 in 10 μ.

Foss.: Kk. Niemenkönkään alus, rare (*fresh w.*).

Of this variety, I have seen only the specimen, delineated in fig. 34. It has about the same outline as *Pinnularia integra* GRUN.

Majores CL.

Pinnularia major KÜTZ. var. **linearis** CL. Syn. Nav. D. II, p. 89. *Syn. Pinnularia major* W. SM. B. D. Tab. 18, f. 162.

Foss,: Ob. Pudasjärvi (CLEVE, l. c.).

Distr. (*fresh w.*): Scandinavia; ubiquist.

Pinnularia viridis NITZSCH var. **fallax** CL. Syn. Nav. D. II. p. 91. — *Syn. Navicula semicruciata* A. S. Atl. Tab. 44, f. 43; Tab. 43, f. 24.

Ladoga. Foss.: Finl., in samples from the Geol. Commission (locality unknown).

Distr. (*fresh w.*): Sweden, Continent of Europe, S. America, Australia.

Pinnularia viridis NITZSCH var. **producta** n. var. — Pl. 2, f. 36.

Valve linear, suddenly contracted to the rostrate ends; 90 μ in length, 15 μ in breadth. Striae 9 in 10 μ.

Foss.: Ab., Hindersmossen, rare (*fresh w.*).

A rostrate form of the var. *intermedia* CL., probably akin to *Pinnularia Esox*.

Pinnularia cuneata (ÖSTR.) var. **constricta** n. var. — Pl. 2, f. 37 a, b.

Valve linear, somewhat constricted in the middle, with cuneate ends. Length 100—145 μ, breadth 25 μ. Axial area broad, slightly widened in the middle. Striae coarse, sligthtly divergent in the middle and convergent at the ends, 6,5 in 10 μ. Median line complex. Striae sometimes unilaterally interrupted in the middle.

Foss.: Ab. Hindersmossen (*fresh w.*).

I have been hesitating about the place of this interesting form, that does not seem akin to any recent Fennoscandian *Pinnularia*, if not perhaps to *P. streptoraphe* var. *minor* in CLEVE's Diat. of Finl. Tab. 1, f. 2. In outline and sculpture there is a great resemblance with *Navicula hevesensis* PANT. and *Pinnularia Floridae* BRUN, but both of these are smaller

forms. It no doubt comes nearest to *Pinn. flexuosa* Cl. var. *cuneata*, a Danish form, recently described and figured by Mr Østrup in Danske D. Tab. 3, f. 76; and I think it ought to be regarded as a constricted form of this species, that had better be distinguished from the much larger and still more coarsely striate, round-ended American species *Pinn. flexuosa*.

Another form, that ought to be mentioned in this place, is »*Pinnularia* sp.», figured by Østrup in Danske Geol. For. Medd. n:o 6 (1900), Tab. 1, f. 4. It agrees in all respects with the Finlandian fossil variety of *P. cuneata*, except in the curious arrangement of the striae, that according to the figure are convergent in the middle and divergent at the ends. But as the text states the striae to be inclined in exactly the opposite way, the drawing may be wrong on this point.

Marinae Cl.

Pinnularia quadratarea A. S. North Sea Diat. Tab. 3, f. 26. — Cleve, Syn. Nav. D. II, p. 95. *Syn. Navicula Pinnularia* Cl. Sv. o. Norska Diat. Tab. 4, f. 1, 2.

Foss.: Kk. Knjäsha, Koudajärvenpää, not rare.

Distr. (*mar.*): West and East Arctic Sea, North Sea, Mediterranean, Sydney, Antarctis.

Pinnularia quadratarea A. S. var. **fluminensis** Grun. A. D., p. 28.

Foss.: Kk. Knjäsha, with the type.

Distr. (*mar.*): East Arctic Sea, Adria, Indian Ocean.

Pinnularia clipeata n. sp. — Pl. 2, f. 38.

Valve linear, with broad, rounded ends, 50 μ. in length, 12 μ. in breadth. Axial area indistinct, central area large, circular. Striae coarse, 8 in 10 μ., parallel throughout.

Foss.; Kk. Knjäsha, rare (*marine* deposit).

I am not quite sure of this small form — of which I have seen only one specimen — being a *Pinnularia*, as it shows a great resemblance to the frustule of *Navicula cancellata* var. *retusa* that I have drawn in fig. 20. Should they be identical, the latter determination cannot be correct, the striae being parallel and not divergent, as in *Navicula*

cancellata or *N. fortis*. — The present form is possibly akin to a small species from Danmark, figured by ØSTRUP in Danske D. Tab. 3, f. 70 under the name of *Pinnularia discifera*, that equally is of marine habitat, but has about twice as close, parallel striae.

Pinnularia cruciformis (DONK.) var. **faeroensis** ØSTR. Fresh w. D. Faeroes, p. 275. — Icon. nost. Pl. 4, f. 83.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): Faeroes; Danmark. The main form is found in the East Arctic Sea, North Sea, Baltic, W. Indies, Cape Horn, Seychelles.

One specimen, 21 μ in length, 6 μ in breadth, with 12 striae in 10 μ, thus intermediate between ØSTRUP's form and CLEVE's var. *brevior* (Vega-Exp. D. Tab. 35, f. 18). As the outline is linear, I have referred it to the var. *faeroensis*. The somewhat oblique position of the valve drawn makes the elevations at the apices visible.

Amphora EHB.

Subgen. *Amphora* CL.

Amphora marina (W. SM.). — V. H. Syn. Tab. 1, f. 16. — Icon. nost. Tab. 2, f. 39?

Foss.: Kk. Knjäsha.

Distr. (*mar.*): E. Greenland (ØSTRUP), North Sea, Balearic Isl., Pacific Ocean.

Amphora marina (W. SM.) var. **minima** n. var. Pl. 4, f. 84.

Frustule elliptical, 11 μ in length, 6 in breadth. Valve lunate, with 19 delicate striae in 10 μ.

Foss.: Kk. Knjäsha, rare.

Amphora Proteus GREG. D. of Clyde, Tab. 13, f. 81. — Icon. nost. Pl. 2, f. 40.

Foss.: Kk. Knjäsha, Koudajärvenpää, frequent.

Distr. (*mar.*): West and East Arctic Sea, North Sea, etc., ubiquist.

As *Amphora Proteus* has been limited in CLEVE's Synopsis, it evidently does not mean altogether the same thing as the

original *A. Proteus* of GREGORY. This is, to judge from GREGORY's figures, a large species, attaining until 125 μ in length, though CLEVE states only 40—65 μ, and distinguished from the closely related *Amphora robusta* by the ventral striae being interrupted by a blank band, widening towards the centrum. *A. robusta* has a band of uninterrupted ventral striae generally of equal length along the median lines. In the Knjäsha-samples, I have seen many frustules of what I believe to be a genuine *Amphora Proteus*, about 80 μ in length, with 9 coarsely punctate striae in 10 μ.

Amphora Proteus GREG. var. **Kariana** GRUN. A. D. Tab. 1, f. 7.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): East Arctic Sea.

CLEVE has not kept this form a distinct variety, but it is smaller than the main form, only 45 μ in length, and has only a single row of striae, on the ventral side, except near the ends.

Amphora Proteus GREG. var. **contigua** CL. Syn. Nav. D. II, p. 103. A. S. Atl. Tab. 27, f. 7—9.

Foss.: Kk. Knjäsha.

Distr. North Sea, ubiquist.

Amphora Proteus GREG. var. **tenuissima** n. var. — Pl. 2, f. 41. — *Syn.? Amphora elongata* GREG. D. of Clyde, p. 49, Tab. 5, f. 84 (not mentioned in CLEVE's Synopsis).

Frustule narrow, elongated, subrectangular. 70 μ in length, 17 μ in breadth. Striae 9 in 10 μ, formed of transapically dilated, coarse puncta. On the ventral side is a narrow, not interrupted band of striae.

Foss.: Kk. Knjäsha (*mar.*).

Amphora Proteus GREG. var. **laevistriata** n. var. — Pl. 2, f. 42.

Frustule elongated-elliptical, 78 μ in length, 27 μ in breadth. Striae 10 in 10 μ, not distinctly punctate (obscurely pearled). Ventral striae more irregularly interrupted, at some distance from the median line, except close to the centrale nodule.

Foss.: Kk. Knjäsha (*mar.*).

Amphora (Proteus var.?) **impressa** n. sp. — Pl. 2, f. 43.

Frustule elliptical, 54 μ in length, 25 μ in breadth. Valve impressed at the central nodule. Striae 12 in 10 μ, not distinctly punctate. Ventral side striate as in *Amphora Proteus*.

Foss.: Ab. Hindersmossen (*Litorina*-dep.), rare.

Amphora robusta Greg. var. **brevistriata** n. var. — Pl. 2, f. 44.

Differs from the typical form of Gregory by the closer striation — 9 coarse puncta in 10 μ — and the short ventral striae, forming a narrow band along the median line.

Foss.: Sat. Panelia (*Litorina*-dep.).

Distr. of the main form (*mar.*): Spitsbergen, North Sea, Adriatic, Pacific Ocean.

Amphora perpusilla Grun. — V. H. Syn. Tab. 1, f. 11.

Foss.: Ab. Hindersmossen.

Distr. (*fresh w.*): Sweden, Continent of Europe.

Amphora mexicana A. S. var. **major** (Cl.). — Pl. 2, f. 45 a, b. *Syn. Amphora arenicola* Grun. var. *major* Cl. Syn. Nav. D. II, p. 104. *Amphora robusta* f. A. S. Atl. 27, f. 39, 41. *Amphora Lima* Pant. III, Tab. 23, f. 347.

Valve 100—130 μ, rarely until 150 μ in length, with 7,5—8 rows of coarse, transapically elongated puncta or alveoli in 10 μ. In dorsal view, a very marked longitudinal line is seen near the median line (fig. 55 a).

Foss.: Ab. Hindersmossen (*Litorina*-dep.).

Distr. (*brack. w.*): Baltic, Sweden (fossil in deposits from the *Litorina*-epoch).

This robust and very conspicuous form has in dorsal view a striking resemblance with *Amphora mexicana* A. S. (Atl. Tab. 27, f. 47) in everything, except concerning the place of the longitudinal line, as Schmidt's figure shows that line nearer to the dorsal margin than to the median line. Schmidt writes about the fig. 39 and 41, quoted above and drawn from Swedish specimens (from Södertelje) that they are »nach meiner festen Überzeugung von *Amphora mexicana* specifisch verschieden» and »scheinen mit *Amphora robusta* zusammenzuhängen». Nevertheless, I think they come nearest to *Amphora mexicana* for the sake of the strong longitudinal

line. For the same reason this form cannot belong to *Amphora arenicola* anymore than to *A. robusta*, and I thus have been obliged to alter CLEVE's name. The said line is distinctly visible only in dorsal, not in ventral view, why CLEVE may not have observed it.

Amphora gigantea GRUN. f. **minor** CLEVE, Syn. Nav. D. II, p. 106. — A. S, Atl. Tab. 40, f. 28—29.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): Hungary (foss.), Leton Bank.

The size and number of striae agree well with CLEVE's description. The longitudinal line is faint, but distinct.

Amphora Lindbergii n. sp. — Pl. 2, f. 46 a, b.

Valve lunate acute, with arcuate dorsal and slightly arcuate, centrally somewhat gibbous ventral margin. Length 75 μ, breadth 12—15 μ. Median line biarcuate. No axial area; central area on the dorsal side small, rounded, on the ventral a little larger. Striae 10 in 10 μ, not punctate, but interrupted on the dorsal side by three blank, longitudinal lines. Ventral side narrow, striate, especially towards the ends. Connecting zone?

Foss.: Kk. Knjäsha (*mar.*).

This species is perhaps allied to *Amphora virgata* ØSTR. (D. N.-E. Greenl. Tab. 13, f. 12), but is certainly different, as will be seen by a comparison of the figures. As I have only seen some valves, nothing can be stated about the connecting zone, and it is thus uncertain to what section of the genus *Amphora* this form belongs.

Oxyamphora CL.

Amphora polaris ØSTR. Mar. D. Øst-Grønl., p. 408, Tab. 3, f. 2. — Icon. nost. Pl. 2, f. 47.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): E. Greenland.

I have seen but one example of this interesting diatom, known only from East Greenland. It agrees well with ØSTRUP's description. Still, as the puncta stand much closer than is seen on ØSTRUP's figure, I give a drawing of it in fig. 47.

There are 9 rows of puncta in 10 μ and 14 puncta in 10 μ in the row.

Diplamphora Cl.

Amphora crassa Greg. D. of Clyde, Tab. 6, f. 64.

Foss.: Kk. Knjäska.

Distr. (*mar.*): West and East Arctic Sea, Mediterranean etc., ubiquist.

Halamphora Cl.

Amphora Terroris Ehb. — A. S. Atl. Tab. 25, f. 17—19. Cleve, Syn. Nav. D. II, p. 122.

Foss.: Kk. Knjäsha, rather frequent.

Distr. (*mar.*): West and East Arctic Sea, North Sea, Mediterranean, Macassar Str., Gulf of Mexico, Australia.

Amphora exigua Greg. D. of Clyde, Tab. 12, f. 75.

Foss.: Kk. Knjäsha, rather rare.

Distr. (*mar.*): West Arctic Sea, North Sea, Adriatic, W. Indies, Pacific Ocean.

Amphora coffaeiformis Ag. var. **borealis** Kütz. — Cleve, Syn. Nav. D. II, p. 121. *Syn. Amphora salina* β *minor* V. H. Syn. Tab. 1, f. 20.

Foss.: Ab. Hindersmossen, rare.

Distr. (*fresh* or *brack. w.*): Gulf of Bothnia, Helgoland.

Cymbamphora Cl.

Amphora angusta (Greg.) Cl. var. **typica** Cl. — Syn. Nav. D. II, p. 135. *Amphora angusta* Greg. D. of Clyde, Tab. 12, f. 66.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): West and East Arctic Sea, North Sea, Western Atlantic, Asia, Africa. (Foss.) Hungary.

Mastogloia Thw.

Mastogloia exigua Lewis var. **rostellata** n. var. — Pl. 4, f. 85.

Valve elliptic-lanceolate, with rostrate-apiculate ends, 25—30 μ in length, 9 μ in breadth.

Foss.: Kk. Knjäsha, rare (*mar.*).

Distr. of the main form (*brack.* and *mar.*): Baltic (Gothl.), Belgium, Atlantic coast of America, Behring Island.

Mastogloia elliptica Ag. f. **major** nob.

Valve 63 μ in length, 27 μ in breadth, thus considerably larger than stated by Cleve, Syn. Nav. D. II, p. 152 (L. 22—45 μ, Br. 10—18 μ).

Foss.: Kk. Knjäsha, rare (*mar.*).

Distr. of the main form (*brack. w.*): Baltic, Caspian Sea, Europe, America, Australia.

Monoraphideae.

Rhoicosphenia Grun.

Rhoicosphenia fossilis n. sp. — Pl. 2, f. 48.

Lower valve linear-clavate, with attenuated ends, 60 μ in length, 7 μ in breadth. Upper end obtuse. Axial area very narrow, central area narrow, lanceolate. Striae about 10 in 10 μ (the distance is somewhat variable), strongly radiate, except at the upper end, where they are transverse. Upper valve unknown.

Foss.: Kk. Knjäsha (*mar.*).

Rhoicosphenia curvata Kütz. var. **linearis** n. var.

Valve linear, with acute ends, 10 times as long as broad, c. 30 μ in length.

Foss.: Ab. Hindersmossen (*brack. w.*).

Cocconeis (Ehb.) Cl.

Cocconeis Scutellum Ehb. var. **parva** Grun. — V. H. Syn. Tab. 29, f. 8, 9.

Foss.: Kk. Knjäsha, not rare.

Distr. (*mar.*): Baltic, East Cape, Adriatic.

Small specimens, from 13 μ in length and 8 μ in breadth, with 11 rows of puncta in 10 μ occur intermingled with the var. *genuina* Cl.

Cocconeis Scutellum Ehb. var. **ornata** Grun. — V. H. Syn. Tab. 29, f. 6, 7.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): East Arctic and North Pacific Ocean, Austr.

Cocconeis speciosa GREG. — *Syn. Cocconeis Scutellum var.* OSTRUP, D. Faeroes, p. 542, f. 115.

Foss.: Kk. Knjäsha, common.

Distr. (*mar.*): Faeroes, North Sea.

Small rhomboid, broad frustules, agreeing with OSTRUP's figure in outline and sculpture, are fairly common in some samples from Knjäsha together with larger, more elliptical ones, that all show the large quadrate alveoli mentioned by OSTRUP. I thus think this form may well be distinguished from *Cocconeis Scutellum*. It is not at all quoted in CLEVE's Synopsis.

Length of the valve 17—42 μ, breadth 14—30 μ.

Cocconeis speciosa GREG. var. **cruciata** n. var. — Pl. 2, f. 49.

There is a rather faint, dark band across the frustule. In other respects as the preceding form.

Foss.: Kk. Knjäsha (*mar.*).

Cocconeis distans (GREG. 1857 ?) A. S. var. **minima** PERAG. — CLEVE, Syn. Nav. D. II, p. 72. A. S. Atl. Tab. 193, f. 26. 36, 40. — Icon. nost. Pl. 2, f. 50. *Syn.? Cocconeis diminuta* PANT. Balat. Tab. 7, f. 181. *? Cocconeis* sp. A. S. Atl. Tab. 192, f. 19.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): West and East Arctic Sea, North Sea, ubiquist.

I think fig. 50 may represent this species and variety, as the axial area of the upper valve is distinctly lanceolate. On the lower valve, the central nodule is transversely continued by two very fine lines, reaching to the margin. Length 28 μ, breadth 17 μ; 5 rows of irregular puncta in 10 μ, that, however, by changing the distance of the image, appear as larger and more regular, quadrate alveoli.

Cocconeis Disculus SCHUM. Preuss. D. I, Nachtr., p. 21, f. 23. — CLEVE, Syn. Nav. D. II, p. 172. OSTRUP, Danm. Geol. Und. II R. n:o 9, Tab. 2, f. 12.

Foss.: Ka. Viborg-dep. (CLEVE 1894); Ab. Hindersmossen; Nyl. Kyrkslätt.

Distr. (*fresh* or slightly *brackish w.*): Sweden, Prussia. In deposits from the Ancylus-Sea.

Cocconeis sp. — Pl. 4, f. 88.

This small form somewhat recalls *Cocconeis Disculus*, as it has been drawn by ØSTRUP, but can hardly be a form of that species, the puncta being very irregular.

Foss.: Sat. Panelia, rare.

Eucocconeis CL.

Cocconeis molesta KÜTZ. var. **Lindbergii** n. var. — Pl. 4, f. 86 a, b.

Frustule elliptical, 20—22 μ in length, 9—11 μ in breadth. Areas undistinct. Epitheca with 20 slightly radiate striae in 10 μ, composed of elongated puncta, the valve thus appearing longitudinally lineated. Hypotheca with 23 finely punctate, radiate striae in 10 μ. No marginal line.

Foss.: Kk. Knjäsha (*mar.* dep.).

Differs from the type by the less close striae.

Cocconeis dirupta GREG. — V. H. Syn. Tab. 22 f. 13—15.

Foss.: Nyl. Kyrkslätt.

Distr. (*mar.*) Arctic a. Antarctic Seas; ubiquist.

Cocconeis Oestrupii nob. — *Syn. Cocconeis sp.* ØSTR. D. N.-E. Greenl., p. 214, Tab. 13, f. 17. — ? Icon. nost. Pl. 4, f. 87.

Frustule elliptical, 30—35 μ in length, 17—21 μ in breadth. Epitheca with a narrow linear area and slightly radiate, delicate striae, 11 in 10 μ. Hypotheca with 11 radiate, finely punctate striae in 10 μ, vanishing towards the centrum. A marginal ring with 6 alveoli in 10 μ?.

Foss.: Kk. Knjäsha (*mar.*).

Distr. (*mar.*): East Greenland.

The lower valve, described above, exactly resembles ØSTRUP's Greenlandian form, of which he has not seen the epitheca. The isolated epithecae, to which the diagnosis refers, can hardly belong to anything but this species, that I have named in honour of Mr ØSTRUP. On single valves, I have no more than Mr ØSTRUP seen any ring. If the frustule, drawn in fig. 87, thus belongs to this species cannot be stated with certainty.

Cocconeis pulchella n. sp. — Pl. 2, f. 51 a, b.

Valves elliptical, 32 μ in length, 20 μ in breadth. Epitheca with a linear, axial area and large lateral, semi-elliptical areas. On each side of the axial area a narrow, linear band

of 10 striae in 10 μ, frequently missing unilaterally on a space near the centrum and irregularly dilated on the opposite side. Axial striae smooth or interrupted in the middle. Marginal striae 8 in 10 μ, composed of circular puncta. Hypotheca with 10—11 finely punctate striae, vanishing towards the centrum.

Foss.: Kk. Knjäsha (*mar.*).

Östrup has in D. N.-E. Greenl., p. 214, Tab. 13, f. 17 mentioned and figured the hypotheca of a *Cocconeis,* that may possibly be this species.

Cocconeis pseudo-marginata Greg. D. of Clyde, Tab. 9, f. 27, 28. V. H. Syn. Tab. 29, f. 20, 21.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): West and East Arctic Sea, Mediterranean, Red Sea, Indian Ocean, Pacific Ocean. (Foss.) Hungary.

Cocconeis Entomon n. sp. — Pl. 2, f. 52.

Frustule elliptical, with rounded ends. Epitheca 80 μ in length, 37 μ in breadth, with a broad, linear axial area and 3 radiate costae in 10 μ, separated by double, occassionally single or triple rows of coarse puncta, 5—6 in 10 μ in the row. Lower valve not seen.

Foss.: Kk. Knjäsha, rare (*mar.*).

Of this interesting species, I unfortunately have seen a single epitheca only, so badly placed that I could draw only part of it. Nevertheless it shows such characteristic features, that I have distinguished the species by now, though the diagnosis will have to be completed later on.

Disconeis Cl.

Cocconeis pinnata Greg. — V. H. Syn. Tab. 30, f. 6, 7.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): West and East Arctic Sea, Mediterranean Sea, Indian Ocean.

Pleuroneis Cl.

Cocconeis costata Greg. var. **typica** Cl.? Syn. Nav. D. II, p. 182. — V. H. Syn. Tab. 30, f. 11, 12.

Length of the valve about 18 μ, breadth about 10 μ. Costae 8 in 10 μ at the margin.

Foss.: Kk. Knjäsha, frequent.

Distr. (*mar.*): West and East Arctic Sea, North Sea, Mediterranean Sea, America, Austr., Antarctis.

I am not sure whether the Finlandian form is identical with CLEVE's var. *typica*, that is stated to have only 5—6 costae in 10 μ.

Achnanthes BORG.

Microneis CL.

Achnanthes exilis KÜTZ. — V. H. Syn. Tab. 27, f. 16—19.

Valve 9 μ in length, 3 μ in breadth. Striae 18 in 10 μ.

Foss.: Ab. Hindersmossen.

Distr. (*fresh w.*): Belgium, Germany.

Finlandian specimens are only about half as long and broad as the typical ones, according to CLEVE (Syn. Nav. D. II, p. 189).

Achnanthes septentrionalis ØSTR. var. **subcapitata** ØSTR. D. N.-E. Greenl., p. 115, Tab. 13, f. 22.

Foss.: Kk. Knjäsha, not rare.

Distr. (*mar.*): N.-E. Greenland.

The rather frequent occurrence of this species, hitherto known only from Greenland, in the Knjäsha-material is of interest. Both valves agree perfectly with ØSTRUP's description. The frustule is distinctly genuflexed.

Achnanthes delicatula KÜTZ. — V. H. Syn. Tab. 27, f. 3, 4.

Foss.: Kk. Knjäsha, rare.

Distr. (*brack. w.*): West Arctic Sea, North Sea, Balearic Islands, San Francisco, Asia, Africa.

Achnanthes polaris ØSTR. Mar. D. Øst-Grønl., p. 408, Tab. 7, f. 86. CLEVE, Baff. Bay, Tab. 1, f. 5.

Foss.: Kk. Knjäsha, several specimens.

Distr. (*mar.*): West and East Arctic Sea.

In the middle of the epitheca, one stria is frequently shortened.

Achnanthes latissima n. sp. — Pl. 4, f. 89.

Frustule broadly elliptical, with subacute ends, 12 μ in length, 9 μ in breadth. Epitheca with 12 slightly radiate striae, lower valve striate as the upper, but with a distinct central nodule. Areas indistinct.

Foss.: Ab. Hindersmossen, rare (*fresh w.*).

Comes probably near to *Achnanthes Hauckiana* Grun.

Achnanthes sp. — Pl. 4, f. 90.

Epitheca linear, with cuneate ends, 19 μ in length, 6,5 μ in breadth. Striae 14 in 10 μ, parallel, at the ends divergent, apparently smooth. The two median ones are a trifle more distant than the others on the one side of the valve. Hypotheca unknown.

Foss.: Kk. Knjäsha, rare.

Achnanthidium (Kütz.) Heib.

Achnanthes lanceolata Bréb. var. **capitata** O. M. Bac. Süd-Patag. Tab. 1, f. 6—7.

Foss.: Ab. Hindersmossen; rare.

Distr. (*fresh w.*) Süd-Patagonien.

Achnanthes lanceolata Bréb. var. **crassa** n. var. — Pl. 4, f. 91.

Frustule genuflexed, elliptical, with abruptly protracted, capitate ends. Length 11—12 μ, breadth 6 μ. Epitheca without axial area, with a horseshoe-formed marginal area on one side of the valve, which side often is less inflated than the opposite, sometimes subundulated side. Striae 13—14 in 10 μ, radiate, not distinctly punctate. Hypotheca without distinct areas, not fasciated.

Foss.: Ab. Hindersmossen (*fresh w.*).

This well defined small variety is closely allied to the var. *Haynaldii* Saarsch (from Ecuador), by the capitate ends and smooth striae, but scarcely half as long, by about the same breadth.

Achnanthes rhynchocephala n. sp. — Pl. 4, f. 92.

Frustule broadly elliptical, with protracted, subcapitate ends. Length 15 μ, breadth 7 μ. Epitheca without axial

area, with a horseshoe-shaped marginal area on one side of the valve. Striae radiate, fine, about 20 in 10 μ. Hypotheca without areas.

Foss.: Ab. Hindersmossen (*fresh w.*).

This species is distinguished from the preceding variety by the less genuflexed frustules and the much finer striation. It recalls in outline *Achn. Peragalli* Brun & Hérib., but differs from this species in the lack of central and axial areas.

Achnanthes brevipes Ag. var. **typica** Cl. Syn. Nav. D. II, p. 193. — *Achnanthes brevipes* Ag. V. H. Syn. Tab. 26, f. 10—12.

Foss.: Sat. Panelia (Litorina-dep.).

Distr. (*mar.* and *brack. w.*): West and East Arctic Sea, North Sea, Baltic, Caspian Sea. (Foss.) Japan.

Achnanthes brevipes Ag. var. **intermedia** Kütz. — *Syn. Achnanthes subsessilis* Kütz. V. H. Syn. Tab. 26, f. 25, 28.

Distr. (*brack.* and *mar.*): West and East Arctic Sea, North Sea, Baltic, Caspian Sea, Mediterranean Sea, ubiquist.

Of this variety, quoted already in Cleve's list, I have found specimens in the marine deposit from Knjäsha. An interesting kind of spore has been drawn in Pl. 2, f. 53. By contraction of the cell-content and regeneration of the wall, there has been formed a spore in probably about the same way as in *Melosira laevis*.

Achnanthes brevipes Ag. var. **parvula** Kütz. — V. H. Syn. Tab. 26, f. 25, 28.

Foss.: Kk. Knjäsha.

Distr. (*brack. w.*): Greenland (Östrup), North Sea, Calvados, Galapagos Islands.

Achnanthes brevipes Ag. var. forma **elliptica** Östr. Kyst-diat. Grönl. Tab. 2, f. 13.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): East Greenland.

Valve of the Finlandian specimens 40 μ in length, 18 μ in breadth, with 8 coarsely punctate striae in 10 μ.

Achnanthes brevipes Ag. var. **angustata** Grev.? — Cleve, Syn. Nav. D. II, p. 194. — *Syn.? Achnanthes pennata* Cl. Vega-Exp. D. Tab. 35, f. 2. — Icon. nost. Pl. 2, f. 54.

Foss.: Kk. Knjäsha, rare.

The specimen, drawn in fig. 54, agrees well with Cleve's *Achnanthes pennata* in size and outline. Only it has distinctly punctate striae, the puncta forming straight transversal as well as longitudinal rows, 10 in 10 μ, whereas Cleve's figure has been delineated with smooth striae. As the Synopsis (II, p. 194) does not tell anything about the nature of the striae, the identification of my form with *Achn. pennata* is not perfectly certain. It is, however, probable that all true forms of *Achnanthes brevipes* have punctate striae, thus also the latter variety.

Achnanthes arctica (Cl.) *Achnanthidium arcticum* Cl. p. p. D. Arct. Sea, p. 25, Tab. 4, f. 22 a (not b). *Achnanthes brevipes* Ag. var. *intermedia* Kütz. Cleve, Syn. Nav. D. II, p. 193 p. p. — Icon. nost. Pl. 2, f. 55 a, b, 56.

Frustule almost cylindrical, genuflexed, with broad, rounded ends, very slightly contracted in the middle, 60—100 μ in length, 17 μ in breadth. Upper valve with 6—7 rows of coarse, subquadrate, distant alveoli in 10 μ; in each row 5 alveoli in 10 μ. Alveoli forming somewhat undulating longitudinal rows. Axial area distinct or not. Lower valve with rather distant median pores and a linear axial area, dilated in the middle to a somewhat broad, transverse fascia and near the ends to small rounded areas. Striae subradiate, 8 in 10 μ, coarsely punctate. Puncta quadrate, forming regular longitudinal rows.

The frustule has double membranes, the inner one at some distance from the other on the dorsal side and with an acute corner leaning against the transverse ends of the connecting zone of the outer membrane.

Foss.: Kk. Knjäsha, frequent in the marine strata.

Distr. (*mar.*): West and East Arctic Sea.

P. T. Cleve first remarked this arctic vicariating form for *Achnanthes brevipes*, described it as a new species and gave a figure of it in zonar view, showing the peculiar feature of the double membranes. But, most probably, he has confused it with another species, that I below have named

Achnanthes septata, since the valve, drawn by CLEVE in fig. 22 b (D. Arct. Sea, Tab. 4), belongs to the latter species. Both of the species in question occurring rather abundantly in the Knjäsha-samples, I have been able to compare them closely in valvar view, and state their difference, which may be seen when comparing the figures 55—57 of this paper.

Later on, CLEVE has united *Achn. arctica* with *Achnanthes subsessilis* KÜTZ., in which I cannot agree with him. These forms are certainly quite different in general structure, habitually, and in size. The numbers of 30—50 μ for the length and 10—11 μ for the breadth, given in CLEVE's Synopsis for *Achnanthes brevipes* var. *intermedia*, apply to the true *Achnanthes subsessilis*, but not to the considerably larger *Achnanthes arctica*, for which CLEVE himself in his original description states a length of 48 μ, which to judge from the figure must be a misprint for 96 μ or more, a heigth of 24 μ and a breadth of 17 μ (as in my form). In Mar. d. Øst-Grønl., p. 408, ØSTRUP follows CLEVE in uniting the two different forms *Achnanthes subsessilis* and *Achnanthes arctica;* moreover he has not remarked the complexity of the latter, *sensu Clevei*, and figures as »*Achnanthes subsessilis* var. *incurvata*» a constricted form of *Achn. septata*.

Only for the case that *Achnanthes arctica* be a sporangial form, it could possibly be the same species as *Achn. septata*.

Achnanthes septata n. sp. — Pl. 2, f. 57 a, b. — *Syn. Achnanthidium arcticum* CL. p. p. D. Arct. Sea, Tab. 4, f. 22 b.

Frustule linear, genuflexed, with subcuneate, obtuse ends and broad, distinct diaphragms at the ends. Length of the valves 70—100 μ, breadth 14—17 μ. Lower valve with an indistinct axial area and no areas at the ends. Central area a narrow, transverse fascia; central pores approximate. Striae subradiate, 6 in 10 μ, composed of coarse, quadrate puncta, forming straight longitudinal rows. Upper valve unknown.

Foss.: Kk. Knjäsha, rather frequent.

Distr. (*mar.*): West and East Arctic Sea.

The diaphragms at the ends of the valves are a feature common to this species and to *Achnanthes groenlandica* CL. In other respects, they, however, are different enough; in size f. i., the latter being a smaller and more gracile form, only 5—7 μ in breadth. Moreover, the central pores are not distant from each other in *Achn. septata*, as is the case in *Achn.*

groenlandica (and *Achn. arctica*). Also the diaphragms of *Achn. groenlandica* seem to be much less marked than in the present species, not being visible at all on CLEVE's figures (D. Arct. Sea, Tab. 4, f. 23; Vega-Exp. D. Tab. 35, f. 3). In OSTRUP's figure of »*Achnanthes groenlandica* CL. var.», Kystd. Grønl. Tab. 2, f. 17 they are represented. Finally, the distinctly quadrate puncta are coarser in *Achn. septata*, for which reason they seem less distant, though there is almost the same number of striae in 10 μ in both species.

From *Achnanthes arctica* this species is distinguished by the presence of diaphragms, by the narrow fascia, by the lack of an axial area and by the coarser alveoli. The size is about the same.

Kalyptoraphideae.

Eschatoraphideae.

Surirella TURP.

Surirella biseriata BRÉB. — V. H. Syn. Tab. 72, f. 1, 2.

Ladoga. Foss.: Nyl. Kyrkslätt.

Distr. (*fresh w.*): Ubiquist.

Occurs together with the var. *bifrons* (EHB.) KÜTZ. (recorded for Finland in CLEVE's list) in until 325 μ long, linear specimens, attenuated towards the sharply acute ends. $1^1/_2$ folds in 10 μ.

Surirella robusta EHB. var. **marginata** n. var. — Pl. 3, f. 58.

Costae marginal, leaving in the centrum of the valve a blank, lanceolate space about a third as broad as the valve. Length 200 μ, breadth 80 μ. Costae 10 in 100 μ.

Foss.: Ab. Hindersmossen; rare, among the type.

Surirella tenera GREG. var. **nervosa** A. S. — HUST. Bac. Wumme, Tab. 2, f. 4—5.

Ladoga. Foss.: Ab. Hindersmossen; rather frequent.

Distr. (*fresh w.*): Continent of Europe.

Finlandian specimens are 130—150 μ in length, 30 μ in breadth and have 4 folds in 25 μ.

Surirella tenera Greg. var. **subconstricta** Hust. Bac. Wumme, p. 312, Tab. 2, f. 6.

Ladoga. Foss.: Ab. Hindersmossen.

Distr. (*fresh w.*): Germany.

Surirella distinguenda n. sp. — Pl. 3, f. 59.

Valve heteropolar, lanceolate, with the broader end obtuse and the narrow end attenuated, subacute, frequently slightly curved, as to make the valve somewhat asymmetrical. Wings high and strong, at some distance from the margin, with 10 folds in 100 μ. Pseudoraphe visible. Length of the valve 70—165 μ, breadth 30—55 μ.

Ladoga. Foss.: Ab. Hindersmossen; Ok. Paltamo (*fresh w.*).

In several fossil gatherings from Fennoscandia, I have remarked this species, that differs from *Surirella robusta* by the smaller size and more attenuated, frequently not quite symmetrical valves, and moreover is recognised by the strong and sparsely folded wings. Occasionally, it has hitherto been united with *Surirella biseriata* var. *bifrons*, from which it, however, must be distinguished as heteropolar.

Surirella Capronii Bréb. — A. S. Atl. Tab. 23, f. 10, 11.

Foss.: Ab. Hindersmossen, Nyl. Kyrkslätt; in deposits from the *Ancylus*-epoch.

Distr. (*fresh w.*): Germany. Fossil in old Baltic deposits from the *Ancylus*-Sea.

Surirella ovalis Bréb. var. **Crumena** (Bréb.) V. H. — V. H. Syn. Tab. 73, f. 1.

Foss.: Sat. Panelia.

Distr. (*fresh a. brack. w.*): Europe, Africa.

Surirella striatula Turp. var. **biplicata** Grun. — V. H. Syn. Tab. 72, f. 6.

Foss.: Ab. Hindersmossen, rare.

Distr. (*brack. w.*): Europe.

Surirella striatula Turp. var. **denseplicata** n. var.

Differs from the typical form by the costae being once and a half as close, or 3 1/2 in 10 μ.

Foss.: Sat. Panelia, with the type.

A similar form is figured, without name, in A. S. Atl. Tab. 21, f. 5. It was taken by the Hoyes-Exp. in the Arctis.

Surirella elegans Ehb. — V. H. Syn. Tab. 71, fig. 3. A. S. Atl. Tab. 21, f. 17—19. *Syn. Surirella slesvicensis* Grun. A. S. Atl. Tab. 21, f. 19; *Surirella norvegica* Eulenst. A. S. Atl. Tab. 21, f. 17.

Ladoga. Foss.: Ab. Hindersmossen, Nyl. Kyrkslätt.

Distr. (*fresh w.*): ubiquist; frequent in old deposits from the *Ancylus*-epoch.

Surirella Gemma Ehb. — V. H. Syn. Tab. 74, f. 1—3.

Foss.: Sat. Panelia, rare. In deposits from the *Litorina*-epoch.

Distr. (*mar.* and *brack.*): Arctis, Antarctis, ubiquist.

Surirella fossilis n. sp. — Pl. 3, f. 61.[1]

Valve isopolar, elliptical with subacute ends, 56 μ in length, 36 μ in breadth. Wings marginal, making one fold in 4 μ, producing depressions on the valve, visible on half the space between the margin and the raphe, that is faintly marked. Striation fine, delicate, visible all over the valve.

Foss.: Kk. Knjäsha, in *marine* strata; rare.

This species seems to be akin to *S. septentrionalis* Østr. (Mar. D. Øst-Grønl. Tab. 6, f. 78) from East Greenland.

Surirella laevis n. sp. — Pl. 3, f. 60.[1]

Valve heteropolar, broadly ovate, 55 μ in length, 33 μ in breadth. Wings marginal, with one fold in 4 μ, producing rather short, triangular, delicately striate depressions. Sculpture of the central part of the valve hardly visible.

Foss.: Sat. Panelia, in deposits from the *Litorina*-epoch.

Surirella Lindbergii n. sp. — Pl. 3, f. 62.

Valve slightly heteropolar, ovate, 42 μ in length, 26 μ in breadth. Wings marginal, 3 folds in 10 μ, producing triangular depressions ending about twice as far from the central axis as from the border. Depressions finely striate, as also the

[1] On the plate, the names of *S. laevis* and *S. fossilis* have been erroneously exchanged.

whole marginal part of the valve, continued each by two or three close costal lines to the narrow lanceolate-fusiform central area.

Foss.: Sat. Panelia, rare (*Litorina*-deposit).

There is a resemblance between this delicate *Surirella*, belonging to the tribe of the *fastuosae*, and a more rounded obtuse form, recently described in Contrib. Diat. Venezia 1913 by Mr A. Forti and named *Surirella striatula* Turp. var. *Azpeiticae*, from a deposit in Modena, Tab. 19, f. 2. Some allied forms are figured in A. S. Atl. Tab. 5, f. 12 as *Surirella fastuosa* var., Atl. Tab. 24, f. 28 as *Surirella recedens* A. S. and especially in the Atl. Tab. 299, f. 32 as *S. septentrionalis* Hust.

Surirella nana n. sp. — Pl. 4, f. 93.

Valve very small, linear with rounded-obtuse ends, 4 times as long as they are broad. Length 15 μ, breadth 4 μ. Costae marginal, delicate, 11—12 in 10 μ. Centrum of the valve smooth.

Foss.: Ab. Hindersmossen, rare.

The nearest relations of this minute *Surirella* seem to be two small forms figured by Pantocsek in D. Balat. See, Tab. 11, f. 283, as *Sur. angusta* and in ff. 284, 286 as *Sur. minuta* (the determination is not exact, according to O. Müller, Bac. Süd-Patag., p. 38). But the present form is still smaller, more delicate and more closely costate.

Surirella spiralis Kütz. — V. H. Syn. Tab. 74, f. 4, 7.

Syn. Surirella flexuosa Ehb., Pant. D. Balat. See, Tab. 14, f. 305.

Ladoga. Foss.: Sat. Panelia; Ka. Viborg-dep. (Cleve 1894).

Distr. (*fresh w.*): Eur., Asia. Fossil in deposits from the *Ancylus*-Sea.

Campylodiscus Ehb.

Campylodiscus angularis Greg. — D. of Clyde, Tab. 3, f. 53.

Foss.: Kk. Knjäsha, Koudajärvenpää, frequent.

Distr. (*mar.*): West and East Arctic Sea (common according to Cleve); Scotland.

f. striata:

Central part of the valve with faint, marginal striae as a continuation of the costae.

Foss.: Kk. Knjäsha, among the type, rare.

Campylodiscus Thuretii Bréb. — V. H. Syn. Tab. 77, f. 1. — *Syn. Campylodiscus simulans* Greg. A. S. Atl. Tab. 17, f. 12—14.

Foss.: Kk. Knjäsha, Koudajärvenpää, frequent.

Distr. (*mar.*): West and East Arctic Sea, North Sea, Asia.

Campylodiscus noricus Ehb. — V. H. Syn. Tab. 77, f. 4—6. A. S. Atl. Tab. 55, f. 8.

Ladoga. Foss.: Ka. Viborg-dep. (Cleve 1894), Nyl. Kyrkslätt, Kk. Tuntsa (*Ancylus*-Sea-dep.); Ok. Paltamo.

Distr. (*fresh w.*); Faeroes (Östrup), Europe. Fossil in Baltic deposits from the *Ancylus*-epoch.

In the fossil form, the costae reach the centre of the valve and form, where they meet, two lines, crossing each other under right angles, still more distinct than in the fig. 6, quoted above.

Tropidoraphideae.

Nitzschia (Hass.) Grun.

Tryblionella Grun.

Nitzschia Tryblionella Hantzsch var. **maxima** Grun. — V. H. Syn. Tab. 57, f. 11—13.

Foss.: Ab. Hindersmossen.

Distr. (*brack. w.*): Europe.

Nitzschia navicularis (Bréb.) Grun. — V. H. Syn. Tab. 57, f. 1.

Foss.: Nyl. Kyrkslätt; Kk. Knjäsha, Niemenkönkään alus (rare, in the uppermost mixed strata).

Distr. (*mar.*): Europe, Africa, Arctis. *Fossil* in Baltic deposits from the *Litorina*-epoch, and, rarely, in elder, northern deposits.

Panduriformes GRUN.

Nitzschia panduriformis GREG. — V. H. Syn. Tab. 58, f. 1.
Foss.: Sat. Panelia, rare (*Litorina*-dep.).
Distr. (*mar.*): South Europe, warmer Oceans.

Nitzschia panduriformis GREG. var. **delicatula** GRUN. — A. D., p. 71, Tab. 5, f. 92.
Foss.: Kk. Knjäsha.
Distr. (*mar.*): East Arctic Sea (GRUNOW), Faeroes (ØSTRUP).

Apiculatae GRUN.

Nitzschia marginulata GRUN. var. **genuina** GRUN. — A. D. Tab. 5, f. 93. V. H. Syn. Tab. 58, f. 16, 17.
Foss.: Kk. Knjäsha, not rare.
Distr. (*mar.*): West and East Arctic Sea; ubiq.

Bilobatae GRUN.

Nitzschia (hybrida var.?) **pellucida** GRUN. — A. D., p. 80, Tab. 5, f. 96.
Foss.: Kk. Knjäsha.
Distr. (*mar.*): East Arctic Sea.
The form I have met with is only 28—40 μ in length, 8 μ in breadth (valve), and thus somewhat smaller than the original *N. pelludica*, for which GRUNOW states a length of 55—70 μ. No striation was seen, but always traces of a central nodule.

Bacillaria GRUN.

Nitzschia socialis GREG. — V. H. Syn. Tab. 61, f. 8.
Foss.: Kk. Knjäsha.
Distr. (*mar.*): West (the var. *kariana* GRUN.) and East Arctic Sea, North Sea, Baltic, Atlantic etc., America.

Sigmata GRUN.

Nitzschia Sigma W. SM. var. **Sigmatella** GRUN. — V. H. Syn. Tab. 66, f. 6, 7.
Foss.: Kk. Knjäsha, Koudajärvenpää; Sat. Panelia.
Distr. (*mar.*): Arctic Sea; Europe.

Lineares GRUN.

Nitzschia vitrea NORM. — V. H. Syn. Tab. 67, f. 10, 11.

Foss.: Sat. Panelia (dep. from the *Litorina*-epoch).

Distr. (*brack. w.*): Baltic, North Sea, Adriatic (GRUNOW), Africa, Asia, Arctis.

Nitzschia vitrea NORM. var. **salinarum** GRUN. — A. D., p. 94. V. H. Syn. Tab. 67, f. 12.

Foss.: Ab. Hindersmossen; Sat. Panelia.

Distr. (*brack. w.*): North Sea; Africa.

Nitzschia polaris GRUN. — Franz Jos. L. D., p. 54, Tab. 1 (A), f. 62—63.

Foss.: Kk. Knjäsha, not rare, usually many together.

Distr. (*mar.*): Greenland (ØSTRUP), Franz Josefs Land.

The specimens observed belong to the shorter form (GRUNOW's fig. 63).

Rhopalodia O. MÜLL.

Rhopalodia parallela (GRUN.) O. M. — *Syn. Epithemia gibba* (EHB.) KÜTZ. var. *parallela* GRUN. V. H. Syn. Tab. 32, f. 3.

Foss.: Ka. Viborg-deposit (CLEVE 1894). Nyl. Kyrkslätt.

Distr. (*fresh w.*): Ubiquist. Common in Baltic deposits from the *Ancylus*-epoch.

Epithemia BRÉB.

Epithemia Hyndmannii W. SM. — V. H. Syn. Tab. 31, f. 3. — Icon. nost. Pl. 3, f. 63.

Ladoga. Foss.: Ka. Viborg-dep. (CLEVE). Ab. Hindersmossen. Nyl. Kyrkslätt. Sat. Panelia.

Distr. (*fresh w.*): (foss.) Frequent in deposits from the *Ancylus*-Sea. Europe, Asia.

It has been suggested by GRUNOW (cfr. ØSTRUP, Danske Diat., p. 168), that this species should be nothing but the sporangial form of *Epithemia turgida*. Notwithstanding the unprobability of a sporangial form occurring in great masses, almost free from the supposed typical species, as is sometimes

the case with *Ep. Hyndmannii*, I think I have found a positive argument against the quoted hypothesis in the sporangial frustule, drawn in fig. 81. It occurred in a sample from Hindersmossen (Ab.) in the company of *Epith. turgida, Hyndmannii* a. o. species of the same genus. Length 170 μ; outline irregular, ends somewhat rostrate.

Eunotia Ehb.

Eunotia Arcus Ehb. var. **plicata** Br. & Hérib. — D. d'Auvergne Tab. 5, f. 6, 7.

Foss.: Kk. Knjäsha, rare.

Distr. (*fresh w.*): Puy de Dôme (fossil).

One specimen of this variety, hitherto known only from France, was found together with a few other fresh-water diatoms intermingled in a marine sample from Knjäsha. There were no other species of the genus *Eunotia* present in the sample.

Eunotia flexuosa Kütz. — V. H. Syn. Tab. 35, f. 7—11 (different varieties).

Foss.: Kk. Knjäsha.

Distr. (*fresh w.*): Europe.

Only one specimen, 180 μ in length, 7 μ in breadth, with 8 striae in 10 μ. Ends dilated, damaged, as not to allow an exact determination of the variety.

Eunotia Clevei Grun. — Cleve, D. of Finl. Tab. 3, f. 13—16. — Icon. nost. Pl. 3, f. 64.

Of this well-known species, living in the Ladoga, but not known recent from Sweden, I have found in a sample from Ab., Hindersmossen, a very large specimen, that has not the typical outline of *Eunotia Clevei*. The valve is slightly gibbous on the ventral side and gradually attenuated towards the broad, obtuse to subtruncate ends. Length 335 μ, breadth in the middle 43 μ, at the ends 22 μ. This form is most probably a sporangial cellule of *Eunotia Clevei*, whose ordinary length is quoted by Cleve (l. c. p. 55) to be 110—180 μ. I have found the fossil species to be most frequently about 140 μ in length, though some specimens reach until 300 μ.

Arraphideae.

Synedra Ehb.

Synedra affinis Kütz. var. **hybrida** Grun. — V. H. Syn. Tab. 41, f. 9, 10.

Foss.: Kk. Knjäsha, rare (14 striae in 10 μ).

Distr. (*brack.* and *mar.*)?

Synedra affinis Kütz. var. **tenuis** Grun. — V. H. Syn. Tab. 41, f. 156, 17. — *Syn. Synedra affinis* Kütz. var. *gracilis* Grun.

Striae 14 in 10 μ.

Foss.: Kk. Knjäsha.

Distr. (*brack.* and *mar.*): Greenland (Østrup). Europe.

Synedra kamtschatica Grun. — Østrup, Mar. D. Ost-Grønl. Tab. 7, f. 85.

Foss.: Kk. Knjäsha, not rare.

Distr. (*mar.*): West and East Arctic Sea.

Synedra kamtschatica Grun. var. **intermedia** Grun. — A. D., p. 106, Tab. 6, f. 111.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): East Arctic Sea.

Synedra crystallina (Lyngb.) Kütz. — V. H. Syn. Tab. 42, f. 10.

Foss.: Sat. Panelia (dep. from the *Litorina*-epoch).

Distr. (*brack.* and *mar.*): Arctis; ubiquist.

Fragilaria Lyngb.

Fragilaria mutabilis (W. Sm.) Grun. var. **lancettula** (Schum.) Hust. — A. S. Atl. Tab. 297, f. 51, 59—64, 69. — O. Müller, Bac. Süd-Patag. Tab. 1, f. 4, 5. — Icon. nost. Pl. 4, f. 94 a, b.

Valve rhomboid-lanceolate, 15—17 μ in length, 6—7 μ in breadth. Striae coarse, 7 in 10 μ. Pseudoraphe narrow. Frustules coherent in chains.

Foss.: Kk. Knjäsha, rare.

Distr. (*fresh w.*): Lule Lappmark, Germany, Süd-Patagonien.

This form, that I am unable to distinguish from *Fragilaria lancettula* SCHUM., occurred in a purely marine sample.

Fragilaria mutabilis (W. SM.) var. **elliptica** (SCHUM.) CARLS. — V. H. Syn. Tab. 45, f. 15—17. — A. S. Atl. Tab. 297, f. 55—58, 65—68, 70—72.

Foss.; Ab. Hindersmossen, with the main form. Probably very spread.

Distr. (*fresh w.*): Europe, Asia.

Fragilaria parasitica (W. SM.) GRUN. — V. H. Syn. Tab. 45, f. 30.

Foss.: Ab. Hindersmossen.

Distr. (*fresh* and *brack. w.*): Europe, Asia, Africa.

Fragilaria producta LAGST.? — A. S. Atl. Tab. 297, f. 73—76. — Icon. nost. Pl. 4, f. 95 a, b.

Foss.: Kk. Knjäsha, rare.

Distr. (*fresh w.*): Spitzbergen, Lapland.

Some frustules in a chain, 13 μ in length, with elongated-elliptical valves, 4,5 μ in breadth. Striae 15 in 10 μ, parallel, interrupted by a very narrow, but distinct, pseudoraphe.

Though occurring in a marine sample, this form was determined to *Fragilaria producta*, because I cannot find any difference between it and the species of LAGERSTEDT, as figured in SCHMIDT's Atlas by HUSTEDT. On the other hand, it may possibly belong to the marine small species *Fragilaria arctica* GRUN. figured in Arct. Diat. Tab. 7, fig. 124, from which it differs only by the presence of a pseudoraphe. GRUNOW's figure shows no axial area, but the texte (A. D., p. 110) states a faint raphe to be present in the species.

Thalassiothrix CL. and GRUN.

Thalassiothrix nitzschioides GRUN. — V. H. Syn. Tab. 43, f. 7. Nord. Plankton, p. 117, f. 159.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): North Sea, Atlantic.

Sceptroneis Grun.

Sceptroneis gemmata Grun. — V. H. Syn. Tab. 37, f. 3.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): Arctic Sea, (foss.) Moler of Mors.

Sceptroneis marina (Greg.) Grun. — V. H. Syn. Tab. 37, f. 2, Tab. 50, f. 18—19. — *Syn. Meridion(?) marinum* Greg. D. of Clyde, Tab. 2 (10), f. 41. *Opephora marina* Petit.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): North Sea.

Sceptroneis sp.? — Pl. 4, f. 96.

Foss.: Kk. Knjäsha. One small clavate, heteropolar valve, 17 μ in length, 4 μ in breadth at the broader end. Striae 11 in 10 μ, leaving a narrow pseudoraphe and composed of two puncta on each side of it.

Plagiogramma Grev.

Plagiogramma Gregorianum Grev. — V. H. Syn. Tab. 36, f. 2. — *Syn. Denticula staurophora* Greg. D. of Clyde, Tab. 2 (10), f. 37.

Foss.: Kk. Knjäsha, frequent.

Distr. (*mar.*): West and East Arctic Sea, ubiquist.

Besides the ordinary, short form there occur some large specimens, reaching 65 μ in length, as Østrup has also observed on the Westcoast of Greenland (Kystd. Grønl., p. 338).

Licmophora Ag.

Licmophora sp.

Foss.: Kk. Knjäsha. — This *Licmophora* cannot be determined, as I have seen only diaphragms, no valves. It belongs to the *profunde septatae* and is rather large, 70—80 μ in length (*L. Lyngbyei* (Kütz.) Grun.?).

Grammatophora Ehb.

Grammatophora arctica Cl. — D. Spetsb. Tab. 23, f. 1. — V. H. Syn. Tab. 73 bis, f. 3.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): West and East Arctic Sea.

Grammatophora arcuata Ehb. — Østrup, Mar. D. Øst-Grønl. Tab. 6, f. 74. — Icon. nost. Pl. 3, f. 65 (short frustule).

Foss.: Kk. Knjäsha, Koudajärvenpää, frequent; Ok. Paltamo, rr.

Distr. (*mar.*): Arctis and Antarctis.

Mr Østrup thinks this species is a mere variety of *Grammatophora islandica* Grun., which seems plausible enough. The folded diaphragms are exactly similar to those of *Gramm. serpentina*, only the striation is a little coarser, 13,5 punctate striae in 10 μ instead of 18 by the latter. Greenlandian specimens of *Gramm. arcuata* have only 10 striae in 10 μ, according to Mr Østrup. Considering this variability in the number of striae, this form might perhaps as well be regarded as a variety of *Gramm. serpentina*. The length of Finlandian examples varies between 30 and 60 μ, and the number of folds with the length.

Grammatophora marina (Lyngb.) Kütz. var. **macilenta** W. Sm. — V. H. Syn. Tab. 53, f. 16.

Foss.: Kk. Knäsha, Kuodajärvenpää, frequent; Ok. Paltamo, rr.

Distr. (*mar.*) Arctic Sea, Europe, Asia, Africa.

Grammatophora hyalina n. sp. — *Syn. Grammatophora oceanica* Ehb. var. *macilenta subtilis?* Østr. Mar. D. Øst-Grønl., p. 340, Tab. 2, f. 11, 12, 19.

Valve linear, with rounded, slightly gibbous ends, 50—93 μ in length, 4—5 μ in breadth. Diaphragms not folded. No striation visible.

Foss.: Kk. Knjäsha, frequent; Koudajärvenpää.

Distr. (*mar.*): West Greenland.

No doubt this perfectly smooth form is identical with the Greenlandian *Grammatophora*, that Østrup refers to *Gr. oceanica* Ehb. var. *macilenta subtilis* Grun. with hesitation, because no striation is visible. I have not succeeded any more than Mr Østrup in finding the slightest trace of a striation, though I have observed number of frustules.

Grammatophora Sagitta n. sp. — Pl. 4, f. 97.

Valve linear, with slightly protracted, acuminate ends. Length 60 μ, breadth 7 μ. Frustule unknown.

Foss.: Kk. Knjäsha, rare.

The outline of the valve being very different from that of the other, broad-ended forms of *Grammatophora*, present in the same samples, I have distinguished this form as a new species, though it is imperfectly known.

Striatella Ag.

Striatella groenlandica Østr. Kystd. Grønl. Tab. 2, f. 16.

Foss.: Kk. Knjäsha; a few specimens, probably belonging to this species.

Distr. (*mar.*): Greenland.

Rhabdonema Kütz.

Rhabdonema arcuatum (Ag.) Kütz. var. **maxima** n. var. — Pl. 3, f. 66 a, b, c.

Valve semilanceolate, with obtuse ends, boatshaped, 140—150 μ in length. Cellulae of the annulus 5 in 10 μ. Diaphragms of variable heigth.

Foss.: Kk. Knjäsha, with the type in the arctic-marine strata.

This conspicuous form attains the size of *Rhabdonema Torellii* Cl. D. Arctic Sea, p. 24, Tab. 4, f. 20, but must be different from that species.

In fossil deposits from the *Litorina*-epoch, *Rhabdonema arcuatum* occurs copiously, but in much smaller specimens, about 40—60 μ in length.

Rhabdonema Oestrupii n. sp. — Pl. 3, f. 67 a, b. — *Syn. Rhabdonema minutum* Østr. Mar. D. Øst-Grønl., p. 454, Tab. 6, f. 77.

Valve 60—80 μ in length, linear with inflated middle and round, subcapitate ends. Breadth 12—16 μ. Valve striate; striae 7 in 10 μ, punctate. Diaphragms as in *Rhabdonema minutum* Kütz.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): East Greenland.

This species was described and figured by Østrup as a big form of *Rhabdonema minutum*. As, however, the outline of the valve is rather different and intermediate forms do not seem to occur, I think it deserves to be made a new species.

Centricae.

Rhizosolenia (Ehb., Brightw.) Perag.

Rhizosolenia Calcar avis Schultze. — Peragallo, Diatomiste I, Tab. 16, f. 9. Nord. Plankt., p. 54, f. 66.

Foss.: Sat. Panelia (*Litorina*-dep.). In samples from the Geol. Commission of Finland.

Distr. (*mar.*): Atlantic Ocean, spreading from its southern parts.

Rhizosolenia minima Lev. Medd. Soc. Fauna et Flora fenn. 1904, p. 115, f. 7. A. S. Atl. Tab. 314, f. 1—7.

Bay of Viborg (*feebly brack. w.*) (Levander).

Rhizosolenia longiseta Zach. — Forschungsber. Plön I, p. 38, f. 7. A. S. Atl. Tab. 314, f. 15—18.

Spread in lakes from Nyland to S. Lapland (Levander).

Distr. (*fresh w.*): Lakes of Scandinavia and Central Europe.

Rhizosolenia longiseta Zach. var. **Levanderi** n. var. — *Rhizosolenia longiseta*, »grosses bauchiges Exemplar», Levander l. c., p. 114, fig. 1.

Kuusamo, Välijärvi.

Distr. (*fresh. w.*): Sweden: Vänern, Alsen (A. Cleve-Euler).

Rhizosolenia eriensis L. H. Smith var. **europaea** Hust. A. S. Atl. Tab. 314, f. 24—26 (drawn from Finlandian specimens). — *Syn. Rhizosolenia eriensis* Levander l. c., f. 5, 6.

Ks. Välijärvi, Tb. Keitele (Levander).

The *Rhizosolenia eriensis*, stated by Levander to occur in the two Finlandian lakes quoted above, is not typical, as it has the connecting zone much more closely striate, with 8—10 costae in 10 μ. Original specimens of *Rhiz. eriensis* from Lake Erie, as well as the same species from Vänern, Sweden, have only 4—5 costae in 10 μ. The Finlandian form thus ought to be distinguished as a new variety, as Hustedt has done, with the remark, however, that this variety comes very near to *Rhizosolenia eriensis* var. *morsa* West. Maybe both varieties are identical.

Attheya West.

Attheya Zachariasi Brun. — Forschungsber. Plön. II, p. 53, Tab. 1, f. 11.

Nyl. Finnträsk, Lohijärvi, Ka. Vammeljärvi, Sb. Räimäjärvi, Kallavesi; Bay of Viborg (Levander).

Distr. (*fresh w.*): Lakes of Scandinavia, Central Europe etc.

Pyxilla Grev.

Pyxilla? baltica Grun. — V. H. Syn. Tab. 83, f. 1—2.

The endocyst of *Rhizosolenia setigera* Btw., according to Peragallo, D. mar. de France, Tab. 124 A, f. 9.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Baltic (foss.).

Chaetoceras Ehb.

Hyalochaete Gran.

Chaetoceras (Dicladia) mitra (Bail.). — V. H. Syn. Tab. 106, f. 12—13. Nord. Plankton, p. 75, f. 89.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Arctic Sea.

Chaetoceras Schüttii Cl. — Plankt.-Und. 1894, Tab. 1, f. 1. — Nord. Plankton, p. 81, f. 97.

Bay of Finland? Foss.: Kk. Knjäsha; Sat. Panelia (spores).

Distr. (*brack.* and *mar.*): Baltic, North Sea.

Chaetoceras holsaticum Schütt. — Nord. Plankton, p. 85, f. 105.

Bay of Finland, Bay of Bothnia. Foss.: Kk. Knjäsha?

Distr. (*brack.* a. *mar.*): Baltic, Skagerak, Porsangerfjord.

Chaetoceras Diadema (Ehb.) Gran. — Nord. Plankton, p. 84, f. 102 b.

Foss.: Kk. Knjäsha (spores).

Distr. (*mar.*): Arctic Sea; North Sea, South America, Japan.

Chaetoceras seiracanthum Gran. — Nord. Plankton, p. 85, f. 103.

Foss.: Ab. Hindersmossen (spores). Kk. Knjäsha? (Pl. 4, f. 98).

Distr. (*brack.* and *mar.*): Coasts of Scandinavia.

Typical spores of this species were met with in Hindersmossen; but as regards the spores, found in the arctic-marine material from Knjäsha, it is probable that they belong to another species, unknown to me.

Chaetoceras subtile Cl. — Nord. Plankton, p. 88, f. 110.

Bay of Bothnia.

Distr. (*brack. w.*): Baltic, Kattegat.

Chaetoceras hispidum (Ehb.) Btw. — V. H. Tab. 82 bis, f. 4.

Foss.: Ab. Hindersmossen; Kk. Knjäsha, Koudajärvenpää (spores).

Distr. (*mar.*): ?

This species, of which the spores are rather frequent in Fennoscandian deposits, is not mentioned in »Nordisches Plankton». It seems to come near to *Chaetoceras diadema.*

Chaetoceras Amanita n. sp. — Pl. 4, f. 99 (f. 100?).

Spores 16—20 μ in diameter, with one side rounded, the other concave, transversely cut by a basal plan. Both sides hispid.

Foss.: Ab. Hindersmossen; Kk. Knjäsha? (fig. 100).

It is doubtful, whether the spores in fig. 99 and 100 belong to the same form.

Skeletonema Grev.

Skeletonema costatum (Grev.) Cl. — V. H. Syn. Tab. 91, f. 4, 8. Nord. Plankton, p. 15, f. 7.

Bay of Finland, Bay of Bothnia.

Distr. (*brack.* and *mar.*): Baltic, Atlantic.

Paralia Heib.

Paralia sulcata (Ehb.) Cl. — V. H. Syn. Tab. 91, f. 16. Nord. Plankton, p. 14, f. 5.

Foss.: Ka. Viborg-deposit (P. T. Cleve 1894); Sat. Panelia; Kk. Knjäsha; Koudajärvenpää (common).

Distr. (*mar.*): Arctic Sea, Atlantic etc. Ubiquist (»die verbreitetste aller marinen Diatoméen», GRUNOW in Franz Jos. L. D., p. 41).

Paralia sulcata (EHB.) var. **siberica** GRUN. — Franz Jos. L. D., p. 42. V. H. Syn. Tab. 91, f. 22.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): East Arctic Sea.

Paralia sulcata (EHB.) var. **minima** ØSTR. — Mar. D. Ost-Grønl. Tab. 8, f. 91.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): East Greenland.

Perhaps this variety is nothing but the smallest individuals of *Paralia sulcata* f. *genuina*, showing valvar impressions as a consequence of the elongation of the cellules in pervalvar direction.

Melosira AG.

Melosira islandica O. M. subsp. **helvetica** O. M. — Jahrb. f. wiss. Botanik, 43 (1906), p. 67, Tab. 1, f. 7—9. A. CLEVE-EULER, Pleom. Melosira, p. 124 etc., f. 1—22.

Ladoga. Foss.: Ab. Hindersmossen; Nyl. Kyrkslätt; Sat. Panelia. Frequent in fossil lacustrine deposits from the *Ancylus*-epoch.

Distr. (*fresh w.*): Plankton of many large lakes in Fenno-scandia and Central Europe.

This form is perhaps identical with the »*Melosira distans*» of LEVANDER, quoted limnetic in several Finnish lakes (Acta Soc. Fauna & Flora Fennica, 9 n:o 2, 1900).

Then *Melosira helvetica* is, as I have previously shown, identical with »*Melosira* (*distans* var.?) *laevissima*» GRUN. in V. H. Syn. Tab. 86, f. 24, while the typical *M. distans* is doubtful as a planktonform.

Melosira italica KÜTZ. f. **laevis** (GRUN.). — *Melosira* (*crenulata* var.?) *laevis* GRUN. V. H. Syn. Tab. 88, f. 19.

Foss.: Ab. Hindersmossen, Nyl. Kyrkslätt.

Melosira italica KÜTZ. subsp. **subarctica** O. M. — Jahrb. f. wiss. Botanik, 43 (1906) p. 70, Tab. 2, f. 7—11.

Ladoga. Foss.: Ab. Hindersmossen; Nyl. Kyrkslätt; Sat. Panelia; frequent in early postglacial, lacustrine deposits.

Distr. (*fresh w.*): Plankton of most deeper and colder lakes.

Melosira (Gaillonella?) **Westii** W. Sm. — V. H. Syn. Tab. 91, f. 11, 12.

Foss.: In some marine samples from the Geol. Comm.; locality unknown.

Distr. (*mar.*): East Arctic Sea, Europe.

Podosira Ehb.

Podosira glacialis Grun. — Cleve, Baff. Bay, p. 12, Tab. 2, f. 17—20. — Syn. *Podosira hormoides* var. *glacialis* Grun. Franz Jos. L. D. Tab. 4, f. 32. *Thalassiosira gravida* Cl.?

Foss.: Kk. Knjäsha, Koudajärvenpää; frequent.

Distr. (*mar.*): West Arctic Sea.

Podosira Montagnei Kütz. — V. H. Syn. Tab. 84, f. 13.

Foss.: Kk. Knjäsha, Koudajärvenpää; not rare.

Distr. (*mar.*): North-East Greenland (Østrup); Atl. Several other records.

Podosira Montagnei Kütz. var. **minor** Grun. — V. H. Syn. Tab. 84, f. 9—10.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Atlantic.

Podosira dubia (Kütz.) Grun. — V. H. Syn. Tab. 84, f. 13—14.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): Atlantic.

Hyalodiscus Ehb.

Hyalodiscus stelliger Bail. — V. H. Syn. Tab. 84, f. 1, 2. Nord. Plankton, p. 26, f. 28.

Foss.: Kk. Knjäsha, Koudajärvenpää; frequent.

Distr. (*mar.*): The Arctic Sea, very common according to Cleve D. Arct. Sea, p. 4; North Sea, Atlantic. Many other records.

The form that occurs fossil in Finland measures 90 μ in diameter and in thus remarkably larger than the now

living pelagic *Hyalodiscus stelliger* in the Skagerak. The latter is only about 50 μ in diameter. The figure in VAN HEURCK's Synopsis represents an intermediate form, 70 μ in diameter.

Cyclotella KÜTZ.

Cyclotella comta EHB. var. **oligactis** (EHB.) GRUN. — V. H. Syn. Tab. 93 f. 18.

Foss.: Kk. Knjäsha, rare.

Distr. (*fresh w.*): Lara.

Cyclotella comta EHB. var. **spectabilis** n. var. — Pl. 3, f. 68. — *Syn.? Cyclotella balatonis* PANT. v. *binotata* PANT. Balat., p. 105, Tab. 15, f. 331.

Valve 30 μ in diameter. Marginal striate zone about one third of the radius; marginal puncta (pores) alternating with 2 or 3 striae. Five distinct channels. Centrum of the disc covered with radiating rows of puncta, leaving a very small blank annulus round two central puncta.

Foss.: Ab. Hindersmossen, in the undermost (eldest) strata from the *Ancylus*-epoch, where also are found some diatoms of brackish water.

This large and beautiful form makes a remarkable transition between *Cyclotella comta* var. *radiosa* and *Cycl. bodanica*. With the former it has the rather narrow, striate zone and the fine striae of equal length in common, with the latter the five distinct channels and the large size. Moreover, the disposition of the marginal puncta is strictly intermediate, as these puncta alternate with two striae in *Cyclotella bodanica*, but with three striae in *Cyclotella comta* var. *radiosa*; cfr A. CLEVE-EULER, Cycl. bod , p. 441. — Most probably the quoted variety of *Cyclotella balatonis* PANT. (= *C. comta* EHB.) is identical with the present form. — Another related form is *Cycl. comta* var. *affinis* GRUN. (V. H. Tab. 93, f. 11—13), without visible channels.

Cyclotella bodanica EULENST. — V. H. Syn. Tab. 93, f. 10. A. CLEVE-EULER, Cycl. bod., p. 441, f. 2 a, b.

Foss.: Kk. Knjäsha, rare.

Distr. (*fresh w.*): Spread in the larger and colder lakes of Europe, as alpine lakes, lakes Vänern and Vättern in Sweden.

Cyclotella bodanica EULENST. var. **borealis** A. CL. Cycl. bod., p. 441, f. 2 c.

Foss.: Kk. Knjäsha, rare.

Distr. (*fresh w.*): Lakes of Northern Sweden.

A few specimens with 2—3 channels were met with among chiefly marine remains.

Cyclotella (Kützingiana var.?) **abnormis** n. var. — Pl. 3, f. 69.

Foss.: Ab. Hindersmossen.

As the form figured is somewhat abnorm, with some of the radiate striae perforated, I do not venture to give it a name. Perhaps it is a form of *Cyclotella Kützingiana.*

Cyclotella dubia FRICKE, A. S. Atl. Tab. 223, f. 23, 25. — *Syn. Stephanodiscus pulcherrimus* A. CL. Arch. f. Hydrobiol. Bd 6 (1910), p. 211, f. 3. — Icon. nost. Pl. 3, f. 70 a—d

Foss.: Kk. Tuntsa; Ab. Hindersmossen.

Distr. (*fresh w.*): Limnetic in European lakes, especially when small and shallow.

As I have remarked in the paper quoted above, this species can be referred to the genus *Cyclotella* as well as to *Stephanodiscus.* It has the characters of the former, viz. a marginal zone with a special structure, but the loculi sometimes are small, the whole valve then getting very similar to that of a *Stephanodiscus.*

I have found this small species to be spread in many Swedish lakes as well as in fossil deposits, and it may no doubt in the future be recorded living also in Finlandian lakes. From *Steph. astraea* it is easily distinguished by the single rows of rather coarse puncta. In a fossil state, the valves generally have the aspect shown by fig. 70 d.

Cyclotella dubia FRICKE var. **spinulosa** n. var. — Pl. 3, f. 71.

Differs from the type by the presence of delicate thorns inserted between every second alveolus.

Distr. (*fresh w.*): sparingly among the type.

Stephanodiscus (Ehb.) Grun.

Stephanodiscus Niagarae Grun. Franz Jos. L. D. Tab. 5, f. 1. — V. H. Syn. Tab. 95, f. 13. — Icon. nost. Pl. 3, f. 72.

Valve robust, not very convex, until 56 μ in diameter. Striae 10 in 10 μ, composed of rather strong puncta in single rows, that, however, at an other mise à point, can be resolved into double rows of fine puncta, as in *Stephanodiscus astraea*. Spins, inserted at some distance from the margin, alternate with three rows of puncta.

Foss.: Ab. Hindersmossen, rather common, associated with *Eunotia Clevei* in strata from the *Ancylus*-epoch.

Distr. (*fresh w.*): Larger lakes of North America and Europe.

Though I think the determination is correct, I give it with reservation, having not had the opportunity of comparing the form from Finland with authentic specimens. If so be the case, I quite agree with Mr Østrup (Danske Diat. j. Afl., p. 60) in the opinion, that *Steph. Niagarae* is hardly specifically different from *Steph. astraea*. It is a stronger, more luxuriant form, from which the recent *Steph. astraea* may have developed in course of time. In reality, the structure of the valves is certainly more similar than it appears to be in consequence of the thicker valves of *Steph. Niagarae*. The presence of a little blank, central annulus is a character, common to this large form and the larger *Cyclotellas*, belonging to the section of *Cyclotella comta*.

Biddulphia Gray.

Biddulphia aurita (Lyngb.) Bréb. — V. H. Syn. Tab. 98, f. 4—9. Nord. Plankton, p. 105, f. 137.

Foss.: Kk. Knjäsha. Koudajärvenpää, frequent.

Distr. (*mar.*): Arctic Sea, ubiquist.

Biddulphia obtusa (Kütz.) Ralfs. — V. H. Syn. Tab. 100, f. 11—14.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Nimrod Sound.

Terpsinoë Ehb.

Terpsinoë trifoliata Cl. — Perag. D. Mar. de France. Tab. 90 f. 7, 8. — *Syn. Triceratium trifolium* A. S. Atl. Tab. 78 f. 4.

Foss.: Ok. Paltamo, rare.

Distr. (*mar.*): (foss.) Auvergne; Barbados.

Entogonia Grev.

Entogonia sp.? — Pl. 3, f. 73.

Foss.: Kk. Knjäsha, Koudajärvenpää. Several fragments of very coarse structure were met with in the marine strata from the quoted localities. The silicious plate is perforated by pores, 9 μ in diameter. As I have no knowledge of the outline of this fossil valve, I cannot say anything about its nature. The large pores mind of the genus *Entogonia*, for instance *E. Jeremiae* Bergon from Haïti, delineated in Le Diatomiste I, Tab. 20, f. 11. Also a large *Hemiaulus* or *Biddulphia* might be suggested.

Thalassiosira Cl.

Thalassiosira decipiens (Grun.) Gran. — Nord. Plankton, p. 17, f. 10. — *Syn. Coscinodiscus decipiens* Grun. V. H. Syn. Tab. 91, f. 10. *Thalassiosira gelatinosa* Hensen.

Foss.: Kk. Knjäsha, rather frequent.

Distr. (*mar.*): N. E. Greenland (Østrup), coasts of N. Europe.

Thalassiosira gravida Cl. D. Baff. Bay, p. 12, Tab. 2, f. 14—16. — Nord. Plankt., p. 18, f. 12. — *Syn. Coscinodiscus subglobosus* Cl. & Grun.

Foss.: Ka. Viborg-deposit (Cleve); Kk. Knjäsha, frequent.

Distr. (*mar.*): Arctic Sea, coasts of North Europe, East America.

Coscinodiscus Ehb.

Coscinodiscus anguste-lineatus A. S. — Nord. Plankton, p. 30, f. 30 b.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Arctic Sea, Atlantic.

According to Gran, Nord. Plankt. l. c., the nature of

this disc is not quite clear. It may possibly be a form of *Coscinodiscus excentricus*.

Coscinodiscus excentricus Ehb. — V. H. Syn. Tab. 130, f. 4. Nord. Plankton, p. 29, f. 29.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): Arctic Sea, Atlantic.

Coscinodiscus hyalinus Grun. Franz Jos. L. D., p. 56, Tab. 3, f. 28.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): East Arctic Sea.

Diameter of Finlandian specimens 50 μ. Inframarginal spines more distant than on Grunow's figure, that has been drawn from a smaller specimen.

Coscinodiscus subtilis Ehb. var. **glacialis** Grun. f. **major** nob.

Foss.: Kk. Knjäsha.

Distr. (*mar.*): East Arctic Sea.

To this variety I refer, because of the similar structure, some specimens with exceedingly delicate rows of alveoli, arranged in about 15 fascicles. Diameter 40—45 μ. The *Cosc. subtilis* var.? *glacialis* of Grunow is recorded to have only 8 fascicles and to be only 22 μ in diameter.

Coscinodiscus curvatulus Grun. — A. S. Atl. Tab. 57, f. 33. — *Syn. Coscinodiscus curvatulus* var. *inermis* Grun. Franz Jos. L. D., p. 31, Tab. 4 (D.), f. 11, 12. — Nord. Plankton, p. 35, f. 37.

Foss.: Kk. Knjäsha, Koudajärvenpää, rather frequent.

Distr. (*mar.*): Arctic Sea, North Atlantic Ocean. Foss.: Peru-Guano; Richmond.

Coscinodiscus curvatulus Grun. var. **minor** Grun.

Foss.: Ka. Viborg-deposit (Cleve 1894).

Coscinodiscus curvatulus Grun. var. **kariana** Grun. A. D. Tab. 7, f. 129.

Foss.: Kk. Knjäsha, rare.

Distr. (*mar.*): East Arctic Sea.

Coscinodiscus subbulliens Jörg. — Nord. Plankton, p. 32, f. 32. *Syn.? Coscinodiscus devius* A. S. Atl. Tab. 60, f. 1—4.

Foss.: Kk. Knjäsha, Koudajärvenpää, rather frequent.
Distr. (*mar.*): Arctic Sea, North Atlantic.

Coscinodiscus centralis EHB. — Nord. Plankton, p. 33, f. 33.

Foss.: Kk. Knjäsha, Koudajärvenpää? Sat. Panelia.
Distr. (*mar.*): Gulf-stream, North Atlantic.

Coscinodiscus concinnus W. SM. — Nord. Plankton, p. 33, f. 34.

Foss.: Kk. Knjäsha, Koudajärvenpää, not rare.
Distr. (*mar.*): W. and E. Arctic Sea, Atlantic.

Coscinodiscus (lacustris GRUN. var.?) **septentrionalis** GRUN. Franz Jos. L. D. Tab. 4 (D.), f. 33.

Foss.: Sat. Panelia (*Litorina*-dep.); Kk. Knjäsha, Koudajärvenpää, Niemenkönkään alus.

Distr. (*mar.*): Greenland (OSTRUP), East Arctic Sea, North Sea. (Foss.) Sweden, frequent in deposits from the *Litorina*-epoch.

The »*Coscinodiscus lacustris* GRUN.», Franz Jos. L. D. Tab. 4, f. 30, mentioned in CLEVE's list, is also present in the samples from Knjäsha, but is less frequent. The greater part of the *Coscinodiscus lacustris*, quoted for fossil Swedish deposits from the *Litorina*-epoch, is identical with *Cosc. septentrionalis* GRUN.

Coscinodiscus plicatulus GRUN. Franz Jos. L. D. Tab. 4, f. 27. — Icon. nost. Pl. 3, f. 74.

Foss.: Sat. Panelia.

A rather large form. 65 μ in diameter, which seems to belong to this species, has been drawn in fig. 74.

Distr. (*mar.*): (foss.) California.

Actinoptychus EHB.

Actinoptychus undulatus (BAIL.). — V. H. Syn. Tab. 22 bis, f. 14; Tab. 122, f. 1—3; Nord. Plankt., p. 42, f. 46.

Foss.: Kk. Knjäsha; samples from the Geol. Commission (locality unknown); Ok. Paltamo, rare.

Distr. (*mar.*): Arctic, Antarctic Seas; ubiquist.

The number of species and varieties, mentioned in this paper as discovered in Finland after the publication of CLEVE's Diatoms of Finland, amounts to 268, or 187 species and 81 varieties besides, among which 28 species and 36 varieties have been now described for the first time.

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Addenda et corrigenda.

p. 3: For *Sceptroneis marina* and *Podosira dubia* I have not found any records from the Arctis.

p. 12: *Diploneis Smithii* Bréb. v. *permagna* n. var. must not be confused with *Nav. fusca* v. *permagna* Pant., that Cleve puts to *D. major* and Peragallo has figured in D. mar. de France Tab. 20, f. 1 under the inappropriate name of *D. Smithii* v. *permagna* Cl.

p. 19: *Cymbella lanceolata* Kütz. v. *inflata* n. v., Pl. 1, f. 17, must be altered to *C. lanceolata* v. *ventricosa* n. v., the name *inflata* being already occupied for a form from the Balaton-lake (Pant. D. Balat. See Tab. 1 f. 8).

p. 24: The form named *Nav. cancellata* Donk. var. *retusa* Bréb.? (pl. 1 f. 20) ist most probably the *Nav. pseudoretusa* Per., D. mar. de France Tab. 11, f. 17. Cfr. also what is said of *Pinnularia clipeata,* p. 32.

p. 36: *Amphora polaris* Østr. may probably be united with *A. ostrearia* Bréb. v. *vitrea* Cl., especially as figured in Per. D. mar. de France. Tab. 49, f. 14 (Distr.: ubiqu.).

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(*Synonymes are printed in italics.*)

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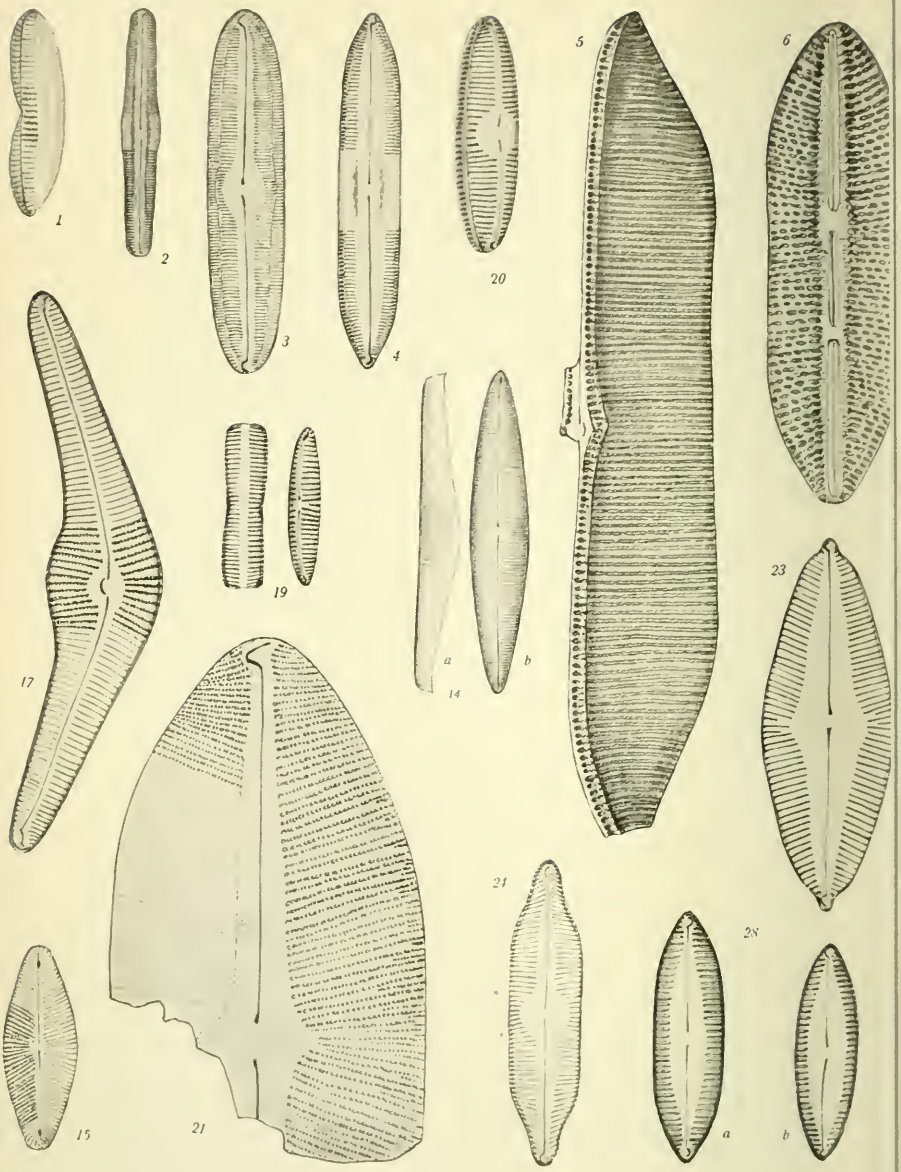

Auct. del. (figures x 640).

1. Amphiprora aboensis n. sp. 2. Caloneis furcata n. sp. 3. C. Liber v. transitans
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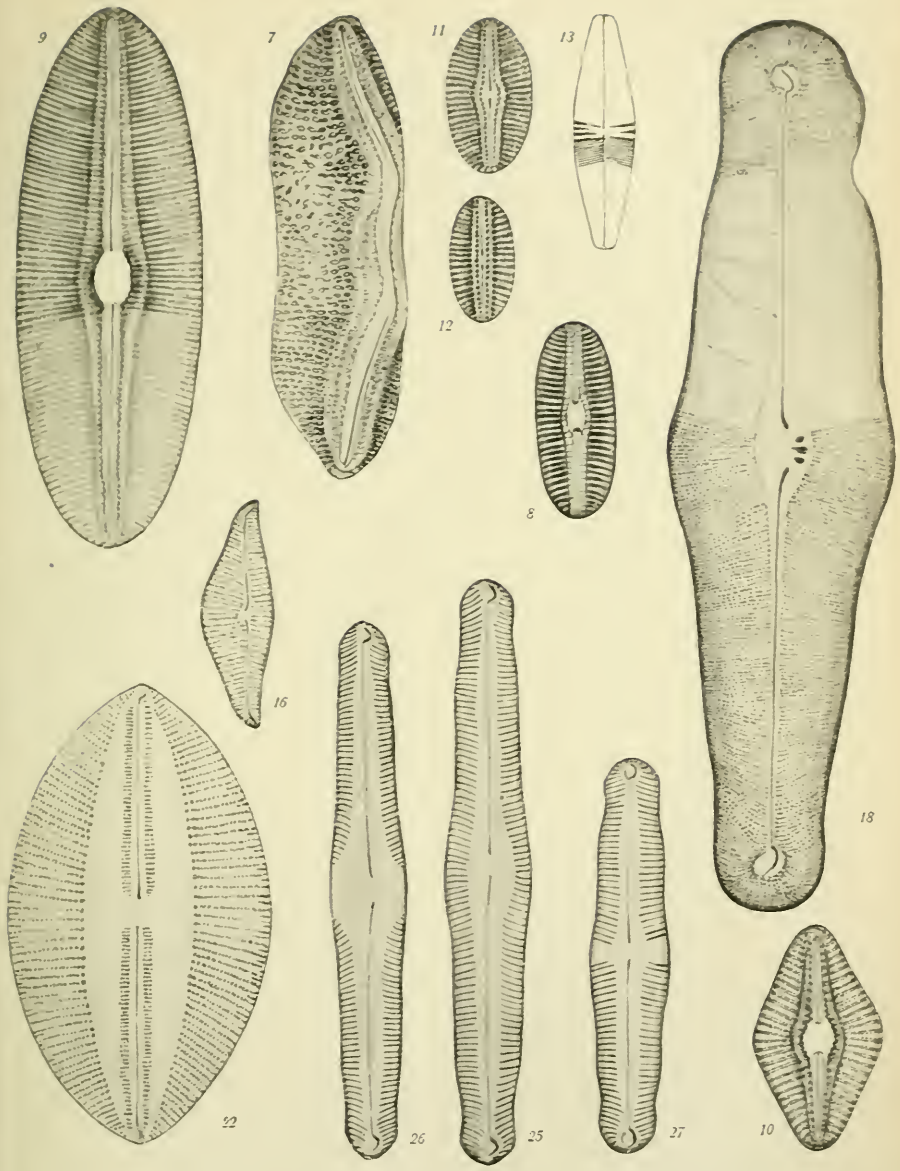

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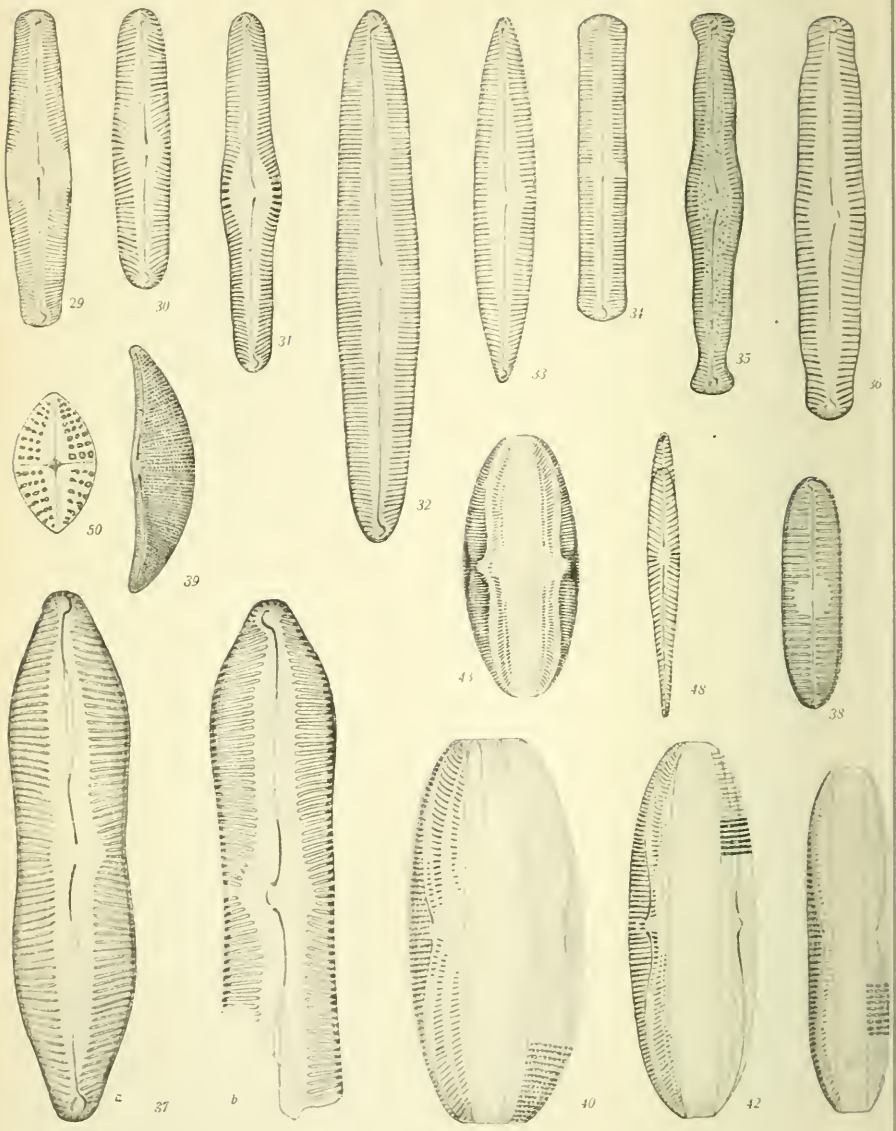
4. C. fossilis n. sp. 5. Scoliotropis septentrionalis n. sp. 6. Diploneis Entomon f. n. v. 10. D. Smithii v. rhombica n. v. 11. D. decipiens n. sp. 12. D. decipiens v. pa- Cymbella fennica n. sp. 16. C. recta n. sp. 17. C. lanceolata v. inflata n. v. 18. Gom- 1. 21. N. latissima v. grandis n. v. 22. N. Hennedyi v. luxuosa n. v. 23. N. angulosa. 26. The same f. interrupta. 27. P. Legumen v. florentina. 28. P. hemiptera.



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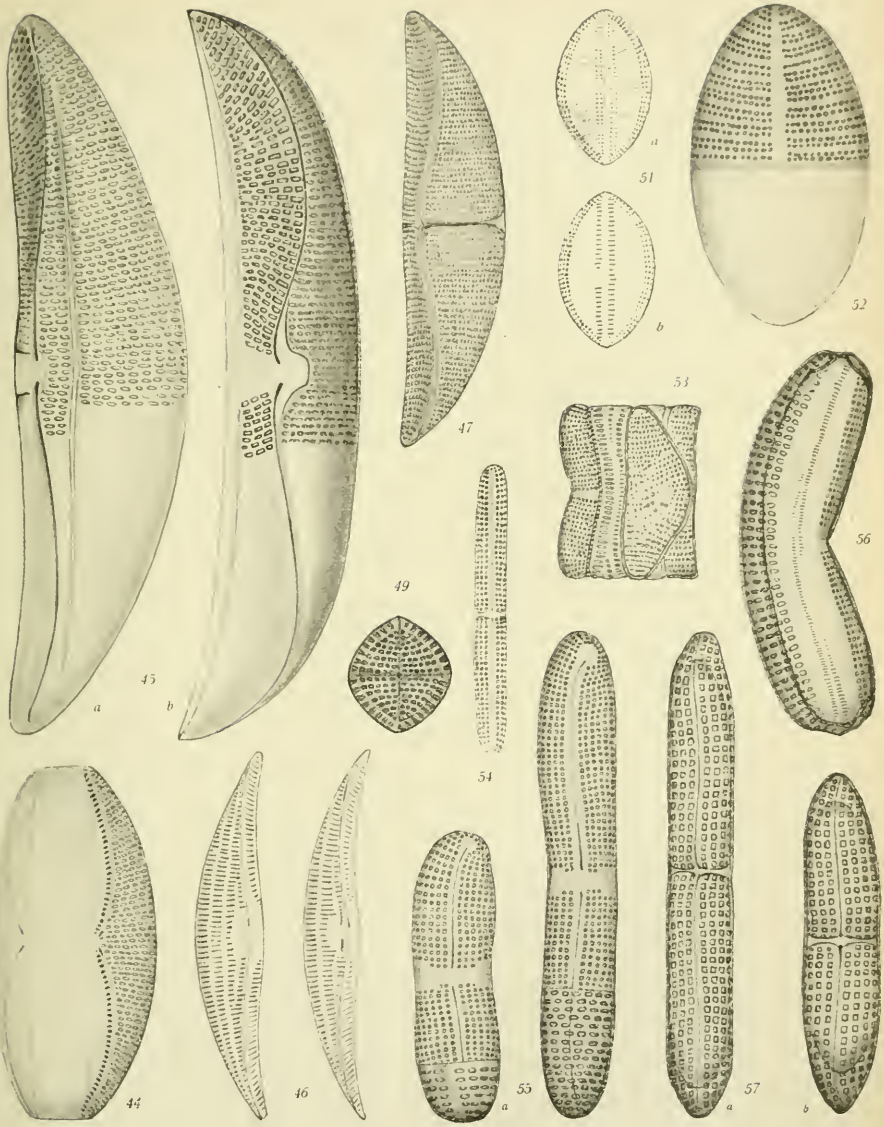
29. P. divergens v. truncata n. v. 30. P. rangoonensis. 31. P. rang. v. förarmensis. f. capitata. 36. P. viridis v. producta n. v. 37. P. cuneata v. constricta n. v. 38. sima n. v. 42. A. Proteus v. lævistriata n. v. 43. A. impressa n. sp. 44. A. robusta cosphenia fossilis n. sp. 49. Cocconeis speciosa v. cruciata n. v. 50. C. distans v. media (spore). 54. A. brevipes v. angustata? 55. A. arct



Cederquists Graf. A.-B., Sthlm.

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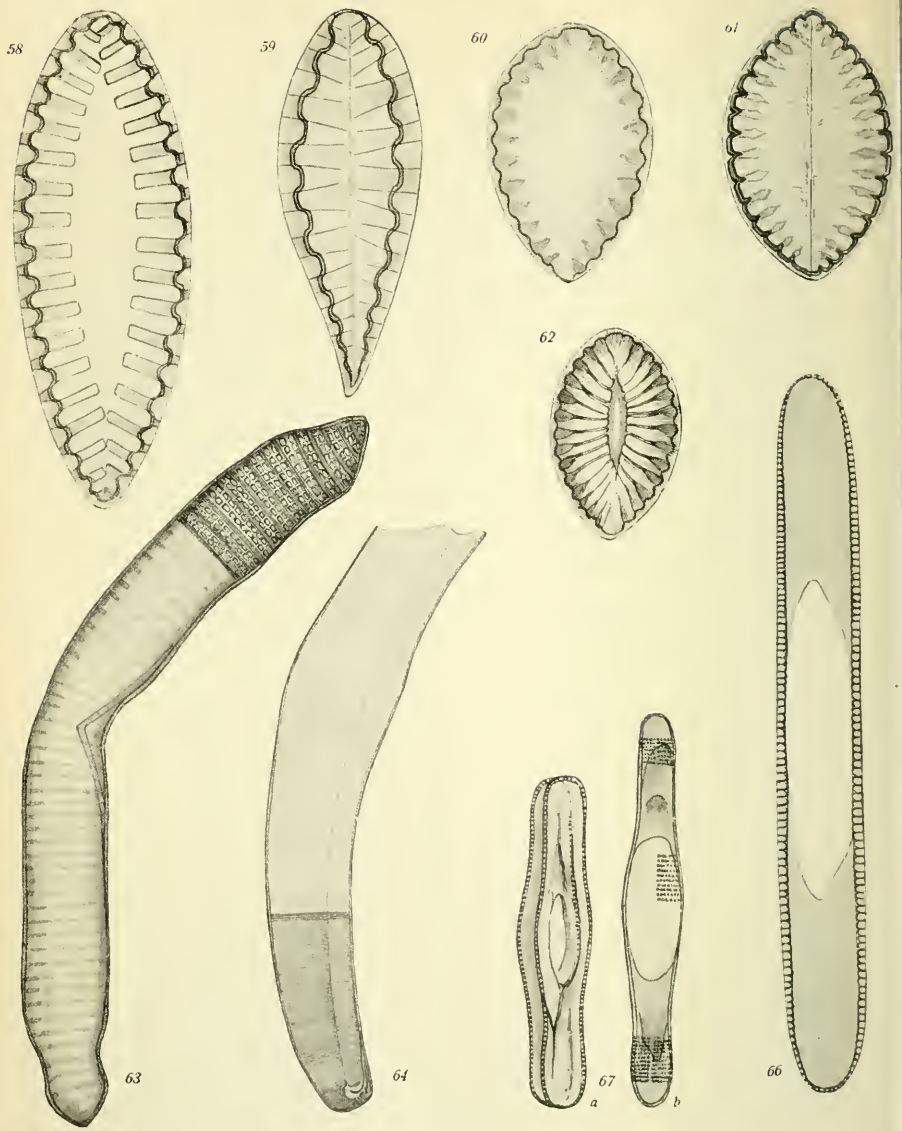
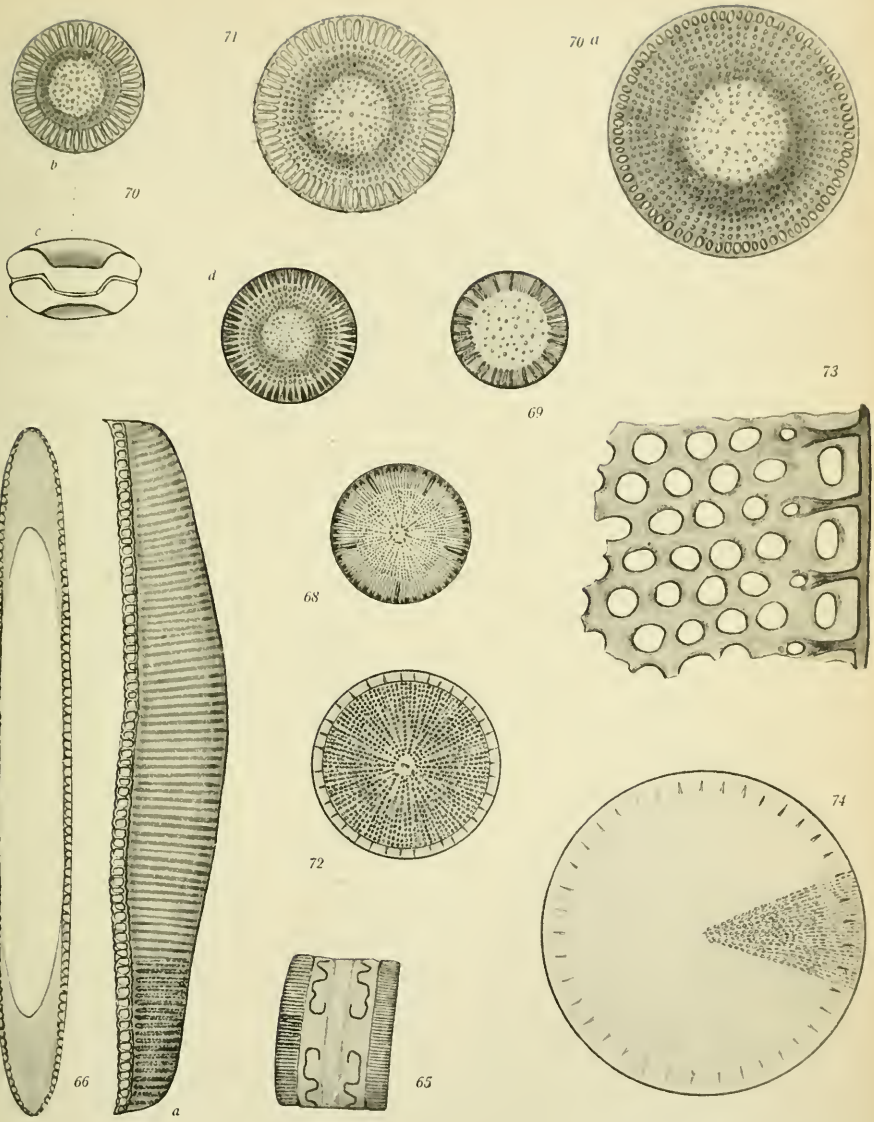


Auct. del. (figures x 640 when not otherwise stated).

58. Surirella robusta v. marginata n. v. (×320). 59. S. distinguenda n. sp. (×400). 60 auxospore? 64. Eunotia Clevei; auxospore (×320). 65. Grammatophora arcuata. 6 tabilis n. v. 69. C. Kützingiana? 70. C. dubia (a-c×1280). 71. C. dubia v. spinulo



Cederquists Graf. A.-B., Sthlm.

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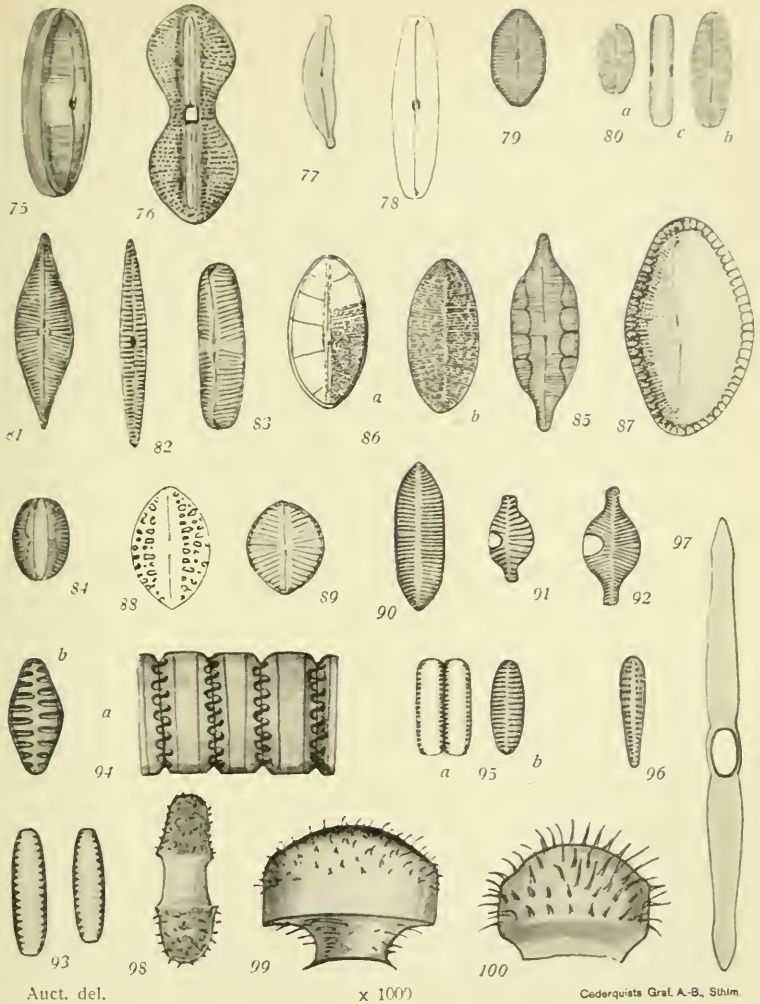

75. Caloneis æmula. 76. Diploneis chersonensis v. diminuta n. v. 77. Cymbella hyalina n. sp. 78. Navicula problematica. 79. N. bahusiensis. 80. N. truncata n. sp. 81. N. ammophila v. Østrupii. 82. N. ammophila v. intermedia. 83. Pinn. cruciformis v. færöensis. 84. Amphora marina v. minima n. v. 85. Mastogloia exigua v. rostellata n. v. 86. Cocconeis molesta v. Lindbergii n. v. 87. C. Østrupii n. sp. 88. C. sp. 89. Achnanthes latissima n. sp. 90. A. sp. 91. A. lanceolata v. crassa n. v. 92. A. rhynocephala n. sp. 93. Surirella nana n. sp. 94. Fragilaria mutabilis v. lancettula. 95. Fr. producta. 96. Sceptroneis sp. 97. Grammatophora Sagitta n. sp. 98. Chætoceras seiracanthum. 99. Ch. Amanita n. sp. 100. Ch. sp.