



<https://www.biodiversitylibrary.org/>

**Annual report of the Fishery Board for Scotland**

Edinburgh The Board; H.M. Stationery Off

<https://www.biodiversitylibrary.org/bibliography/98312>

**v.15:pt. 2-3 (1896):** <https://www.biodiversitylibrary.org/item/176986>

Article/Chapter Title: 1896CleveRptPhytplankShetlandIslands

Page(s): Page 297, Page 298, Page 299, Page 300, Page 301, Page 302, Page 303, Page 304, Text

Holding Institution: Harvard University, Museum of Comparative Zoology,  
Ernst Mayr Library

Sponsored by: Harvard University, Museum of Comparative Zoology,  
Ernst Mayr Library

Generated 16 June 2023 8:40 AM

<https://www.biodiversitylibrary.org/pdf4/1595675i00176986.pdf>

Cleve, P.T. 1896. Report on the phyto-plankton collected on the expedition of the H.M.S. 'Research', 1896.  
Annual report of the Fishery Board for Scotland, 15, pt.2-3: 297-304, 1 plate.

This page intentionally left blank.

X.—REPORT ON THE PHYTO-PLANKTON COLLECTED ON THE EXPEDITION OF H.M.S. 'RESEARCH,' 1896. By Professor P. T. CLEVE, LL.D., of the University of Upsala, Sweden. (Pl. VIII.)

From the Fishery Board for Scotland I received for examination a series of samples collected last summer around the Shetland Islands. Some of the samples were so poor in diatoms and cilioflagellates that they are omitted in the following account.

The samples examined were the following:—

- |     |                           |                  |                  |            |             |
|-----|---------------------------|------------------|------------------|------------|-------------|
| 1.  | Station Jackal II.,       | lat. 61° 45' N., | long. 0° 59' W., | 30th July, | 10 a.m.     |
| 2.  | "                         | "                | "                | "          | 1 p.m.      |
| 3.  | "                         | "                | "                | "          | 3 p.m.      |
| 4.  | Station Jackal XIII.,     | lat. 61° 1' N.,  | long. 3° 12' W., | 31st July, | 10 a.m.     |
| 5.  | "                         | "                | "                | "          | 11.30 a.m.  |
| 6.  | "                         | "                | "                | "          | 2 p.m.      |
| 7.  | Station Jackal XIV.,      | lat. 61° 20' N., | long. 4° 22' W., | 4th Aug.,  | 11 a.m.     |
| 8.  | "                         | "                | "                | "          | 2 p.m.      |
| 9.  | Station Jackal XVII.,     | lat. 60° 34.5',  | long. 5° 37.5',  | 5th Aug.,  | 2 p.m.      |
| 10. | "                         | "                | "                | "          | 3.30 p.m.   |
| 11. | Station Knight Errant 28, | lat. 60° 2' N.,  | long. 7° 11' W., | 6th Aug.,  | 11.30 a.m.  |
| 12. | "                         | "                | "                | "          | 6 p.m.      |
| 13. | "                         | "                | "                | "          | 8 p.m.      |
| 14. | Station Knight Errant 33, | lat. 60° 3' N.,  | long. 5° 51' W., | 1st Aug.,  | 10 a.m.     |
| 15. | "                         | "                | "                | "          | 2 to 4 p.m. |
| 16. | "                         | "                | "                | "          | 3rd Aug.,   |
|     |                           |                  |                  |            | 11 a.m.     |
| 17. | "                         | "                | "                | "          | 2 p.m.      |

The more important forms are named in the following table (p. 298), where *r* signifies rare and *c* common, *cc* very common, + neither rare or common.

A complete enumeration of the forms, with remarks, will be found later on. In order to get as complete a list as possible, I treated a mixture of all the samples with acids, and examined the cleaned forms. This sample is in the following pages named 'mixed sample.'

#### LIST OF SPECIES.

##### A. DIATOMS.

*Asteromphalus heptactis* (Bréb.), Ralfs. (Pritch., Pl. VIII. fig. 21; *Spatangidium Ralfsianum*, Norm. M.J. VII. (1859), Pl. VII. figs. 7, 8; *Asteromphalus Ralfs.*, A. Schm., Atl., Pl. XXXVIII. figs. 5–8) occurs rarely in some samples, and has been observed by M. Grove in samples from Färö (Knight Errant Exp.) and by various observers in guano from California and Peru. It belongs to the warmer Atlantic. Another species, *A. atlanticus*, Cl., occurs also in the Atlantic, but in company with *Chaetoceros-species*, and seems to characterise the chaetoceros-plankton as *A. heptactis* does the east atlantic plankton. *A. atlanticus* is found in Davis Strait, and this summer near Spitsbergen always in chaetoceros-plankton.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
DIATOMS.	r	r	r	r	+	+	+	cc	cc	cc	c	+	c	c	cc	c	c
<i>Asteromphalus heptactis</i> , Ralfs.,	.	.	.	.	.	.	r	.	.	.	r	.	.	.	.	.	r
<i>Bacteriastrium delicatulum</i> , Cl.,	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	r
<i>Cerataulina Bergonii</i> , H. P.,	.	.	.	.	.	.	.	.	.	.	r	.	.	r	.	.	r
<i>Chaetoceros atlanticus</i> , Cl.,	.	.	.	.	.	.	.	.	.	.	r	.	.	.	.	.	r
<i>C. borealis</i> , Btw.,	.	r	r	r	r	r	r	.	.	r	r	.	.	r	.	.	.
<i>C. currens</i> , Cl.,	.	.	.	.	.	r	+	.	.	r	r	rr	.	.	.	.	.
<i>C. decipiens</i> , Cl.,	.	.	.	.	.	.	r	.	.	r	.	.	.	r	.	.	r
<i>C. peruvianus</i> , Btw.,	.	.	.	.	r	.	r	.	.	.	.	.	.	.	.	.	.
<i>Corethron hysrtix</i> , Hensen.,	.	.	.	.	.	.	r	.	.	r	r	.	.	.	.	.	r
<i>Dactyliosolen antarcticus</i> , Castr.,	r	.	.	.	.	.	r	.	.	r	r	r	.	.	.	.	r
<i>D. mediterraneus</i> var. <i>tenuis</i> , Cl.,	.	.	.	.	.	.	r	.	.	.	r	.	.	.	.	.	r
<i>Nitzschia seriata</i> , Cl.,	.	.	.	.	.	.	.	.	.	r	r	.	.	.	.	.	r
<i>Rhizosolenia alata</i> , Btw.,	.	+	.	.	.	.	+	cc	c	cc	.	+	c	cc	cc	c	c
<i>R. al.</i> var. <i>gracillima</i> , Cl.,	.	.	.	r	.	.	r	.	c	c	.	r	.	.	.	c	.
<i>R. styliformis</i> , Btw.,	.	+	+	+	+	+	+	+	c	cc	c	+	cc	c	+	+	c
CILIOFLAGELLATES.	cc	cc	cc	cc	cc	cc	+	r	r	r	r	c	+	+	.	r	+
<i>Ceratium furca</i> , Duj.,	.	+	+	r	+	+	+	r	.	r	.	.	r	r	.	.	r
<i>C. fusus</i> , Duj.,	.	+	+	r	+	+	+	r	.	r	.	.	.	.	.	.	r
<i>C. tripos</i> , Ehb. type,	.	c	c	c	c	c	+	r	r	+	+	c	c	c	.	r	c
<i>C. tripos</i> var. <i>horrida</i> , Cl.,	.	+	+	+	r	r	r	r	r	r	r	r	r	r	.	.	r
<i>C. tripos</i> var. <i>longipes</i> , Baile,	.	r	.	.	r	.	.	.	.	.	.	r	+	r	.	r	r
<i>Peridinium divergens</i> , Ehb.,	.	r	r	.	r	r	r	.	r	r	r	.	r	r	.	.	.
<i>Pyrophacus horologium</i> , Stein.,	.	.	.	.	.	.	.	.	.	.	.	rr	.	r	.	.	r
CHLOROPHYLLACEAN.																	
<i>Halosphora viridis</i> , Schmitz,	.	.	.	r	r	.	.	.	.	.	.	.	.	r	.	.	.

*Bacteriastrium delicatulum*, Cl., n. sp. (Pl. fig. 15). Slightly silicious. Frustule cylindrical. Long. axis, 0.015; diam., 0.012 mm. Awns arising inside the margin of the valve, furcate, with distinct basal part (in length 0.002 mm.), about eight in the circle.—This species was found very rarely in some samples. It is distinguished from *B. varians* by its delicate membrane and the long basal parts of the awns. The cell-contents were heaped at the valves, but my specimens were perhaps not healthy when killed by the alcohol. In *B. varians*, the cell-contents consist of a number of small chromatophores scattered along the wall of the frustule.

*Cerataulina Bergonii*, H. P. (Monogr. du Rhizosol., Pl. I. figs. 15, 16), rare in some samples.

*Chaetoceros atlanticus*, Cl. (D. f. the Arct. Sea, Pl. II. fig. 8), rare in some few samples.

*Chaetoceros borealis*, Btw., rare.

var. *Brightwellii*, Cl. (D. f. the Arct. Sea, Pl. II. fig. 7a), rare (Nos. 2, 9, 17).

var. *solitaria*, Cl., n. var. Cells isolated, or in pairs. Not very rare. (Nos. 2, 7, 9, 10, 11, 12, 17.)

*Chaetoceros criophilus*, Castr. (Challenger D., p. 78), rare (Nos. 11, 17).

*Chaetoceros curvisetus*, Cl. (Bih. K. Sv. Vet. Ak. Handl., XX. 32, Pl. I. fig. 5), very rare (Nos. 11, 17).

*Chaetoceros currens*, Cl., n. sp. (Pl. fig. 8). Cells isolated. Valves dissimilar. Upper valve usually the largest, convex, with the awns arising near the centre. Lower valve flat, with awns arising between the centre and the margin. Valves nearly orbicular. Awns of the upper valve directed in the direction of the sagittal axis, not distinctly striate,

with a spire of conspicuous spines. Awns of the lower valve somewhat diverging. Cell-contents: scattered chromatophores, also in the awns. Long. axis, 0.02; sag. axis, 0.015; trans. axis, 0.012 mm.

This species may be the same as *C. volans*, Schütt (Ber. D. Bot. Ges., 1895, Bd. XIII. fig. 20), but in the fig. of Schütt the awns of the upper valve arise near the margin, and, besides, there is no description of the awns, so I cannot, without original specimens, identify them. *C. currens* was met with this summer in the seas around Spitsbergen and Beeren Eiland.

*Chaetoceros decipiens*, Cl. (D. f. Arct. S., Pl. I. fig. 5). Of this species, so abundant in the middle Atlantic, some few specimens only were found.

*Chaetoceros peruvianus*, Btw. (Pl. fig. 7) (M.J. IV., Pl. VII. figs. 16-18; and VI., Pl. VIII. figs. 9, 10). This species is nearly related to *C. currens*, but much coarser, and differs especially by the awns, which are coarsely transversely striate (striae 21 in 0.01 mm.), and carry a spiral of coarse spines.

*C. peruvianus* belongs to the warmer seas. I know this form from Ascension, the Mediterranean, and Java.

*Corethron hystrix*, Hensen (Pl. fig. 15). Frustule very thin and membranaceous, cylindrical, short, with very convex valves. Long. axis, 0.04 to 0.07; diam., 0.02 to 0.03 mm. Both valves at their basis with a circlet of straight, simple awns, all in the same direction, or about 45° from the longitudinal axis; upper valve besides with a number of exceedingly delicate hairs, thickened at their ends. Cell-contents: numerous linear chromatophores, which radiate from the nucleus along the inside of the frustule. Nucleus near the connecting zone.

This species is nearly related with a form from the Antarctic Ocean, of which Mr Comber sent me specimens; also that form has, as Mr Comber pointed out, between the awns, hyaline hairs, which end in hooks, but they are much stronger than in *C. hystrix*.

*C. hystrix* was found only in a small number of specimens. I have also observed it this summer in samples from Beeren Eiland, and in the end of October in the middle of the North Sea. It seems to be a characteristic, but rare, form of the Atlantic plankton.

*Coscinodiscus anguste-lineatus*, A. Schm. (Atl., Pl. LIX. fig. 34) var. Some few valves were found in the mixed sample. Diam., 0.01 to 0.03 mm. Margin with a row of apiculi (5 in 0.01 mm.). Rows of cellules, 12 to 18 in 0.01 mm.

*Coscinodiscus curvatulus*, Gran. var. Some few valves in the mixed sample. Diam., 0.035 to 0.055 mm. Margin with a row of apiculi (2-3 in 0.01 mm.) and a pseudonodule. Rows of cellules almost straight, 6 to 7 in each bundle, and about 6 in 0.01 mm.

*Coscinodiscus minor*, Ehb. var. In the mixed sample some few valves were found of a form resembling A. S. Atl., CXIII. fig. 10, and LIX. fig. 8, but of extremely small size, 0.01 mm. only in diameter. Cellules about 12 in 0.01 mm., larger in the middle and smaller at the margin, which is striate (striae about 20 in 0.01 mm.).

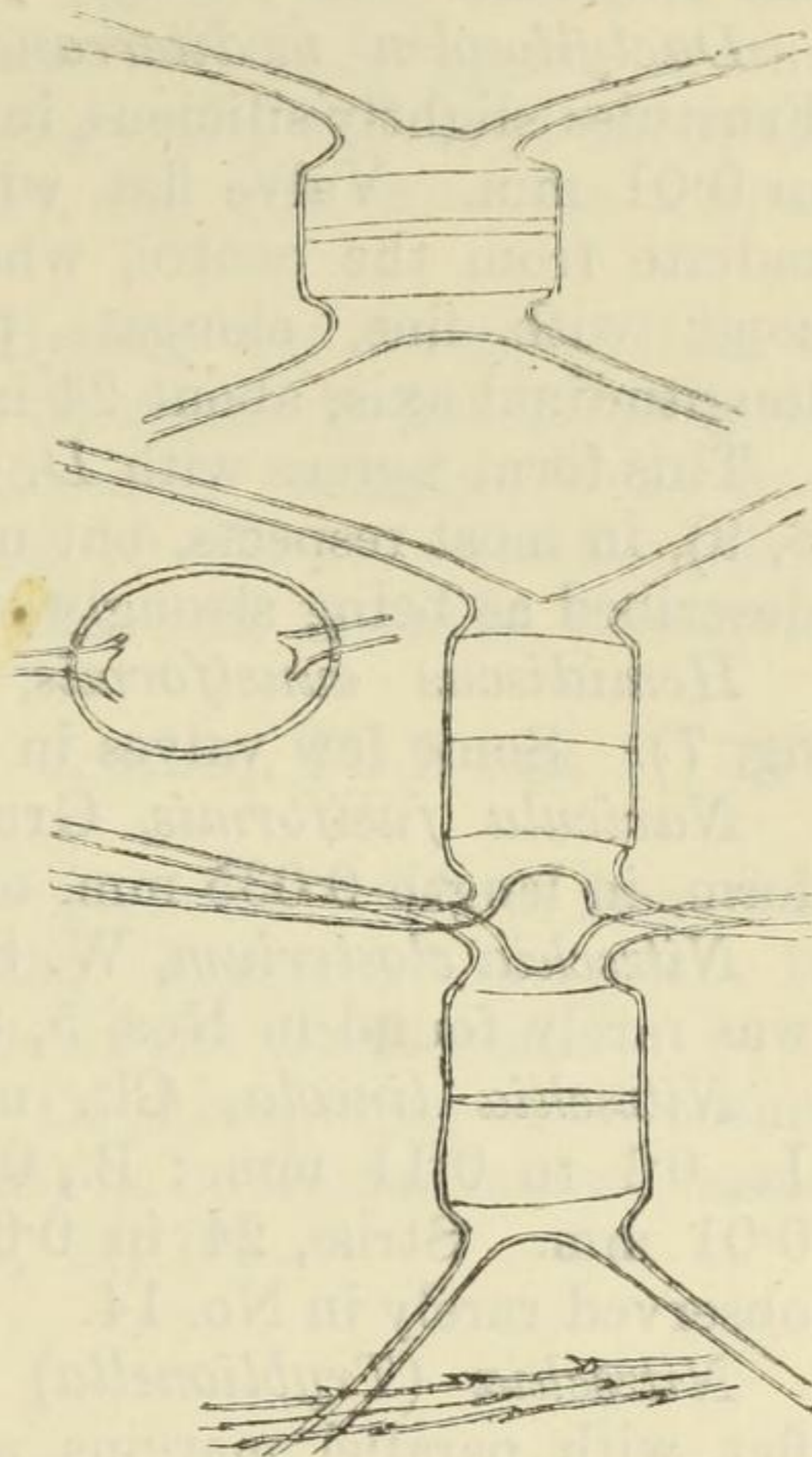


FIG. 1.—*Chaetoceros borealis*, var. *solitaria*, 500 tm.

*Coscinodiscus oculus iridis*, Ehb. A single specimen only was found in the mixed sample.

*Dactyliosolen antarcticus*, Castr. (Challenger D., p. 75, Pl. IX. fig. 7), occurs in several samples, but nowhere abundant. Hitherto observed in the Antarctic Ocean only.

*Dactyliosolen mediterraneus*, H. P. var. *tenuis*, Cl. (Pl. fig. 14). Frustules slightly silicious, in diameter 0·01 to 0·025 mm. Annuli, 2 to 4 in 0·01 mm. Valve flat, with delicate puncta arranged in rows, which radiate from the centre, where are some scattered puncta. Connective zone, with fine, elongate puncta arranged in lines parallel to the longitudinal axis, about 24 in 0·01 mm.

This form agrees with *D. medit*, H. P. (Monogr. d. Rhizosol, Pl. I. figs. 8, 9), in most respects, but not in the strength of the membrane, which is described as being strongly silicious.

*Hemidiscus cuneiformis*, Wallich (Janisch. Gazelle Exp., Pl. I. fig. 7). Some few valves in the mixed sample.

*Navicula fusiformis*, Grun. var. A very small, exceedingly delicate, form, in length 0·035 mm. only, was found in the mixed sample.

*Nitzschia closterium*, W. Sm. A delicate variety, with straight beaks, was rarely found in Nos. 5, 8, 12, 16, 17.

*Nitzschia lineola*, Cl., n. sp. (Pl. fig. 10). Valve narrow, acute. L., 0·1 to 0·11 mm.; B., 0·002 mm. Keel eccentric, its puncta 14 in 0·01 mm. Striæ, 24 in 0·01 mm. This exceedingly delicate form was observed rarely in No. 14.

*Nitzschia (Tryblionella) migrans*, Cl., n. sp. (Pl. fig. 9). Valve flat, with parallel margins and subcuneate somewhat obtuse ends. L., 0·035 mm.; B., 0·007 mm. Keel-puncta indistinct. Striæ coarse, 11 in 0·01 mm.

This species was found in isolated specimens, rarely in Nos. 12 and 13. It is related to *N. seriata*, Cl.

*Nitzschia seriata*, Cl. (Vega Exp. D., Pl. XXXVIII. fig. 75). This species, which occurs in the Arctic Sea, and occasionally in the North Sea the Irish Channel, was met with in some few samples only. It is the only arctic form observed in the 'Research' samples.

This species may easily be mistaken for another form, which I name *N. fraudulenta*, n. sp. The latter (Pl. fig. 11) occurs in chains as *N. seriata*, but is much more delicate, and has finer striæ (23 in 0·01 mm.), which are seen only with difficulty, whilst *N. seriata* is coarsely striate.

*N. fraudulenta* was found last summer in the harbour of Plymouth, and at the end of October in the middle of the North Sea. It is a southern, and *N. seriata* a northern, form, perhaps of the same species.

*Rhizosolenia alata*, Btw. (M.J. VI., Pl. V. fig. 8). This species was exceedingly common in several samples, especially from the western stations. The form found there was the typical one, but variable in size, so that several specimens must be considered as belonging to *R. alata* var. *gracillima*, Cl. The latter form, but not the typical, occurs in summer-time in large masses in the Kattegatt and Skagerak. This variety was also found as the principal constituent of the plankton near Beeren Eiland in September this year. At both places I have sometimes met with specimens, of which one-half belongs to *R. alata* and the other to *R. gracillima* (see the fig. in Van Heurck Synopsis, Pl. LXXIX. fig. 8). I am very much inclined to consider *R. alata* as an Atlantic form, which, in water of less salinity, becomes changed into *R. gracillima*.

*Rhizosolenia semispina*, Hensen (Pl. fig. 13). Under the name *R. setigera*, two well distinct species have been confounded, viz., the original

form figured by Brightwell in M.J. VI., 1858, Pl. V. fig. 7, and the form figured in Van Heurck's Synopsis, Pl. LXXVIII. fig. 7, and in Peragallo, Monogr. du g. Rhizosol., Pl. IV. figs. 12 and 14. The original *R. setigera* is very delicate, has no markings on the calyptra. There are no rings to be seen on the connecting zone. This form has not been found in the 'Research' samples, but occurs in the winter and early spring in the Kattegatt and Skagerak, where it forms interior cells, which are identical with *Pyxilla baltica*, Grun. The figures (Pl. fig. 12) show the formation of *Pyxilla baltica* inside *R. setigera*.

The other form, named *R. semispina* by Hensen was formerly (Bih. t. K. Sv. Vet. Akad. Handl., Bd. XXII. 3, No. 5) named by me *R. setigera forma gracilis*. It is very rare in the 'Research' samples, some few specimens only having been observed in Nos. 10 and 11. On the other hand, it is of very frequent occurrence in the west Atlantic plankton, which I call *tricho-plankton*.

*Rhizosolenia Stolterfothii*, H. P. (Monogr. d. Rhiz., Pl. I. figs. 17, 18). A few specimens only were found in No. 11.

*Rhizosolenia styliformis*, Btw. This characteristic Atlantic form was found more or less abundant in most of the 'Research' samples. It seems to belong especially to the eastern parts of the Gulf-stream.

*Thalassiothrix longissima*, Cl. and Grun. Of this species, which occurs in the western Atlantic (south west of Iceland) in enormous masses, some few specimens only were found in Nos. 7, 11, 14, 17.

## B. CILIOFLAGELLATES.

*Ceratium furca*, Duj.

*Ceratium fusus*, Duj.

*Ceratium tripos*, Ehb. This widely distributed species occurs in different varieties, which it is of importance to distinguish. Ehrenberg named a variety *macroceros* and another *arctica*, but did not give any figures of them. In the Infusionsthierschen, Pl. XXII. fig. 18, he figures two forms, of which the left is the most common, and may be considered as *the type*, and is as such figured by Claparède and Lachman. It corresponds with the var. *baltica*, Schütt (Besch. d. Plankton-Exp. von Krümmel, pp. 266 and 302). The right figure corresponds in outline with the variety *arctica*, figured by Claparède and Lachman, Etudes sur les infusoires, Pl. XIX. fig. 3. This is evidently the same as Schütt's var. *labradorica*, l.c. The other variety, *macroceros*, is figured by Claparède and Lachman, fig. 1. This easily recognised form has been named *scotica* by Schütt.

Schütt adds two other varieties, viz., *parvula*, the figure of which is insufficient for identification, and *tergestina*. The latter has in my paper (in Bih. K. Sv. Vet. Akad. Handl., XXII. 3, No. 5) been named *arctica* Aur, but was figured by Bailey, already 1854, as *Peridinium longipes* (Smithsonian contr., Vol. vii. f. 35). To these varieties I will add two, viz., *C. tripos* var. *bucephalus* and *C. tripos* var. *horrida*.

I give on Plate figures of all these varieties.

1. *C. tripos* type = *C. tripos* var. *baltica*, Schütt, fig. 1, is very common in the North Sea and in the 'Research' samples. In the Kattegatt and Skagerak it belongs to the summer plankton or the tripos-plankton.

2. *C. tripos* var. *macroceros*, Ehb. = *C. tripos* var. *scotica*, Schütt, fig. 6, very common in the English Channel and the south part of the North Sea. It was found very rarely in the 'Research' samples No. 10. In the Kattegatt and Skagerak it appears in the summer and autumn,

always in company with southern forms, and it belongs to tripos- and didymus-plankton.

3. *C. tripos* var. *arctica*, Ehb. = *C. tripos* var. *labradorica*, Schütt, fig. 3, is abundant in Baffin's Bay and the Labrador current. The form figured by Claparède and Lachman is remarkable for the coarse apiculi on the horns and the tail. It has not yet been found with certainty in the Kattegatt and Skagerak.

4. *C. tripos* var. *longipes*, Bail = *tergestina*, Schütt, *arctica*, Aur, fig. 2, was rarely found in the 'Research' samples; it occurs in the winter abundantly in the Kattegatt and Skagerak.

5. *C. tripos* var. *horrida*, Cl., fig. 4, resembles the var. *longipes*, but is remarkable for the spines on the horns and the tail. Occurs, although rarely, in most of the 'Research' samples.

6. *C. tripos* var. *bucephalus*, Cl., fig. 5, was not found in the 'Research' samples, but this summer in the collections of the Swedish expedition to Spitsbergen, as well as in a sample taken at the end of October in the middle of the North Sea.

*Peridinium divergens*, Ehb. (Stein, *Inf.*, Pl. X. figs. 1-5).

*Pyrophacus horologium*, Stein (*Inf.*, Pl. XXIV.).

#### C. SILICOFLLAGELLATES.

*Dictyocha fibula*, Ehb., extremely rare in the mixed sample.

*Dictyocha speculum*, Ehb., rarely in No. 11.

#### D. CHLOROPHYLLACEAN.

*Halosphaera viridis*, Schmitz, rare in several of the samples.

#### Results.

In a paper published this 1896 (in Bih. K. Sv. Vet. Akad. Handl., Bd. XXII. 3, No. 5), I have distinguished in the Skagerak and Kattegatt four different types of plankton, viz. :—

I. *Tripos-plankton*, characterised by abundance of crustaceans and cilioflagellates, but usually a scarcity of diatoms, among which *Coscinodiscus concinnus* and *Rhizosolenia gracillima* are the most important. This kind of plankton rules at the west coast of Sweden in the summer, and there are reasons for believing it to be derived from the northern or southern North Sea.

II. *Didymus-plankton* (Sign N), characterised by *Chaetoceros didymus*, *C. Schüttii*, *C. curvisetus*, *C. lacinosus*, *Ditylum Brightwellii*, *Leptocylindrus danicus*, *Skeletonema costatum*, *Eucampia Zoodiacus*, &c., all species belonging to the coast-plankton of the English Channel, west Scotland, and continental coasts of the North Sea. It appears in the Skagerak and Kattegatt in the autumn, and comes no doubt along the west coast of Jütland and from Norway.

III. *Tricho-plankton* (Sign T), characterised by abundance of diatoms, the most important being *Thalassiothrix longissima*, *Rhizosolenia semispina*, *Chaetoceros atlanticus*, *C. borealis*, *C. decipiens*, &c., species abundant in the western part of the Atlantic, south of Iceland. It arrives to Sweden in January and February, usually mixed with the following kind :—

IV. *Sira-plankton* (Sign Si), characterised by an abundance of diatoms,



the following being the most remarkable: *Thalassiosira Nordenskiöldii*, *T. gravida*, *Nitzschia seriata*, *Coscinodiscus excentricus* var. *Chaetoceros socialis*, *C. teres*, *C. scolopendra*, *C. similis*, *C. diadema*, &c. This plankton belongs to the Arctic Sea, and arrives some years (as in 1895 and 1896, but not in 1894) at the coasts of Sweden in the end of January or in February. It disappears in the spring almost completely.

The plankton collected in the 'Research' expedition has no resemblance to 2, 3, and 4, but it has to 1, or tripos-plankton, and may be considered as its Atlantic facies. A glance at the table shows that the samples belong to two types, one characterised by the scarcity of diatoms and abundance of cilioflagellates. The other shows the contrary. Now, the samples rich in diatoms have been collected at the *western* and the samples poor in diatoms at the *eastern* stations. They belong evidently to *two different* kinds of water. There is thus reason for distinguishing the two kinds of plankton as *Styli* (Sign S) and *Tripos*-plankton (Sign Tp). The former comes no doubt from the warmer Atlantic, and continues probably to Finmark and Beeren Eiland, where it seems to arrive in September. The examination of samples collected by the Swedish expedition to Spitsbergen, not yet finished, has convinced me that there ruled at Beeren Eiland, in the month of August, tricho-plankton, but in September styli-plankton of nearly the same facies as at the coast of Sweden in summer, that is, with *Rhizosolenia gracillima*. Dr Fulton informs me that the drift-bottles thrown out at the most westerly station, Knight Errant 28, have not yet been returned. There ruled S plankton. On the other hand, drift-bottles from the station Jackal II., where the plankton was Tp, landed at Scotland. Bottles from Jackal XIII. (pl. Tp) did, on the other hand, not land, but those from Jackal XVII. (pl. S) drifted ashore in Scotland. This discrepancy might be explained by the situation of the last-named stations at the boundaries between the two kinds of water, but this explanation cannot be accepted without being strengthened by the analysis of the water. That the drift-bottles from the eastern stations landed on the coast of Scotland proves that the water with Tp drifted to the south. The water with Tp had, the last summer, a very wide extension in the north-eastern Atlantic as well as in the North Sea.

---

#### EXPLANATION OF PLATE.

- Fig. 1. *Ceratium tripos*, Ehb., typical (Sweden, summer-plankton), 150 t.m.
- Fig. 2. *Ceratium tripos* var. *longipes*, Bail (Sweden, winter-plankton), 150 t.m.
- Fig. 3. *Ceratium tripos* var. *arctica*, Ehb. (Baffins Bay), 150 t.m.
- Fig. 4. *Ceratium tripos* var. *horrida*, Cl. (Shetland Islands), 150 t.m.
- Fig. 5. *Ceratium tripos* var. *bucephalus*, Cl. (North Sea, Oct. 1896), 150 t.m.
- Fig. 6. *Ceratium tripos* var. *macroceros*, Ehb. (the English Channel, July 1896), 150 t.m.

- Fig. 7. *Chaetoceros peruvianus*, Btw., 500 t.m.; *b*, piece of the awn, 1000 t.m.
- Fig. 8. *Chaetoceros currens*, Cl.; *a* and *b*, specimens from Spitsbergen; *c*, valve; all 500 t.m.; *d*, piece of the awn, 1000 t.m.
- Fig. 9. *Nitzschia migrans*, Cl., n. sp., 1000 t.m.
- Fig. 10. *Nitzschia lineola*, Cl., n. sp., 500 t.m.; *b*, piece of the valve, 1000 t.m.
- Fig. 11. *Nitzschia* (*seriata* var. ?) *fraudulenta*, Cl., n. sp., 500 t.m.; *b*, piece of the valve, 1000 t.m.
- Fig. 12. *Rhizosolenia setigera*, Btw.; first *b* second, and *c* third, state in the formation of interior cells (*Pyxilla baltica*, Grun.); all from Sweden (March 1896); 200 t.m.
- Fig. 13. *Rhizosolenia semispina*, Hensen, 500 t.m. (Sweden).
- Fig. 14. *Dactyliosolen mediterraneus* var. *tenuis*, Cl.; *b*, ignited; both 500 t.m.
- Fig. 15. *Corethron hystrix*, Hensen; entire frustule in zonal view; *b*, in valvular view, from the North Sea (Oct. 1896); *c*, ignited specimen from Shetland Islands; all 500 t.m.
- Fig. 16. *Bacteriastrium delicatulum*, Cl., n. sp.; *b* ignited specimen; *c*, valve; all 500 t.m.

