ÖFVERSIGT

AF

KONGL. VETENSKAPS-AKADEMIENS FÖRHANDLINGAR.

Arg. 57. 1900. № 8.

Onsdagen den 10 Oktober.

INNEHÅLL:

Anmäldes, att vid Norska Finmarken ytterligare en flytboj från Andreé-expeditionen blifvit funnen och hit öfverlemnad samt härstädes undersökt och derefter till Nationalmuseum öfverlemnad.

Anmäldes, att Akademiens ständiga Regnell'ska komité utsett Amanuensen Doktor G. O. Malme till Regnellsk resestipendiat med uppgift att i Brasilien och angränsande länder idka botaniska forskningar.

Friherre Nordenskiöld redogjorde för en af honom utförd resa till omgifningarna af Karlsbad i Böhmen för utredande af möjligheten att derstädes genom borrning i urberget erhålla dricksvatten, äfvensom i sammanhang dermed för att studera traktens märkliga geologiska formationer.

Hr. Bohlin redogjorde för en af Doktor H. G. Olsson afgifven berättelse öfver af honom, med understöd från Wall-

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Plankton from the southern Atlantic and the southern Indian ocean.

By P. T. Cleve.

[Communicated 1900, October 10.]

I recently received a very interesting series of plankton samples, collected by the Dutch frigate »Tromp» on an expedition to Rio Janeiro and Sumatra.

This collection affords a good insight into the plankton of the seas near the limit of drifting ice, north of the antarctic regions, for which reason I here will report on the plankton collected from 33° S. 31° W. to 30° S. 91° E., in all 35 samples.

The sample collecting commenced on the 10th of October 1899 at 48° 31′ N. 9° 31′ W. and was continued almost every day till the 7th of February 1900, when the vessel arrived at Sumatra, and then 95 samples had been collected.

The first samples, from the point named, contained sparingly some specimens of the *styli-type* (*Centropages typicus*, *Paracalanus parvus* etc.) Traces of styli-plankton continued to about 43° N. 16° W., where the styli-plankton became more plentiful and intermingled with rare specimens of the *desmo-type*. The plankton had the same character to about 33° N. 19° W., a point not far from Madeira, reached on the 18th of October. From that point the *desmo-plankton* predominated and continued so to about 33° S. 31° W., which point was reached on the 8th of December. There the water was sterile. On this long route through the region of

desmo-plankton, some styli-plankton, intermingled with the desmo-plankton, was met with at some points, viz. at

21°—19° N. 25° W. (near Cape Verde islands),
4° S. 29° W. (near Fernando Noronha),
17° S. 35° W. (N.W. of Trinidad),
26° S. 36° W.,
34° S. 29° W.

The last named point is situated on the limit of the ant-arctic drift-ice and was reached on the 9th of December. Thence the styli-plankton recurred continually to about 30° S. 91° E. (reached on the 9 th ofJanuary). Again, from that point a sterile region was met with, that reached to about 23° S. 90° E., where desmo-plankton was found not sparingly. The desmo-plankton contained about the same forms as the Atlantic desmo-plankton. From the last named point to about 11° S. 89° E. the water was practically sterile, but thence to Sumatra the water contained desmo-plankton.

In the following I will report on the plankton that was found between 33° S. 31° W. and 30° S. 91° E., omitting some rarer forms of the desmo-plankton, which occurred intermingled in some samples. The remaining forms are to be classified as styli- and tricho-plankton, and they will be treated of with reference to the natural classes to which they belong.

Crustacea.

Of 35 samples examined, one only, from 36° S. 89° E., contained some few copepoda, viz. *Clausocalanus arcuicornis* and *Paracalanus parvus*, both common in the styli-plankton of the Atlantic in the northern hemisphere.

Ciliata.

Amphorella amphora (Clap. & Lachm.) Jörg. (*Tintinnus amphora* Cl. & Lachm. Entz., Bütschli. *Amphorella amphora* v. Dad. *Tintinnus quadrilineatus* Cl. & Lachm. *Am-*

phorella quadril. JÖRGENS. Bergens Mus. Aarbog 1899 N. 2, p. 12).

This species was found at one point only, viz. 42° S. 3° W. in the southern Atlantic. It occurred besides in samples from 1° S. 27° W. and 5°—21° N. 24° W. — The Dutch Frigate »Königin Emma» collected this species in April 1900 from 23° S. 3° E. to 5° S. 17° W., thus in the Benguela Current, near St. Helena and Ascension, besides in May at 1° N. 24° W. and 12° N. 32° W.

Amphorella (?) antarctica CL. N. Sp. — House thin-walled, campanulate, hyaline and structureless, with a short apical spine. Mouth not constricted, without distinct teeth. Length 0,06—0,07, diameter 0,046 to 0,041 m.m. — Fig. 1.

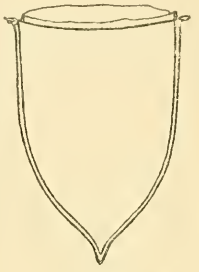

Fig. 1. 500 t. m.

Some rare specimens were found in styli- and tricho-plankton intermingled, from 45° S. 26° E. to 45° S. 34° E.

Amphorella norvegica (CLAP. & LACHM.) V. DAD. *Cyttarocylis norvegica* JÖRGENS. *var.* was found in two samples, at 45° S. 26° and 29° E. As I have not seen (in water) any structure of the house, I think it is more natural to place it in the genus *Amphorella* than in *Cyttarocylis*. The antarctic specimens were somewhat smaller than the arctic, and there was a difference in the number of teeth, being less close, about 14 only, on the antarctic specimens. — Fig. 2.

Fig. 2
500 t. m.

Amphorella Steenstrupii (CLAP. & LACHM.) V. DAD. — This species, which occurs not rarely in the styli-plankton of the northern hemisphere, was found at about 34° S. 29° E., in all samples from 41° S. 6° W. to 45° S. 26° E. and at 43° S. 71 E.

Codonella pusilla CL. (Öfvers. K. Sv. Vet. Akad. Förh. 1899 N. 10 p. 970). This species was seen in samples from 39° S. 10° W. to 42° S. 3° W. It has been noted in the northern hemisphere from 46° N. 13° W. to the Newfoundland Banks.

Cyttarocylis striata Cl. N. Sp. This form is nearly akin to *C. amor* Cl., but has much closer striæ and is more thin-walled. It occurred in two different forms, viz:

α elongata. House about $3^1/_2$ times longer than it is broad, conical, with acute end and slightly widened mouth. The wall is longitudinally striate, with almost straight close striæ, about 5

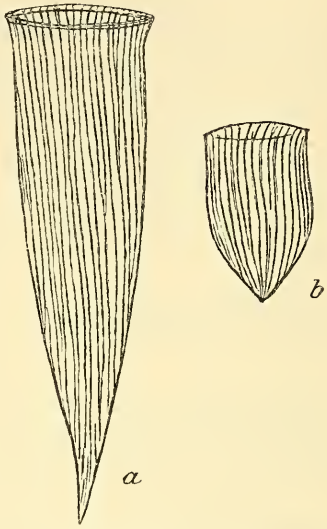

Fig. 3. *a. forma elongata. b. f. curta.* 500 t. m.

in 0,01 m.m. Length 0,14; diameter 0,04 m.m. — Fig. 3 *a*. It was met with in samples from 41°—42° S. 6°—3° W. and from 43° S. 57° E. to 40° S. 82° E.

β curta. House about $1^1/_2$ times longer than broad. Length 0,048, breadth 0,03 m.m. — Fig. 3 *b*. This form was seen in samples from 41° S. 6° W., 45° S. 29° E.; 43° S. 57°—71° E. and 41° S. 76° E.

Dictyocysta elegans Ehb. Rare at 39° S. 10° W. and 44° S. 4° E. In all respects similar to specimens from the northern hemisphere.

D. mitra (Hkl) v. Dad. (Mitth. d. zool. st. Neapel VI 1886 p. 497 Pl. XXV f. 16). In almost all samples from 38° S. 20° W. to 41° S. 6° W. and from 43° S. 57° E. to 41° S. 80° E.

— Not rare in the styli-plankton of the temperate, northern Atlantic.

D. templum HKL (ENTZ., v. DADAY). In almost all samples from 37° S. 23° W. to 44° S. 9° E. and from 42° S. 73° E. to 41° S. 80° E. This form, which is scarcely specifically distinct from *D. elegans*, is common in the *styli-plankton* of the temperate Atlantic in the northern hemisphere.

Tintinnus lusus undæ ENTZ. This form was found in samples from 41° S. 6° W. and 40° S. 82° E.

Undella caudata (OSTF.) CL. This species was found sparingly at 42° S. 3°. E., 45° S. 29° E. and at 41° S. 80° E.

U. Claparedii (ENTZ.) v. DAD. This species was met with at 41° S. 6° W. (very rare).

Undella subacuta CL. N. Sp. — This species is akin to *U. Claparedii*, but it is smaller and less thick-walled. Besides, the apical end is not rounded. Length 0,04, greatest diameter 0,03, diam. of the opening 0,022 m.m. Very rare at 40° S. 32° E. Fig. 4 *a*. Another, more slender form was found at 23° to 24° S. 5°—4° E. (April 1900). Fig. 4 *b*.

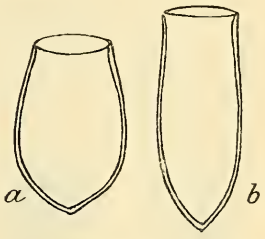

Fig. 4.
a. Specimen from 40° N. 32° E.
b. Specimen from 24° S. 4° E.
500 t. m.

Rhizopoda.

Globigerina was found at 39° S. 13° W.; 44° S. 4° E. and at 44° S. 41° E., thus on the whole rare, at least in the summer of the southern hemisphere.

Radiolaria.

Botryopyle setosa CL. (Kongl. Sv. Vet. Akad. Handl. XXXII N. 3 p. 27 Pl. 1 f. 10. *Lithomelissa setosa* JÖRGENS. Bergens Mus. Aarbog 1899 N. VI p. 81). Some few specimens were found at 44° S. 9° E.

Silicoflagellatæ.

Dictyocha fibula Ehb. This species was found in almost all samples from 41° S. 6° W. to 44° S. 45° E.; at 43°—42° S. 73°—76° E. and at 32° S. 91° E.

Distephanus speculum (Ehb.) Stöhr. — More or less common in all samples from 41° S. 6° W. to 44° S. 48° E. and at 43° S. 73° E.; 34° S. 89° E. and 33° S. 90° E.

Chlorophyllaceæ.

Halosphæra viridis Schmitz, *forma minor*: from 37° S. 23° W. to 39° S. 17° W., always rare.

Cystæ.

Diplocystis antarctica Cl. N. Sp. — By this name I distinguish a unicellular alga, which seems to characterize the styli-plankton of the southern hemisphere. As I have seen only alcohol-preserved specimens, I am unable to give a complete description, but the form of the cellula is so characteristic, that this organism may nevertheless be easily recognized. The cellula is somewhat flattened, constricted in the middle, and thus divided in two parts, of which one has a short conical process. It multiplies by division. Length 0,05; breadth 0,07 m.m. — Fig. 5.

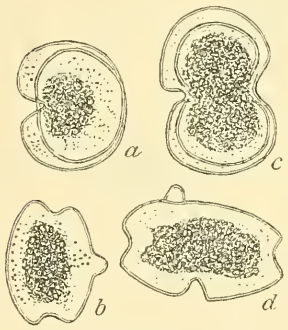

Fig. 5.
a. b. Ordinary cellula in different positions.
c. d. Cellula in division.
250 t. m.

This problematic form was found in many samples, from 36° S. 24° W. to 44° S. 4° E.; at 45° S. 29° E. and from 43° S. 57° E. to 36° S. 89° E.

Dinoflagellatæ.

Ceratium (tripos) arietinum Cl. (K. Sv. Vet. Akad. Handl. XXXIV. N. 1 p. 13 Pl. VII f. 3. *C. trip. arcuatum* forma

heterocampta JÖRGENSEN. Bergens Museums Aarbog 1899 N. VI Pl. II f. 11). This form, a characteristic constituent of the styli-plankton of the northern hemisphere, was found from 37° S. 23° W. to 43° S. 1° E., in almost all samples and, besides, at 40° S. 82° E. and 36° S. 89° E.

Ceratium (tripos var.) azoricum CL. (K. Sv. Vet. Akad. Handl. XXXIV N. 1 p. 13 Pl. VII fig. 6, 7). This form was found at 34° S. 29° W., from 41° S. 6° W. to 45° S. 32° E. and at 43° S. 57° E., 43° S. 71° E. and 41° S. 80° E.

C. (tripos var.) bucephalum CL. was met with in one sample only, viz. at 45° S. 26° E.

Ceratium fusus DAJ. This common species, exactly agreeing with the form in the styli- and tripos-plankton of the northern hemisphere, was met with in most samples from 38° S. 20° W. to 40° S. 82° E., but sparingly.

Ceratium lineatum EHB. Sparingly in most samples from 41° S. 6° W. to 33° S. 90° E.

var. robusta CL. This form, remarkable for its large size (length 0,045; breadth 0,017 m.m.), may possibly be a new species. It occurred in samples collected between 45° S. 29° E. and 43° S. 57° E. — Fig. 6.

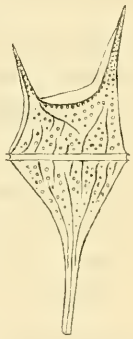

Fig. 6. *Ceratium lineatum v. robusta.* 250 t. m.

Ceratium macroceros EHB., rare in samples from 39° S. 17° W. and 39° S. 10° W.

C. tripos NITZSCH, rare in samples from 38° S. 20° W.; 44° S. 45° E.; 39° S. 85° E. and 36° S. 89° E.

Dinophysis homunculus STEIN. This species, very characteristic for the styli-plankton of the temperate Atlantic in the northern hemisphere was found, not rarely, in almost all samples from 37° S. 23° W. to 44° S. 4° E. and, besides, at 41° S. 80° E.

Dinophysis truncata CL. N. Sp. This species, remarkable for the truncate inferior end, occurred sparingly from 38° S. 20° W. to 43° S. 1° E. and at 45° S. 29°—32° E. It seems to belong to the antarctic styli-plankton. — Fig. 7.

Dinophysis Vanhöffenii OSTF. var.? Sparingly in almost all samples from 41° S. 6° W. to 36° S. 89° E. — Fig. 8.

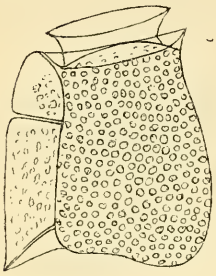

Fig. 7. 500 t. m.

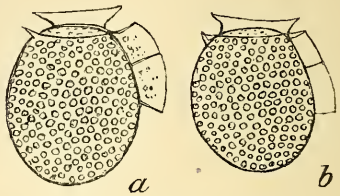

Fig. 8.
a. Specimen from 42° S. 3° W.
b. Specimen from Davis's strait.
500 t. m.

This form is smaller and has not such coarse areolation as the typical form (or *D. norvegica* CLAP. & LACHM. according to JÖRGENSEN). It agrees better with *D. acuminata* (CLAP. & LACHM.?) JÖRGENS. Exactly the same form occurs in the Arctic Sea.

Diplopsalis lenticula BERGH. was seen very rarely at 37°—39° S. 28°—17° W.and at 43° S. 57° E.

Gymnaster pentasterias (EHB.) SCHÜTT. (Ergebnisse d. Plankton-Exp. Peridinéen Pl. XXVII f. 100, 3). Sparingly in samples collected between 42° S. 3° W. and 44° S. 41° E.

Oxytoxum scolopax STEIN. This species, which occurs on the northern hemisphere in desmo-plankton aud frequently in the styli-plankton of the temperate Atlantic as far as to Bergen, was met with very sparingly at 36°—37° S. 24°—23° W., at 45° S. 29° E. and from 43° S. 71° E. to 34° S. 89° E.

Peridinium diabolus CL. (K. Sv. Vet. Akad. Handl. XXXIV N. 1 p. 16 Pl. VII f. 19, 20) was found sparingly in most samples from 41 S. 6° W. to 39° S. 85° E. — It occurs in the northern hemisphere in the styli-plankton of the temperate Atlantic.

Peridinium Michaëlis EHB. was found sparingly at 36° S. 24° W. and from 42° S. 76° E. to 34° S. 89° E.

Peridinium oceanicum VANH. (Cl. K. Sv. Vet. Akad. Handl. XXXIV N. 1. p. 17 Pl. VII f. 17, 18) was found in almost

all samples from 37° S. 23° W. to 34° S. 89° E. This species occurs thus as plentifully in the styli-plankton of the southern as of the northern Atlantic.

Peridinium pedunculatum SCHÜTT. (Ergebn. d. Plankton-Exp. Peridinéen Pl. XIV f. 47) occurred sparingly between 34° S. 29° W. and 38° S. 20° W., also at 36° S. 89° E.

Peridinium pellucidum (BERGH) SCHÜTT. This species, which occurs in the Arctic Sea, was found in samples from 43° S. 1° E. to 43° S. 57° E., always sparingly.

Diatomaceæ.

Asteromphalus Hookeri EHB. (1844). To judge from the frequent occurrence in the antarctic regions, this species may be the same as occurred in most of my samples. My specimens agree completely with the form which I, in 1873, found in bottom-mud from Davis's Strait and considered as *A. Brookei* BAIL. (CLEVE, Bih. Sv. Vet. Akad. Handl. I. No 13 p. 10 Pl. IV fig. 19), later, in 1896, named *A. atlanticus* (Bih. K. Sv. Vet. Akad. Handl. XXII. Part III N. 4 pag. 5), a name that was adopted by GRAN (D. Norske Nordhavs Expedition 1876—78, Botanik, protophyta 1897 Pl. IV f. 63). It was recently confounded by OSTENFELD with *A. heptactis* (Iagttagelser over overfladvandets temperatur, saltholdighed og plankton 1898 p. 52).

I have proved the specific difference of *A. atlanticus* and *A. heptactis* (K. Sv. Vet. Akad. Handl. XXXIV N. 1 p. 19) and stated the identity of *A. atlanticus* and *A. Hookeri*. GREVILLE (Trans. M. Soc. vol. VIII p. 114 1860) considered the Ehrenbergian species *A. Bruchii*, *A. Cuvierii* and *A. Humboldtii* as identical with *A. Hookeri*, which opinion was accepted by RATTRAY (A revision of the genus Coscinodiscus. Proc. Roy. Soc. Edinburgh 1890 p. 208). The *A. challengerensis*, *A. Roperianus var. atlanticus* and *A. antarcticus* CASTR. (Rep. Challeng. Diat. 1886 Pl. V. f. 2, 3; Pl. XVI f. 11) seem to represent the same species. *A. reticulatus* LEMMERMAN (Abh. Nat. Ver. Brem.

Vol. XVI Pl. 2 f. 32) is not the form thus named by me, but *A. Hookeri*.

Asteromphalus reticulatus Cl. (Bih. K. Sv. Vet. Akad. Handl. I N. 11 Pl. I f. 2 1873. Van Heurck Syn. CXXVII f. 11). This species, which evidently belongs to another kind of water than *A. Hookeri*, was met with at 41°—43° S. 6° W. to 1° E. and from 43° S. 73° E. to 33° S. 90° E.

Chætoceros atlanticus Cl. In all samples from 41° S. 6° W. to 45° S. 34° E.; at 44° S. 48° E. and 43° S. 73° E.

This species, which on the whole is very little variable in the arctic regions, exhibits in the southern Atlantic a great variability. It seems to me as if the following forms were varieties only of *Ch. atlanticus*:

C. atl. var. exigua Cl.

C. audax Schütt.

C. skeleton Schütt.

C. compactum Schütt.

C. polygonum Schütt.

C. neapolitanum Schröder.

Chætoceros (atlanticus var.) exiguus Cl. (a Treatise on the phyto-plankton Pl. I fig. 9. *C. neapolitanum* Schröder Mitth. aus d. Zool. Stat. zu Neapel Vol. XIV. I. Pl. I f. 4). In samples from 45° S. 29° E. to 44° S. 45° E.

C. audax Schütt. (Ber. d. Deut. Bot. Ges. 1895 XIII, 2, p. 47) represents isolated cellules of *C. polygonus*. It was found in a sample from 44° S. 9° E. Schütt mentions it from the Irminger Sea.

Chætoceros borealis Btw. was met with in samples from 42° S. 3° W. and 44° S. 45° E., in both sparingly.

C. criophilus Castr. This form was found from 42° S. 3° W. to 44° S. 9° E. and at 44° S. 48° E.

C. dichæta Ehb. (Abh. d. K. Acad. d. W. zu Berlin 1872 Pl. XII f. 3, 4, 1873. — Cl. K. Sv. Vet. Ak. Handl. XVIII N. 5 p. 26 Pl. VI f. 77. — *C. remotus* Cl. & Grun. K. Sv. Vet. Ak. Handl. XVII N. 2. p. 120; 1880 — *C. Janischianum*

CASTR. Chall. Rep. Diat. p. 77; 1886), occurred at 42 S. 3° W.; 44 S. 9 E.; 45° S. 34° E. — JÖRGENSEN found this species once near Bergen.

Chætoceros Ostenfeldii CL. (K. Sv. Vet. Ak. Handl. XXXIV N. 1, Pl. VIII f. 19). Rare specimens were found at 45 S. 29 E.; 43 S. 73 E. to 41 S. 80° E.

Chætoceros peruvianus BTW. This species is very variable, and it seems to me impossible to distinguish *C. peruvianus* from *C. volans* SCHÜTT. The variety *gracilis* SCHRÖDER (Mitth. d. Zool. St. zu Neapel B. XIV. 1. Pl. I. f. 5) occurred frequently together with other forms in samples from the south Atlantic and Indian Ocean. *C. curvatum* CASTR. (Challeng. Rep. Diat. p. 78) seems to me to represent a form of *C. peruvianus*.

More or less abundant in nearly all samples from 41 S. 6 W. to 32 S. 91° E.

Chætoceros polygonus SCHÜTT (Ber. d. Deutsch. Bot. Ges. XIII p. 46). This form scarcely differs from *C. skeleton* SCHÜTT and *C. audax* SCHÜTT, the latter representing isolated (primordial) cellules. On the other hand, some varieties are nearly connected with *C. dichæta* EHB. (conf. SCHÜTT), that also belongs to the group of *C. atlanticus*. This form (inclusive *C. skeleton*) was found from 44 S. 4 E. to 45 S. 34° E. and at 41°—40° S. 80°—82° S.

SCHÜTT found this form in the Guinea Current. I have met with it in the styli-plankton of the temperate Atlantic.

Chætoceros Schüttii CL. Some few specimens, which seemed to belong to this species, were found at 45° S. 29° E.

C. scolopendra CL. Rare specimens were found at 45° S. 34° E.

I have once met with this species in the Cape Verde region. It frequently occurs in the northern Atlantic together with arctic species.

Corethron criophilum CASTR. (Chall. Rep. Diat. Pl. XXI, f. 12, 14, 15, 1886. — *C. hystrix* HENSEN, Fünft. Ber. Kommiss. in Kiel 1882—86 Pl. V fig. 49. — CL. Report Fish. B. for

Scotland for 1896 p. 298 f. 15). There is no specific difference between CASTRACANE's and HENSEN's species, the latter being somewhat shorter only. This species occurred more or less abundantly in nearly all samples from 41° S. 6° W. to 32° S. 91° E.

Corethron hispidum CASTR. (Challeng. Rep. Diat. Pl. XXI, f. 3, 5, 6) seems to represent a coarser form of *C. criophilum*. The denticulation of the awns seems not to be of specific value. This form occurred in many samples, from 42° S. 3° W. to 43° S. 57° E. Whether it represents a distinct species or a variety of *C. criophilum*, it has never been met with in the northern hemisphere.

Coscinodiscus (Actinocyclus) curvatulus GRUN. (incl. *C. gyratus* JAN. Exp. Gazelle Pl. V. f. 2, 3 and *var. subocellata* GRUN.). This species occurred more or less abundantly and in many varieties as a constant component of the plankton, from 41° S. 6° W. to 36° S. 89° E. It occurs in the northern Atlantic and the Arctic Sea, on the whole rarely.

Coscinodiscus excentricus EHB. More or less sparingly from 43° S. 1° E. to 45° S. 32° E.

Coscinodiscus lentiginosus JANISCH (Exp. Gazelle Pl. IV f. 1, 2. A. S. Atl. P. LVIII f. 11). This species is very characteristic of the antarctic regions and was found in all samples from 43° S. 1° E. to 44° S. 48° E.; besides at 33°—32° S. 90°—91° E.

Coscinodiscus lineatus EHB. Occurred in many samples from 41° S. 6° W. to 34° S. 89° E. This form is so closely allied to the large *C. tumidus*, that the distinction is in many cases difficult or impossible.

Coscinodiscus minor EHB. (A. S. Atl. Pl. LVIII f. 39, 40; Pl. LIX f. 8, 9; Pl. CXIII f. 10). This very small form was found in many samples from 41° S. 6° W. to 34° S. 89° E.

Coscinodiscus (Actinocyclus) Olivieranus O'MEARA [*Act. Ol.* O'M. Linn. Soc. Journ. Bot. vol. XV p. 58 Pl. 1 f. 7. *A. umbonatus* CASTR. Challeng. Rep. Diat. Pl. IV fig. 4. *Coscinodiscus atlanticus* CASTR. l. c. Pl. III f. 7, probably also *C. po-*

lyradiatus CASTR. l. c. Pl. III f. 4. — *Podosira* (*Micropodiscus*) *Oliveriana* GRUN. VAN HEURCK Syn. Pl. CXVIII f. 8. — JANISCH Exp. Gazelle Pl. XX f. 3, 5]. This form, characteristic for the antarctic region, occurred sparingly in almost all samples from 45° S. 11° E. to 43° S. 57° E.

Coscinodiscus sol WALLICH. At 37° S. 23° W. and more or less common from 43° S. 71° E. to 32° S. 91° E.

Coscinodiscus Trompii CL. N. Sp. Valve thin-walled, concave, diam. 0,05 to 0,08 m. m., finely punctate; puncta of equal size, forming straight, radiate fasciculate rows, 10 in 0,01 m.m. Fasciculi composed of about 20 rows; their number about 9. The border with a row of small, sometimes indistinct, apiculi, 4 or 5 in 0,01 mm.

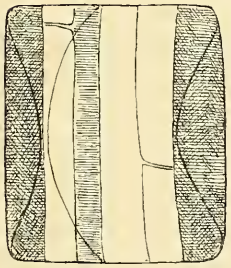

Fig. 9. Entire frustule. 500 t. m.

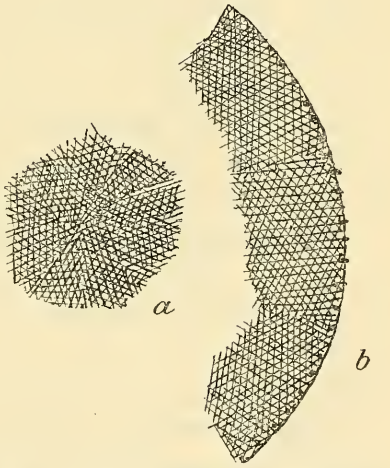

Fig. 10. *a*. The centre. *b*. The border af the valve. 1000 t. m.

This species has some resemblance to the arctic *C.* (*Thalassiosira*) *polychordus* GRAN, but the valve of the latter is plane, and I have not seen the frustules united by slime-threads. The fasciculate arrangement of the rows of puncta is sometimes not apparent on smaller specimens, on which they cross each other as in *C. lineatus*, but the rows are much closer than in this species. Found in samples from 44° S. 9° E. to 44° S. 41° E., in some abundantly. Fig. 9, 10.

Coscinodiscus tumidus JANISCH (Exp. Gazelle Pl. III f. 6. A. S. Atl. LIX f. 38, 39). This form, nearly akin to *C. lineatus*, is characteristic of the antarctic regions. It was found in many samples from 42° S. 3° W. to 44° S. 48° E.

Dactyliosolen antarcticus CASTR. (Challeng. Rep. Diat. Pl. IX f. 7) was not rare in samples from 42° S. 3° W. to 44° S. 48° E.

Dactyliosolen mediterraneus H. PER. More or less sparingly in samples from 42° S. 3° W. to 45° S. 34° E.

Euodia (Actinocyclus) gibba BAIL. (in Pritch Inf. p. 852 Pl. VIII f. 22). The diatom I consider to represent this species is nearly akin to *Coscinodiscus curvatulus*, having the puncta arranged in the same manner and, besides, a pseudonodule; I am therefore inclined to consider it as an asymmetrical variety of the named *Coscinodiscus*. It may be possible that *E. ventricosa* CASTR. (Chall. Rep. Diat. Pl. XII f. 5) represents this species, but the figure is too bad to admit of identification. — This form occurred sparingly in many samples from 41° S. 6° W. to 45° S. 34° E., besides at 41° S. 80° E.

Fragilaria kerguelensis O'MEARA [*Terebraria kerguel.* O'M. Linn. Soc. J. Bot. XV p. 56 Pl. I f. 4. — *Fragilaria antarctica* SCHWARTZ Sitzungsb. d. ges. naturf. Freunde zu Berlin 1877. *F. antarctica* CASTR. Chall. Rep. Diat. Pl. XXV f. 12. 1886. *Fragilaria* (*an Terebraria*?) CASTR. l. c. Pl. XXV f. 1, 2. — *Denticula antarctica* JANISCH Exped. Gazelle Pl. III f. 1. *Fragil. Castracanei* DE TONI, LEMMERMANN, Abh. Nat. Ver. Bremen. Vol. XVI Pl. II f. 28, 29]. O'MEARA's figure is erroneous, but can, to judge from the locality and the characteristic form of the figured colony, scarcely represent another form than this antarctic species. It was found in almost all samples from 41° S. 6° W. to 32° S. 91° E., most abundantly along 45° S.

Navicula Trompii CL. N. Sp. *Sectio Naviculæ orthostichæ* Valve thin, 7 times longer than broad, acute. Median line straight. Central nodule very small, not transversely dilated. No areas. Striæ: coarser longitudinal, 20 in 0,01 m.m. and finer transverse,

about 29 in 0,01 m.m. Length 0,07, breadth 0,01 m.m. — Fig. 11. Very rare at 45° S. 26° E.

Nitzschia (pungens var.) atlantica CL. (A treatise on the phytoplankton, Pl. II f. 24) was seen in a sample from 42° S. 76° E.

Nitzschia bicapitata CL. N. Sp. Valve lanceolate, with capitate ends, length 0,012 to 0,016 m.m. breadth 0,003 to 0,005 m.m. Keel very excentric. Puncta 13 in 0,01 m.m. Striæ fine, about 26 in 0,01 m.m. — Fig. 12.

This very small species was found in samples from the Färöe Channel, hauled by the Research Expedition in 1896. It occurred sparingly in several samples from 44° S. 9° E. to 45° S. 34° E., besides at 42° S. 76° E. and 34° S. 89° E.

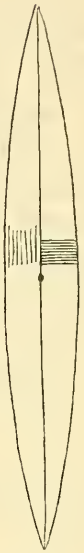

Fig. 11. 1000 t. m.

Nitzschia delicatissima CL. (A treatise on the phytoplankton Pl. II f. 22). This characteristic species, which at certain periods appears in the Northern Atlantic and constitutes GRAN's »Nitzschia-plankton» (Rep. on Norweg. Fishery and Marine investigations, Vol. I 1900 N. 5 p. 61) occurred not sparingly at 43° S. 1° E. and at 45° S. 19° E.; 45° S. 26° E.; 42° S. 76° E.

Fig. 12. 1000 t. m.

It is in the northern hemisphere a boreal, but not strictly arctic form and seems also in the southern hemisphere not to be a strictly antarctic form. Its occurrence in the southern hemisphere is a fact of very great interest.

Nitzschia Kolaizeckii GRUN. (Trans. Mic. Soc. 1877 p. 173 Pl. CXCIV f. 10). This very characteristic species was found, extremely sparingly, in several samples from 41° S. 6° W. to 45° S. 29° E. and at 42° S. 76° E.

GRUNOW mentions this species as found in the stomach contents of *Salpa* from the Southern Ocean, also from Honduras (west or east coast?).

Nitzschia lineola Cl. (Fifteenth Ann. Rep. of the Fishery Board for Scotland p. 300 f. 10). This species, found in plankton from the Färöe Channel, occurred between 42° S. 3° W. and 45° S. 34° E. as well as from 43° S. 73° E. to 40° S. 82° E. It occurs in long chains as *N. seriata.*

Nitzschia (Tryblionella) migrans Cl. (Fifteenth annual report of the Fishery Board for Scotland p. 300 f. 9). This form, hitherto found only in the Färöe Channel, occurred very sparingly at 45° S. 26° E. and 45° S. 34° E. The specimens from the southern Atlantic had closer striæ (16 in 0,01 m.m.) than specimens from the Färöe Channel (11 in 0,01 m.m.). Length 0,027, breadth 0,008 m.m.

Odontella (?) antarctica (Ehb.) Grun. (*Hemiaulus antarcticus* Ehb. 1844. *Hem. ambiguus* Janisch. A. S. Atl. CXLII, f. 16—24. Exp. Gazelle Pl. XX f. 30. *Eucampia balaustium* Castr. Challeng. Rep. Pl. XVIII f. 5, 1886). This characteristic antarctic form was found sparingly in some samples between 43° S. 1° E. and 43° S. 73° E.

Pseudo-eunotia doliolus (Wallich) Grun. (Van Heurck, Syn. Pl. XXXV f. 22). This species occurred in almost all samples, from 39° S. 10° W. to 32° S. 91° E.

Rhizosolenia alata Btw. Sparingly from 41° S. 6° W. to 33° S. 90° E.

R. Bergonii H. Per. Very rare at 43° S. 1° E.; 45° S. 26° E.; 45° S. 34° E.; 44° S. 45° E.; 43° S. 73° E.; 42° S. 76° E.; 33° S. 90° E.

Rhizosolenia inermis Castr. (Chall. Rep. Diat. Pl. XXIV, f. 7, 8, 10, 13. *R. obtusa* Hensen. *R. alata var. truncata* Gran.). Sparingly at 44° S. 9° E.; 45° S. 34° E.; 44° S. 45° E.; 44° S. 48° E.

There is, so far as I can see, no specific difference between the antarctic *R. inermis* and the boreal *R. obtusa.* The former is somewhat coarser and has more visible fulcral ribs of the zone.

Rhizosolenia styliformis BTW. Sparingly in most samples from 39° S. 10° W. to 43° S. 57° E., common to very common from 43° S. 71° E. to 36° S. 89° E.

Synedra affinis var. hybrida GRUN. (VAN HEURCK Syn. Pl. XLI f. 10). Rare specimens (0,06 m.m. in length, 0,006 m.m. in breadth, striæ 13 in 0,01 m.m.) were found at 44° S. 4° E.; 45° S. 11° E.; 45° S. 34° E.

Synedra affinis is a litoral form, and such diatoms may drift a long way from the shores. Thus specimens of *Achnanthes longipes* were found sparingly in most samples from the Southern Atlantic and Indian ocean. Another example how far such litoral forms can drift in the ocean is offered by the samples, collected in October by the frigate "Tromp", from 49° N. 10° W. to 40° N. 17° W. They contained *Aulacodiscus argus* and some also *Biddulphia granulata*.

Thalassiosira antarctica COMBER. (Ms. with photograph.) The ordinary cellules are very thin-walled, 0,05 m.m., in diameter, with a marginal row of close small apiculi, 6 in 0,01 m.m. The markings are delicate and arranged as in *Coscinodiscus hyalinus* GRUN. (Fr. Jos. L. Diat. Pl. III f. 28) or as in C. *bioculatus*, about 17 in 0,01 m.m. The frustules are connected by a single central thread. The endocysts are more silicious than the ordinary cellules and coarsely areolated, areolæ about 7 in 0,01 m.m., arranged in an irregular fasciculate manner. The margin has a row of close apiculi. There can scarcely be any doubt about their identity with *Coscinodiscus decipiens* GRUN. (A. S. Atl. LIX f. 18, 19). Probably also *C. antarcticus* GRUN. (Fr. Jos. L. Diat. p. 84 Pl. C fig. 23) represents the same species.

I found endocysts sparingly in samples from 42°—43° S. 3° W.—1° E.; 45° S. 26°—34° E.

Thalassiothrix longissima CL. & GRUN. More or less sparingly in nearly all samples from 38° S. 20° W. to 32° S. 91° E.

This species variable as to the coarseness. The more from the south the gatherings were, the coarser the frustules were, but, on the other hand, they became very thin and narrow towards the

north. There were found in my samples both the very coarse form, collected in the antarctic regions by the Challenger Expedition, and finer forms quite similar to those of the Arctic Ocean.

Tropidoneis antarctica (Grun.) Cl. (*Amphiprora* (?) *ant.* Grun. — *Navicula Challengeri* Grun. — *Stauroneis glacialis* Castr. Chall. Rep. Diat. Pl. XXVII f. 11) was found sparingly in almost all samples from 42° S. 3° W. to 43° S. 57° E.

The plankton, collected during December 1899 and January 1900 in the South Atlantic and the South Indian ocean, has the characteristics of a mixture of *styli-* and *tricho-plankton* in variable relative quantities. Although it is at present scarcely possible to classify all the noted forms in the one or other type, at least not in a conclusive manner, still, I will try to arrange them in the plankton-types, to which they belong with the greatest degree of probability.

I. Styliplankton-forms.

A. Occurring also in the temperate or boreal Atlantic of the northern hemisphere:

Amphorella amphora.
A. Steenstrupii.
Codonella pusilla.
Dictyocysta elegans.
D. mitra.
D. templum.
Tintinnus lusus undæ.
Undella caudata.
U. Claparèdii.
Globigerina.
Dichtyocha fibula.
Distephanus speculum.
Halosphæra.
Ceratium arietinum.
C. azoricum.
Ceratium bucephalum.
C. fusus.
C. lineatum.
C. macroceros.
C. tripos.
Dinophysis homunculus.
Diplopsalis lenticula.
Gymnaster pentasterias.
Oxytoxum scolopax.
Peridinium diabolus.
P. Michaëlis.
P. oceanicum.
R. pedunculatum.
Chætoceros (*atlanticus v.*) *exiguus.*

Chætoceros audax.
C. dichæta.
C. Ostenfeldii.
C. peruvianus.
C. polygonus.
C. Schüttii.
Corethron criophilum.
Coscinodiscus excentricus.
C. lineatus.
C. minor.
Coscinodiscus sol.
Dactyliosolen antarcticus.
D. mediterraneus.
Nitzschia pungens var. atlantica.
N. bicapitata.
N. delicatissima.
N. lineola.
N. migrans.
Rhizosolenia alata.
R. styliformis.

B. Probably characteristic of the southern Atlantic and the southern Indian ocean.

Cyttarocylis striata.
Undella subacuta.
Diplocystis antarctica.
Dinophysis truncata.
Ceratium lineatum v. robusta.
Asteromphalus reticulatus.
Pseudo-eunotia doliolus.
Rhizosolenia Bergonii.

II. Trichoplankton-forms.

A. Occurring also in the Arctic Sea.

Amphorella norvegica.
Botryopyle setosa.
Dinophysis Vanhöffenii.
Peridinium pellucidum.
Asteromphalus Hookeri.
Chætoceros atlanticus.
Chætoceros borealis.
C. criophilus.
C. scolopendra.
Coscinodiscus curvatulus.
Rhizosolenia inermis.
Thalassiothrix longissima.

B. Probably characteristic of the antarctic regions:

Amphorella antarctica.
Corethron hispidum.
Coscinodiscus lentiginosus.
C. Oliverianus.
C. Trompii.
C. tumidus.
Evodia gibba.
Fragilaria kerguelensis.
Navicula Tronpii.
N. Kolaizeckii.
Odontella antarctica.
Thalassiosira antarctica.
Tropidoneis antarctica.

There are thus found 57 forms, probably belonging to the *styli-plankton* of the southern hemisphere, and among these not less than 86 per cent also occur in the northern hemisphere, chiefly in the space between the Azores and Iceland. Some of them have been found in the region of Ascension and near Cape Verde, which seems to prove that the water, containing styli-plankton moves as an under-current below the water of the tropical Atlantic, that contains *desmo-plankton*.

Of forms probably belonging to the antarctic tricho-plankton I found 25 in all. Of these 48 per cent also occur in arctic regions, thus a much smaller percentage than of the styli-plankton.

These figures seem to me to afford a very strong evidence of the correctness of the theory of CHUN, [2]) according to which there is a connection between the arctic and antarctic seas by means of under-currents.

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[1]) Die Beziehungen zwischen dem arktischen und antarktischen Plankton, Stuttgart 1897.