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NOTES

ON SOME

ATLANTIC PLANKTON-ORGANISMS

BY

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WITH VIII PLATES

COMMUNICATED 1900, APRIL 11

STOCKHOLM
KUNGL. BOKTRYCKERIET. P. A. NORSTEDT & SÖNER
1900

During the years 1898 and 1899 a large number of samples of plankton have been collected from all parts of the Atlantic Ocean by Dutch, English and French ocean liners, by some wessels of the Dutch and Swedish navy, by whalers in the Arctic Sea and besides, at some stations, viz. at Vestmanna ö (S. Iceland), the Färöes and the Azores. Most samples of plankton were collected at the same time as the temperature of the sea was determined and samples of water for the determination of the salinity preserved. Professor S. O. Pettersson and M. Gust. Ekman have charged themselves with the purely hydrographical work and left to me the examination of the plankton. In examining these samples I found a number of forms, which seem to me to be new to science, and some, the determination of which seems to me to be uncertain for the want of figures in the litterature. As I intend to publish in a future work my notes on the seasonal distribution of the Atlantic plankton-organisms as well as an account of the mean and extreme temperature and salinity for every species, I wish here to publish my drawings of some new or doubtful forms.

Although the officers on many of the ocean liners and government wessels have assisted us in a most liberal way for this extensive hydrographical and biological survey of the Atlantic, still considerable expenses have been necessary. For covering these we have obtained from the fund »Lars Hiertas Minne» the sum of 7,000 kronor.

I. COPEPODA.

Acartia macropus. N. Sp.

Plate I. Fig. 1—7.

Male. Length of cephalothorax 0,88, of abdomen 0,3, of furca 0,05, of the longest seta of the furca 0,4. Breadth of cephalothorax 0,24 millim.

Lateral angles of the last segment of the thorax rounded; margin of the last segment smooth, without small spines.

Rostral filaments present.

R. e. 2 of the right fifth foot longer than broad; *R. e 3* elongate, with a very small terminal claw.

Female. Length of cephalothorax 0,88, of abdomen 0,25, of furca 0,05, of the longest seta of the furca 0,4 millim. Breadth of cephalothorax 0,25 millim.

Last segment of the thorax with two small finger-like processes. Its margin not spinous.

The genital-segment of abdomen three times longer than the second segment, which is as long as the third one. The longest seta of the furca exceeds the abdomen in length. All setæ of equal thickness. Furca nearly twice as long as broad.

Rostral filaments present.

Cephalothorax three times longer than broad.

Fifth pair of feet: *R. e* very short, uniting with *B. 2;* its interior margin denticulate.

This fine species is most akin to *A. verrucosa* Thomps., but is easily distinguished by the fifth pair of feet both of the male and the female.

Habitat. The Azores, rare in August and September 1898. *Temperature:* 21,2 to 21,4. *Salinity:* 36,25 to 36,28 p. m.

Corycæus longicaudis Dana.

Plate I. Fig. 8—11.

Male. Abdomen one-jointed, twice as long as the furca. Branches of the furca at least 7 times as long as broad.

Dimensions: total length 0,8, length of cephalothorax 0,5, of abdomen 0,3, of furca 0,1 millim.

The male of this species has not been described in Giesbrecht's »*Systematik und Faunistik der Pelagischen Copepoden*». It is common in the whole tropical Atlantic.

Euchirella rostrata Claus.

Plate II. Fig. 1—12.

Male. Head without crista, but with a subulate rostrum. Fifth foot six times as long as its *B. 2.* Margin of its *R. e. 2* not denticulate and of the *R. e. 3* smooth. *R. e.* of the posterior antennæ twice as long as *R. i.* No triangular scales on the inside of *B. 1* of the 4th foot.

Length of cephalothorax 2, of abdomen 0,5, of furca 0,08 millim.

The male has not been described by Giesbrecht's in the *Systematik und Faunistik der Pelagischen Copepoden*, but he mentions as questionable synonyme *Euchæta Hessei* Brady (Chall. Rep. Vol. VIII pag. 63). A comparison af my fig. of the fifth foot with the drawing of Brady proves that *Euchæta Hessei* is exactly the same as *Euchirella rostrata.*

Some few specimens of the male were found together with several females in December 1898 off the Canaries.

Oncæa subtilis GIESBR.

Plate III. Fig. 1—11.

Male. Branches of the furca $^5/_7$ as long as broad, closely approximate; anal-joint as long as broad. *R. i.* of the feet not ending in conical processes.

Total length: 0,4 (of the female 0,6); length of cephalothorax 0,29, of abdomen 0,1, of furca 0,02; breadth of cephalothorax 0,1 millim.

This species has been found in the eastern Atlantic from 32° S. to 52° N. The male was found together with numerous females in a collection from the vicinity of Uschant.

II. RADIOLARIA.

Acanthosphæra trichophora. N Sp.

Plate V. Fig. 3.

Shell thin-walled, with irregular, polygonal meshes, 4 on the radius. Bars thin, thread-like. Spines few, hair-like, flexuose, twice as long as the radius.

Diameter of the shell 0,06. Meshes 0,004 to 0,012 millim.

Atlantic, November 1898, 50° N. 33° W.

Actinomma(?) Sol N. Sp.

Plate V. Fig. 2.

Radial proportion of the three shells 1 : 2,5 : 9. Cortical shell thick-walled, with circular, regular, six-lobed pores, as broad as the bars. At each nodal-point is a bristle-like spine, half as long as the radius, thus every pore surrounded by a corona of six bristles.

Diameter of the outer shell 0,09, of the cellules 0,001 millim.

Found in *January* 1899 at 45° N. 49° W. in styli- and tricho-plankton intermingled. *Temperature* 12. *Salinity* 35,54 p. m.

Owing to the thickness of the cortical shell, the interior shells were visible merely as faint shadows, so I am not quite convinced whether the shells are 3 or 2. If the latter be the case, the species belongs to *Haliomma* and is then nearest akin to *H. horrida*.

Amphihymenium elegans. N. Sp.

Plate. V. Fig. 1.

Arms equal, more than twice as long as broad, 5—6-jointed; joints increasing in breadth towards the blunt ends. Their axis a straight line. Patagium enveloping the arms with the exception of the distal ends.

Length 0,24; breadth 0,09 millim.

Found at 25° N. 52° W. *December* 1898. *Temperature* 24,2. *Salinity* 37,17. *Desmoplankton.*

Anthocyrtium anthemis Hkl.?

Plate III. Fig. 12.

As there exists no figure of this species, I am somewhat uncertain about the identification. I have seen a single specimen only, which was found alive at 63° N. 2° E. (March 1898), where it occurred together with some species of the tricho-type. The description in Hæckel's Monograph (Chall. Rep. pag. 1273) agrees well with my specimen, but the dimensions are somewhat dissimilar. On my specimen the cephalis was 0,02 millim. long and broad and thorax 0,05 long, 0,1 broad.

Hæckel's species was found in the abysmal depths of the nothern Pacific. If my specimen really belongs to Hæckel's species, the occurrence above the deep »Norske Rende» is a fact of considerable interest.

Challengeron brevispina. N. Sp.

Plate III. Fig. 14, 15.

Shell ovate, scarcely compressed, with a single, very short conical spine on the aboral pole. Peristome with a single truncate tooth of the same length as the aboral spine. Structure: quincuncially disposed alveoli, about 4 in 0,01 millim.

Length 0,06; breadth 0,04 millim.

I found a single specimen only in a sample from 63° N. 2° E. (March 1898). *Temperature* 6,7. *Salinity* 35,10.

Clathrocanium minutum. N. Sp.

Plate IV. Fig. 9.

Horn of the cephalis fenestrated. Cephalis hemispherical with small subquadrate pores and a horn of $1^1/_2$ the length, surrounded by an irregular network. Length of the two joints 3 : 5; breadth 1 : 2. Thorax with an irregular network; its ribs united by a circular, irregulary latticed ring. Peristome smooth.

Dimensions: cephalis 0,024 long, 0,04 broad; thorax 0,05 long and 0,08 millim. broad.

Found at 21° S. 36° W. (1898 October). *Temperature* 22. *Salinity* 37,21. *Desmo-plankton.*

Dictyocephalus cylindricus. N. Sp.

Plate IV. Fig. 10.

Mouth not constricted, without peristome. Shell thick-walled, with distinct collar stricture. Length of the two joints 4 : 7, breadth 9 : 11. Cephalis nearly spherical, large, with unequal, circular pores, and rough of numerous, short spines. Thorax cylindrical, with rounded, unequal pores.

Length of the shell 0,1 millim.

Found at 15° N. 71° W. (February 1898). *Temperature* 27. *Desmo-plankton.*

This species differs from *D. hispidus* Ehr. in the cylindrical, not funnel-shaped, thorax and from *D. obtusus* by the spiny cephalis and the unequal pores.

Dictyoceras neglectum. N. Sp.

Plate IV. Fig. 5.

Shell with two distinct strictures. Length of the three joints 1 : 3,5 : 1,5, breadth 1 : 3 : 4. Cephalis almost spherical, with a strong horn, nearly twice as long, and small irregular circular pores. Thorax campanulate, with three small triangular lattice wings. Cellules subregular, hexagonal, quincuncially disposed, 2,5 in 0,01 millim., similar on the thorax and abdomen.

Length of the three joints: 0,02 : 0,05 : 0,03; breadth 0,02 : 0,06 : 0,08 millim.

Tropical Atlantic 11°—33° N. 32°—76° W. Mean *temperature* 25,1. Mean *salinity* 36,04. *Desmo-plankton.*

Euphysetta pusilla. N. Sp.

Plate III. Fig. 16.

Shell egg-shaped, without apical horn; structure double: longitudinal lines 11 in 0,01 millim., and very small alveoli, quincuncially arranged, 19 in 0,01 millim. Small feet subulate; odd foot half as long as the shell, not branched.

Length 0,06; breadth 0,04 millim.

Very rare at 45° N. 49° W. (January 1899). *Temperature* 12. *Salinity* 35,54.

Haliomma echinosphæra. N. Sp.

Plate V. Fig. 5.

Cortical shell thick-walled, $2^1/_2$ times broader than the medullary shell, with regular, circular, hexagonally framed pores as broad as the bars. The outer openings of the pores are sixlobed, lobes ending in short, conical spines.

Diameter of the outer shell 0,1, of the interior 0,04, of the meshes 0,01 millim.

Very rare at 45° N. 49° W. (1899 January). *Temperature* 12. *Salinity* 35,54.

Similar to *H. melitomma*, but smaller, with thicker bars and smaller meshes. The thickness of the cortical shell prevented all examination of the medullary shell.

Haliomma irregulare. N. Sp.

Plate V. Fig. 4.

Pores of the cortical shell irregular, rounded, of different size and form. Spines stouter main-spines and smaller by-spines, the former $^1/_6$ of the radius. By-spines scattered at intervals. Cortical shell thin-walled, 3 times as broad as the medullary shell. Pores irregular rounded, 3 to 9 times as broad as the bars. Medullary shell with rounded, smaller pores.

Diameter of the outer shell 0,22, of the medullary shell 0,07, of the meshes 0,01 to 0,03 millim.

Very rare at 45° N. 49° W. (January 1899). *Temperature* 12. *Salinity* 35,54.

Haliomma spinulosum var. *)

Plate V. Fig. 7.

I have met with specimens having *two* concentric, exterior shells with very wide irregular meshes and thread-like bars. The interior shell had, as usually, very regular hexagonal meshes. There is thus no other difference between this form and the normal, than that the variety has *three*, in stead of *two*, shells and should therefore be classified as *Echinomma*. It seems as were the number of exterior shells variable, and it may be possible that *Arachnosphæra* comprises forms with an increased number of shells, especially as the interior shell of *Haliomma spinulosum* is similar to those of *Arachnosphæra myriacantha* and *A. oligacantha*.

Heliosphæra minuta Cl.

Plate VI. Fig. 2.

Thick-walled, 5 to 6 times as broad as the meshes. Pores regular, all equal, hexagonally framed. Main-spines three sided pyramidal, few, $1^1/_2$ times as long as the radius. By-spines short, acute, arising from the nodal points of the meshes.

Diameter 0,05 to 0,07; pores 0,006; bars 0,006, main-spines 0,02 to 0,06 millim.

Rare at 41° N. 21°—23° W., 49° N. 18° W., 62° N. 11° W. (March 1898) and 17° N. 71° W. (August 1898). *Temperature* 11,7, mean of 4 observations, max. 14,9, min. 8, exceptionally 27,2. *Salinity* 35,63, mean of 3 obs., max. 35,87, min. 35,37.

*) The same form has been figured by JØRGENSEN (Bergens Museums Aarbog 1899, N. 6, Pl. III, fig. 18) as *Arachnosphæra dichotoma*.

Hexacontium armatum. N. Sp.

Plate VI. Fig. 5.

Cortical shell thick-walled, with regular, honeycomb-like network. Meshes funnel-shaped, with circular inner and hexagonal outer aperture, as broad as the bars, about 7 on the radius. Main spines strong, three-sided prismatic, as long as the radius of the outer shell. By-spines at every nodal point, short, bristle-like. Radial proportion of the three shells 1 : 3 : 8.

Diameter 0,11; length of the main spines 0,06; basal breadth of the main spines 0,02; diameter of the meshes 0,01 millim.

Rare at 56° N. 17°. W. (November 1898). *Temperature* 11,6. *Salinity* 35,27. *Styliplankton.*

Nearest akin to *H. favosum*, from which it differs by the smaller meshes and the stronger main spines.

Hexacontium hostile. N. Sp.

Plate VI. Fig. 4.

Radial proportion of the three shells 1 : 3 : 9. Outer shell thick-walled, with irregular, rounded pores, 1 to 5 times as broad as the bars. Main spines strong, three-sided prismatic, slightly spirally twisted, twice as long as the radius. By-spines bristle-like as long as the diameter of the pores.

Diameter of the outer shell 0,09, of the middle 0,03, of the inner 0,009; diameter of the pores 0,006 to 0,016; length of the main spines 0,08, their basal breadth 0,024 millim.

Rare at 56° N. 23° W. (November 1898). *Temperature* 10,8. *Salinity* 35,32.

Hexacontium setosum Hkl.?

Plate V. Fig. 6.

This species (Chall. Rep. Radiol. pag. 198) has not been figured, of which reason the identification is doubtful. The radial proportion of the three shells 1 : 4 : 7. Diameter of the outer shell 0,14, of the middle 0,04, of the inner 0,02; diameter of the cortical pores 0,01 to 0,03; breadth of the bars 0,004; length of the main spines 0,06 millim.

Rare at 45° N. 49° W. (January 1899). *Temperature* 12. *Salinity* 35,54.

My specimen occurred in styli- and trichoplankton intermingled.

Hexastylus nobilis. N. Sp.

Plate VI. Fig 1.

Shell thick-walled. Pores regular circular, hexagonally framed, 10 on the radius. Six main spines triangular pyramidal, with straight edges, as long as the radius; their

bases as broad as two meshes. By-spines bristle-shaped, arising from all nodal points of the meshes, half as long as the main spines.

Diameter of the shell 0,16; length of the main spines 0,06 millim. Meshes 9 in 0,01 millim.

Very rare at 19° N. 60° W. (1898 November). *Temperature* 27,5. *Salinity* 35,22.

Lampromitra erosa. N. Sp.

Plate IV. Fig 2—3.

Shell flat conical, with slight collar stricture. Length of the two joints 1 : 4; their breadth 1 : 3. Cephalis hemispherical, with a horn of $1^1/_2$ the length and with irregular rounded pores of unequal size. Thorax with large rounded pores of unequal size. Its margin with distant, frequently double teeth.

Cephalis 0,02 long, 0,03 broad; thorax 0,06 long, 0,16 millim. broad.

Very rare at 45° N. 49° W. (January 1899). *Temperature* 12. *Salinity* 35,54.

Psilomelissa longispina. N. Sp.

Plate IV. Fig. 4.

Shell smooth, with strong collar structure. Length of the two joints 4 : 3, breadth 1 : 1. Cephalis large ovate, with numerous scattered circular pores of unequal size, larger and more crowded towards the collar stricture. Thorax short cylindrical, with scattered circular pores. From the collar stricture there arise three divergent spines of equal thickness throughout their whole length, as long as the cephalis.

Cephalis 0,04 long, 0,03 broad; thorax 0,028 long, 0,03 millim. broad.

Western tropical Atlantic (1898 January at 32° N. 74° W.; May at 41° N. 51° W.; December at 18° N. 67° W. *Temperature* 19 to 26,8. *Salinity* 34,88 to 36,01.

Quadrilonche crux. N. Sp.

Plate IV. Fig. 1.

Four equatorial spines with apophyses, the other needle-shaped. Equatorial spines with conical ends, gradually narrowed towards the centre, winged along their whole length, except at the conical end.

Length of the cross 0,16 millim.

Western tropical Atlantic, sparingly from 26° S. to 36° N. *Temperature* 25,4, mean of 13 obs., max. 28, min. 21,7. *Salinity* 36,40, mean of 8 obs., max. 37,43, min. 34,88.

Sethoconus crinitus. N. Sp.

Plate III. Fig. 13.

Cephalis subspherical large, with numerous bristle-shaped horns and close polygonal meshes of different size. Collar constriction deep. Thorax conical, with straight outline, gradually increasing in breadth towards the wide open mouth. Pores of the thorax similar to those of the cephalis, polygonal and of different size, much broader than the thread-like bars.

Cephalis 0,03 long and broad. Thorax 0,06 long and broad. Collar constriction 0,02 millim.

Sparingly along the N. coast of S. America and in the Florida current, 7°—41° N. 53°—75° W. *Temperature* 22,4 to 28. *Salinity* 33,88 to 36,56.

Sethocyrtis pyrum. N. Sp.

Plate IV. Fig. 6.

Shell thick-walled, pear-shaped, with slight collar stricture. Length of the two joints 1 : 6, breadth 1 : 4. Cephalis hemispherical, with a small horn of half the length and unequal small pores. Thorax inflated, with circular, regular pores, quincuncially arranged and as broad as the bars. On the nodal points short spines arise. Mouth flat, half as broad as the thorax.

Cephalis 0,012 long, 0,02 broad. Thorax 0,072 long and 0,08 millim. broad.

Very rare at 45° N. 49° W. (January 1899). *Temperature* 12. *Salinity* 35,54.

Spermatogonia antiqua Leud. Fortm.

Plate III. Fig. 17, 18.

Dr. Leuduger Fortmorel described in 1892 (Diatomées de la Malaisie. Annales du Jardin botan. de Buitenzorg. Vol. XI pag. 49. Pl. IV, fig. 8) under the above name an organism from the Malay Archipelago, which he considered as a diatom. The figure has been reproduced in Van Heurck's Treatise on the diatomacee (1896) pag. 541 with the remark »is it a diatom?». This form is by no means rare in the tropical Atlantic and cannot be a diatom. It is a part of an organism, of which I have however seen only alcohol-preserved specimens. The neadles, called *Spermatogonia*, are by their arrow-head like ends fastened in groups on a hyaline sack, which encloses, besides a number of smaller granules, a larger cucumber-like body. This body, which treated with soda shows a peculiar structure of longitudinal and transverse lines, reminds of the central capsule of the radiolarians. If so, the hyaline sack should correspond to the calymna. But, on the other hand, there is no radiolaria known, wich offers any distant relation to *Spermatogonia*. From the *phæodarian* it differs by the entirely different central capsule. In all cases this form is no diatom, and, if a radiolaria, it belongs to a quite new type.

The range of distribution in the Atlantic is from Rio Janeiro to 56° N., chiefly in the west. *Temperature* 24,5, mean of 26 obs., max. 28,4, min. 9,6. *Salinity* 35,39, mean of 23 obs., max. 36,40, min. 33,93.

Theoconus junonis Hkl. aff.

Plate IV Fig. 8.

I have reproduced in Fig. 8 a drawing of the only specimen I have seen, as it is of considerable interest for its occurrence W. of Norway. It is doubtless akin to *T. jovis* or to *T. junonis*, but does not sufficiently agree with any. It was found in March 1898 at 62° N. 2° E. (temperature 7,4. Salinity 35,12). The water was very poor in plankton, as the tow-net catched in half an hour some few plankton-specimens only, such as *Coscinodiscus oculus iridis* and several radiolarians, not found at other spots in the Atlantic. *T. junonis* was taken by the Challenger Expedition from great depths east of Japan. *Theoconus jovis* has been found in the abysmal depths of the central Pacific.

Length of the three joints 1 : 3,5 : 2, breadth 1 : 4 : 5. Cephalis 0,016 long, 0,02 broad. Thorax 0,05 long, 0,08 broad. Abdomen (incomplete) 0,03 long, 0,1 millim. broad.

Theocyrtis aculeata. N. Sp.

Plate IV. Fig 11.

Shell thick-walled. Length of the three joints 1 : 2 : 4; breadth 1 : 3 : 3. Cephalis hemispherical, with a strong horn, longer than the cephalis. Thorax slightly inflated. Abdomen cylindrical, with several rows of strong aculei towards the mouth. Pores of the thorax and abdomen of nearly equal form and size, circular, regular, quincuncially disposed, 3 to 4 times as broad as the bars.

Length of the three joints: *a* 0,025, *b* 0,06, *c* 0,11; breadth: *a* 0,03, *b* 0,076, *c* 0,09. Horn 0,04 millim. long.

Found in November 1898 between 56° N. 17° W. and 48° N. 29° W. *Temperature* 10,8 to 15. *Salinity* 35,27 to 35,44.

Theocyrtis turris. N. Sp.

Plate IV. Fig. 7.

Length of the three joints 1 : 3 : 4, breadth 1 : 3 : 3. Pores of the thorax and abdomen of the same form and size. Cephalis small, hemispherical, with some scattered pores and a horn of the same length. Thorax conical; abdomen cylindrical. Pores rounded, or rather subhexagonal, broader than the bars, quincuncially arranged. Length and breadth of the cephalis 0,01, of thorax 0,03. Abdomen 0,045 long, 0,05 millim. broad.

Very rare at 45° N. 49° W. (January 1899). *Temperature* 12. *Salinity* 35,54.

Trypanosphæra brachysiphon. N. Sp.

Plate VI. Fig. 3.

Shell a regular sphere. Pores of unequal size; the larger prolonged in a very short tube, with two or three teeth.

Diameter: 0,15, of the larger pores 0,017 millim.

Found very rarely at 56° N. 17° W. (November 1898) and at 41° N. 66° W. (December 1898). *Temperature* 11,6 to 12. *Salinity* 34,60 to 35,25.

III. DINOFLAGELLATÆ.

Ceratium (tripos var.) arcuatum Gourret.

Plate VII. Fig. 11.

Gourret has described (Ann. du Musée d'Hist. Naturelle de Marseille; zool., Vol. I 1883 n:o 8, pag. 25, Pl. II, fig. 42) a form of *C. tripos*, which I consider, although with a some hesitation, to be identical with the Atlantic form.

It is rather common in the tropical Atlantic from 29° S. to 48° N.

Ceratium (tripos var.) arietinum. N. Sp. *)

Plate VII. Fig. 3.

This form, which belongs to the tripos-type, is very constant and could be considered as a distinct species. I have seen it in samples from the Indian Ocean and the Atlantic, chiefly on the area between the Azores, the Engl. Channel and New York. It occurs besides, but sparingly, in the N. Equatorial current, the Antilles current and in the Caribbean Sea. It belongs to the *styli-plankton*.

Ceratium (tripos var.) azoricum. N. Sp.

Plate VII. Fig. 6, 7.

This form is nearly related to the typical *C. tripos*, but differs by smaller size and short apical horn. It occurs round the Azores and W. of the Spanish Peninsula. I have also met with this form in plankton from 25° S. 7° E.

Ceratium (furca var.?) belone. N. Sp.

Plate VII. Fig. 13.

This form, which is evidently nearly akin to *C. furca*, is very rare in the Atlantic and has been found in samples from 10° N. 53° W. and 33°—34° N. 15°—12° W., thus in the western and eastern tropical Atlantic.

*) Jørgensen (Bergens Museums Aarbog 1899, N. VI, Pl. II, fig. 11) names this form *Ceratium tripos arcuatum* forma *heterocampta*. Jørgensens work was not published when this paper was written.

Ceratium contortum Gourret.

Plate VII. Fig 10.

This species, akin to *C. tripos*, is too constant for being considered as a mere variety. It has been described by Gourret in Annales du Mus. d'Hist. Nat. de Marseille; zool. vol. I n:o 8, 1883, Pl. II, fig. 33. Schütt has figured it in Pflanzenleben d. Hochsee, pag. 268, VII b., but not named it. It occurs in the Mediterranean, Indian and Pacific. In the Atlantic it is rather common in the tropical parts, E. of S. America and W. of Africa. If a line be traced on the northern hemisphere from the Cape Verde to the Newfoundland Banks the space on the left of this line represents the area of distribution of this species.

Ceratium curvicorne v. Daday.

Plate VII. Fig. 2.

This constant and characteristic form described by v. Daday (Termezetrajri füzetek a mus. Hung. Budapestense vulgata 1887—88, Pl. III, fig. 4, 8, 12, 14) as a variety of *Cer. tripos*, has been figured (without name) in Schütt Pflanzenleben der Hochsee, pag. 268, VII a.

I have met with this species in samples from the Red Sea, the Indian ocean and the tropical Atlantic, where it occurs rather common in ths Equatorial currents, the Brazil current, the Florida current towards the Newfoundland Banks as well as east thereof between 40°—45° N., in the Sargasso Sea, at the Azores and the Canaries.

Ceratium flagelliferum Cl.

Plate VII. Fig 12.

I have proposed this name in 1899 (Kongl. Sv. Vetensk.-Akad. Handl., Vol. XXXII, n:o 3, pag. 1, nomen nudum) for a characteristic form of the tropical Atlantic. It has been figured by Schütt (Pflanzenleben der Hochsee, pag. 267, fig. 77, V. b, without name) as a form of *Ceratium tripos*. It may possibly be the same as *C. tripos var. inflexum* Gourret, but I dare not identify them. This species is remarkable for the small size of the body and the very long horns, the posterior of wich have a characteristic flexure. This species is very common in *desmo-plankton* of the whole tropical Atlantic, from 29° S. to 45° N.

Ceratium(?) hyperboreum. N. Sp.

Plate VIII. Fig. 14.

By the above name I denote a very small, but characteristic dinoflagellate, of which I have not been able to distinguish the tabulation and which possibly may belong to *Peridinium*. The longitudinal axis measures 0,07 and the transverse 0,05 millim. The membrane has a coarse and irregular areolation.

I found this species in samples from Spitzbergen, collected in August 1898 (80° 31' N. 18° 50' E.) and the same month 1899 (80° N. 16° E.). *Temperature* — 0,30 to + 2,42. *Salinity* 25,36 to 33,93. It is thus to be considered as an arctic neritic form.

Ceratium paradoxides. N. Sp.

Plate VII. Fig. 14.

I propose this name for a form, nearly akin to *C. limulus*. It is characterized by the cellular reticulation of the membrane. I have seen it, but very rarely, in samples from the Newfoundland Banks, the Azores and the Canaries.

Ceratium ranipes. N. Sp.

Plate VII. Fig. 1.

This rare and remarkable form has been figured by SCHÜTT in Pflanzenleben der Hochsee, pag. 267, fig. 79, VIII b. but without name. LEMMERMANN (Abh. Nat. Verein. Bremens. Vol. XVI, Part 2, pag. 346) names it *C. tripos var. digitatum*, but as Schütt has already used the name *digitatum* for another different species, a new name becomes necessary.

This form occurs in the tropical Atlantic, in the Equatorial, Antilles and Florida currents, also round the Azores, or between 12° and 49° N.

Ceratium reflexum. N. Sp.

Plate VII. Fig. 8, 9.

This form, characterized by the divergency of the posterior horns, of which one is nearly parallel to the apical horn, is very rare and has been seen twice only, viz. at 19° S. 31° W. and 38° N. 47° W.

Ceratium (tripos var.?) volans. N. Sp.

Plate VII. Fig. 4.

This form is characterized by the straight and very long posterior horns, which proceed in a right angle to the apical horn. They become first towards the distal end somewhat bent towards the apical horn.

This species is common in the tropical Atlantic, and it may be possible that it is the same as *Ceratium carriense* GOURRET, which I dare not decide without comparing original specimens.

Ceratium (tripos var.?) vultur. N. Sp.

Plate VII. Fig. 5.

This species, which is characterized by the angular flexure of the posterior horns, occurs frequently in chains. I have found it in samples from the Indian ocean and from the tropical Atlantic between 21° S. and 45° N.

Dinophysis Vanhöffenii Ostenf. *)

Plate VIII. Fig. 3.

Under the name *D. granulata* I have described a small form (Kongl. Sv. Vet.-Akad. Handl., Vol. XXXII, n:o 3, pag. 39, Pl. IV, fig. 7) from Spitzbergen, where it was found among drift-ice. This form seems to me to be a small variety of a widely distributed arctic species, named by Vanhöffen »*D. ovata* Clap & Lachm.» (Grönl. Exp. 1891—93. Vol. II, 1 part, 1897, Pl. V, fig. 7). Ostenfeld (Iagttagelser over overfladvandets temperatur, saltholdighet og plankton, 1898, pag. 58) proposed the name *D. Vanhöffenii*, which I accept as it denotes the typical form, and my name a dwarf-form only. This species, which seems to have been confounded with *D. Michaëlis* (Ehb.) Auriv. or *D. rotundata*, is well characterized by its thick, coarsely areolated membrane, the upper part of which scarcely proceeds beyond the girdle. The apical part has frequently some short spines.

I have seen this species in a collection from Jeddo Bay (Japan) and very frequently in specimens from the northern Atlantic, between 81° and 52° N. *Temperature* 5,9, mean of 21 obs., max. 9,8, min. — 0,9. *Salinity* 34,35, mean of 21 obs., max. 35,41, min. 32,03.

Peridinium diabolus. N. Sp.

Plate VII. Fig. 19, 20.

This species has been figured by Murray and Whitting (Trans. Lin. Soc. of London, 2 Ser. Bot., Vol. V, Part 9, Pl. XXIX, fig. 4 b) as a variety of *P. divergens*. It is such a characteristic form that it merits to be considered as a species, remarkable for its small size and the very strong posterior horns. I have found it in samples from the Indian ocean and the Atlantic, where it has been observed from the region of Cape Verde to the coasts of Portugal and near the Azores, besides S. of the Newfoundland Banks and E. of Cape Hatteras. *Temperature* 14,8 to 24. *Salinity* 36 to 36,40. Belongs to the *styli-plankton*.

Peridinium elegans. N. Sp.

Plate VII. Fig. 15, 16.

This species is nearly related to *P. divergens* and has been figured by Murray & Whitting (Trans. Linn. Soc. of London, Ser. 2, Vol. V, part 9, Pl. XXIX, fig. 4 a) as a variety of the named species. It differs from *P. divergens* by larger size (length 0,2, breadth 0,1 millim.), by the absence of teeth at the basis of the posterior horns and by the ends of the girdle not being oblique. The longitudinal axis is slightly oblique to the plane of the girdle.

*) *Dinophysis norvegica* (Clap. et Lachm.) Jørgensen (Bergens Museums Aarbog 1899, N. VI., Pl. I, fig. 3—6) and *D. acuminata* Jørg. *l. c.* fig. 7—9.

This species has been found in samples from the Indian ocean as well as from the Atlantic, where it occurs in the tropical part, at least from 21° S. to 47° N. *Temperature* 23,8, mean of 43 obs., max. 28,3, min. 10. *Salinity* 35,84, mean of 40 obs., max. 37,28, min. 32,87. It belongs to *desmo-plankton*.

Peridinium exiguum. N. Sp.

Plate VIII. Fig 5.

This species is also nearly akin to *P. divergens*, but differs in the small size (length 0,05—0,06, breadth 0,04 millim.), the coarse arcolation, the serrated posterior horns without basal teeth and in the oblique girdle.

I have found it in samples from the Azores (August 1898) and from the coast of Portugal (June 1898). *Temperature* 21,2. *Salinity* 36,25. It belongs probably to *styli-plankton*.

Peridinium oceanicum Vanhöffen.

Plate VII. Fig. 17, 18.

In the »Peridineen der Planktonexpedition» (Pl. XIII, fig. 44) Schütt has figured, as a variety of *P. divergens*, a common atlantic form, which Vanhöffen (Grönl. Exp., Vol. II, 2 part, Pl. V, fig. 2) names *P. oceanicum*. The same form was, also in 1898, named by Aurivillius (Kongl. Sv. Vet.-Akad. Handl., Vol. XXX, n:o 3, pag. 96) *Perid. div. var. obliqua*.

It is a very constant, easily recognised form, which I have seen in samples from the Red Sea and the Indian ocean. It occurs in the Atlantic chiefly in the region of the Azores and N. thereof, in the spring across the whole Atlantic, between 40° and 50° N., whence it spreads, during the summer, towards Greenland, into the Irminger Sea and across the Färöe Channel into the North Sea and the Skagerak. *Temperature* 12,9, mean of 32 obs., max. 22, min. 3. *Salinity* 35,45, mean of 28 obs., max. 36,25, min. 34,16. (For the calculation of the means only such samples have been used as contained this form in any abundance) It is a typical *styli-plankton* form.

Peridinium pallidum Ostenf.

Plate VII. Fig. 21, 22.

Under the above name Ostenfeld (Iagttagelser over overfladvandets temperatur, saltholdighed og plankton in 1898, pag. 60, 1899) has distinguished a form nearly related to *P. pellucidum*, but with oblique posterior horns.

It is an *arctic* form, that ranges between 39° and 79° N. *Temperature* 8,5, mean of 45 obs., max. 19,4, min. 0. *Salinity* 34,87, mean of 45 obs., max. 35,97, min. 32,43. It belongs to *tricho-plankton* and to the *northern neritic plankton*.

Phalocroma minutum. N. Sp.

Plate VIII. Fig 10, 11.

Longitudinal axis 0,05, sagittal axis 0,04, transverse axis 0,025 millim. Areolation coarse, 3 to 4 areoles in 0,01 millim.

I have found this small form twice only, viz. at 41° N, 57° W. (July 1899) and at 41° N., 62° W. (August 1899). *Temperature* 22 to 24,4. *Salinity* 33,88 to 36,13.

Steiniella(?) punctata. N. Sp.

Plate VIII. Fig. 4.

This species is characterized by its biconical form, solid membrane and coarse areolation. Longitudinal axis 0,11, sagittal and transverse axis 0,06 millim. A nearly related form has been described by MURRAY & WHITTING (Trans. Linnean Soc. of London, ser. 2, Bot., Vol. V, Pl. XXVI, fig. 4) as *Ceratium biconicum*, which also probably belongs to the genus *Steiniella*.

I have found this form once only in a sample from 48° N., 24° W. (August 1899). *Temperature* 19,4. *Salinity* 35,63. *Styli-plankton.*

IV. CYSTÆ.

Cysta limbata CL. *)

Plate VIII. Fig. 15.

By this name I propose to denote an organism, that has already been observed by HENSEN (»Welliger Statoblast» 5te Ber. d. Kieler kommission, Pl. IV, fig. 28, 29), but has not got a name. It represents probably a stage in the development of some other organisms, perhaps some dinoflagellate, still, as it is of a certain importance to have a name for it, I propose the above one. It is a cellule of nearly spherical shape, in diameter about 0,05 millim., filled by a granular, probably green, mass. The membrane is somewhat thick and surrounded by a hyaline, plicate girdle, twice as broad as the enclosed cellule. This form is not very rare in the northern Atlantic, the North Sea and the Skagerak.

Hyalosphysa delicatula. N. Sp.

Plate VIII. Fig. 22.

By this name I denote an unknown unicellular alga, which was found in samples from the Azores (August 1898). It is remarkable for the very thin membrane and small scarce chromatophores scattered on the inside of the wall. The form of the cellules is

*) Since the above was written JØRGENSEN (Bergens Museums Aarbog 1899, p. 48) has named this organism *Pterosphæra Möbii*, which name has priority.

slightly cylindrical or almost globular. Diameter 0,08 to 0,08 millim. As I have seen alcohol-preserved specimens only, I am unable to decide whether the chromatophores are green or yellow.

Pyrocystis hamulus. N. Sp.

Plate VII. Fig. 23.

This characteristic cysta, perhaps a stage in the development of some dinoflagellate, seems to be akin to *Pyroc. lunula*. It is remarkable for the small body, that suddenly goes over in two long, towards the distal part bent horns. I have found it in samples from the Indian ocean and in the Atlantic between 12°—32° N., 47°—74° W., in *desmoplankton*.

Xanthidium pancispinosum. N. Sp.

Plate VII. Fig. 24.

This cysta is probably the same as has been figured by HENSEN (5te Ber. d. Kieler kommission, Pl. IV, fig. 31) as »dornige cyste». I have met with it both off the N. coast of South America and at the Azores.

V. DIATOMACEÆ.

Asterionella notata GRUN.

Plate VII. Fig. 32.

GRUNOW has figured a valve and two frustules of this species (Van HEURCK Synopsis, Pl. LII, fig. 3), which I have found in samples from the Azores. The frustules are connected by their basal part to comb-like colonies, which are twisted in different ways. Besides, the frustules in one colony are frequently directed in various directions.

Asteromphalus atlanticus CL. and **As. heptactis** RLFS.

Plate VIII. Fig. 6—9.

In the year 1873 I published a figure of an *Asteromphalus* (Bih. till Kongl. Sv. Vet.-Akad. Handl., I, n:o 13, Pl. IV, fig. 19), found in bottom-mud from Davis Strait, which I supposed to be *A. Brookei* Bail. Later, in 1896 (Bih. till Kongl. Sv. Vet.-Akad. Handl., Vol. XXII 3, n:o 4, pag. 5) I proposed to name this form, which occurs in the northern Atlantic, *A. atlanticus*. GRAN (Den Norske Nordhavs Expedition 1876—78. Protophyta 1897, Pl. IV, fig. 63) has given a good figure of the same form. In a recent publication (Iagttagelser over overfladvandets temperatur, saltholdighed og plankton fra Islandske og Grönlandske skibsrouter in 1898, pag. 52) OSTENFELD means, that *A. atlanticus* is a small form only of *A. heptactis*. This opinion seems to me to be erroneous,

as will be seen from the figures, Pl. VIII, fig. 6—9. Of these the fig. 6 represents a specimen of *A. heptactis* (23d of May 1898 58° 48′ N., 18° 45′ W., OSTENFELD's collection), the fig. 9 a very small specimen of *A. atlanticus* from the same gathering. The fig. 8 represents a specimen of ordinary size from Davis Strait and the fig. 7 a specimen from the coast of Portugal, the largest I have seen.

The specific difference may be seen from the following comparison:

	A. heptactis.	*A. atlanticus.*
Size	0,05 to 0,1 millim.	0,025 to 0,05 millim.
Radial proportion of the umbilical space and the limbus	1 : 3.	1 : 2.
Alveoli in 0,01 millim.	6.	12.
Geographical distribution	26° S.—63° N.	46° N.—78° N.
Plankton-type	*Styli-plankton.*	*Cheto- and tricho-plankton.*

That *A. heptactis* and *A. atlanticus* are different species cannot be doubted, but the question whether *A. atlanticus* and *A. Brookei* are identical or not, is more difficult to decide without comparison of original specimens. GREVILLE's figure of *A. Brookei* from Kamtchatka (Trans. Mic. Soc., Vol. VIII, Pl. IV, fig. 18) has 10 alveolate fields, else it seems to agree well, but as the minute structure has not been accurately described, the identification is impossible. It would be of a great interest to settle that question.*)

Chætoceros difficilis. N. Sp.

Plate VIII. Fig. 16—18.

Chains loose, of quadrate cellules, separate by large rectangular or subhexagonal foramina, half as long as the cellules. Cellules thin-walled, in sagittal-longit. position quadrate with flat valves. Cell-contents (as far as could be ascertained on alcohol-preserved specimens) with only one chromatophore. All awns very delicate. Endocysts in the middle of the cellules, biconvex, smooth, but with a peripherical row of small puncta.

Longitudinal axis 0,005 to 0,008. Sagittal axis 0,008 to 0,01. Endocysts 0,007 to 0,01 millim. Sterile specimens resemble *C. balticus* CL. (Bih. till Kongl. Sv. Vet.-Akad. Handl., Vol. XXI 3, n:o 5, pag. 25), but the endocysts are different.

This species was found in September 1899 at 59° N., 1° 2′ W. (temperature 11,8, salinity 35,37) together with forms that belong to *tripos-* and *sira-plankton.*

Chætoceros longisetus. N. Sp.

Plate VII. Fig. 25—29.

Chains composed of numerous cellules, straight, thin-walled, without foramina. Cellules in longitudinal-sagittal position quadrate, with flat valves. Awns arising from

*) When this paper was in the press, I received samples from the southern Atlantic, which contained abundantly *A. Hookeri* EHR. This antarctic form agrees perfectly with the boreal *A. atlanticus*, which name consequently must be exchanged for *A. Hookeri.*

the angles, all turned in an angle of 15°—20° towards the longitudinal axis, thinner and stronger intermingled. Terminal awns very long, stronger than the others, angular, with spirally arranged small spines, which become stronger towards the distal end. Endocysts in the middle of the cellules, biconvex, covered with numerous, long bristles.

Longitudinal axis 0,012 to 0,028. Sagittal axis 0,02 to 0,025. Endocysts 0,009 to 0,012 long. Their sagittal axis 0,02 to 0,025 millim. This species was found in March 1898 at 7° N., 55° W. (Temperature 25,9.)

This species is well distinguished from all known forms by the absence of foramina, by the direction of the awns by the endocysts and the size. In the absence of foramina and the direction of the awns it reminds of the very small form, which I have named *C. subtilis* (Bih. till. Kongl. Sv. Vet.-Akad. Handl., Vol. XXIII 3, n:o 5, fig. 8). Another form without foramina I found in plankton from the Caspian Sea.

Chætoceros Ostenfeldii. N. Sp.

Plate VIII. Fig. 19.

Chains flexible, with large oval foramina, as large as the cellules. Cellules thin-walled, with concave valves, somewhat longer than broad. Awns thread-like, short. Terminal setæ stronger than the others. Cell-contents (as far as could be ascertained on alcohol-preserved specimens) with one chromatophore along the wall of the zone.

Longitudinal axis of the cellules 0,01. Sagittal axis 0,007 millim.

This form has a considerable resemblance to *C. laciniosus* Schütt, but is much more delicate and has a single chromatophore. It has been distinguished by Ostenfeld (Iagttagelser over overfladsvandets temperatur, saltholdighed og plankton, in 1898) as »*C. laciniosus off.*»

It was observed in April 1898 abundantly at 49°—48° N., 19°—29° W., rarer in the Irminger Sea and the Färöe Channel, but became there common in May. Later it was seen only rarely, but in August it was found abundantly between Iceland and Greenland.

Dactyliosolen hyalinus. N. Sp.

Plate VIII. Fig. 33.

Cellules cylindrical, 1 1/2 to 2 times longer than broad, firmly united into confervoid threads. Valves circular flat, without any visible structure and with simple, not crenulate margins. Zone with numerous transverse rings, 2 in 0,01 millim., not distinctly punctate. Chromatophores small. Length of the cellules 0,06 to 0,08, their diameter 0,04 millim.

This species was found from February to June 1898 in the region of the Newfoundland Banks, associated with species belonging to *styli-plankton*. It reappeared on the same area in November. *Temperature* 14,4, mean of 32 obs., max. 20, min 8. *Salinity* 35, mean of 27 obs., max. 36,49, min. 32,62.

Skeletonema tropicum. N. Sp.

Plate VIII. Fig. 30, 31.

This species differs from *S. costatum* in its larger size and numerous, closer peripherical processes. Sagittal axis 0,015 to 0,038, longitudinal axis 0,01 millim. Processes 7 to 9 in 0,01 millim., their length 0,01 to 0,02 millim. I found this species in samples from the coasts of S. America, 29° S. and 6°—10° N. *Temperature* 23,8 to 27,2. *Salinity* from 34,53 to 36,01. Evidently a *tropical neritic* form.

Thalassiosira condensata. N. Sp.

Plate VIII. Fig. 12, 13.

Cellules very thin-walled, short, cylindrical, united by a single central short slim-thread to somewhat rigid chains. Valve orbicular with a central pore and a marginal circlet of close small protuberances, about 7 in 0,01 millim., but else without any visible structure (on ignited specimens). Zone with numerous rings. Chromatophores small and rounded, along tho interior wall of the cellule. Length 0,02 to 0,03, diameter 0,025 to 0,03 millim.

The membrane is so little silicious that it, on drying, becomes deformed.

This species was found in October 1899 at Plymouth together with several *arctic* forms.

Plate I.

Fig. 1—7. *Acartia macropus* CL.
» 1. Outline of the male, dorsal . . . . . × 85.
» 2. Outline of the female, dorsal . . . . . × 85.
» 3. Left anterior antenna of the male . . . . . × 170.
» 4. Right anterior antenna of the male . . . . . × 170.
» 5. Fifth foot-pair of the male . . . . . × 170.
» 6. Fifth foot of the female . . . . . × 300.
» 7. Head of the male, lateral . . . . . × 170.
» 8—11. *Corycæus longicaudis* DANA, *male*.
» 8. Outline, dorsal . . . . . × 85.
» 9. Outline, lateral . . . . . × 85.
» 10. Abdomen and furca, dorsal . . . . . × 170.
» 11. Posterior antenna . . . . . × 500.

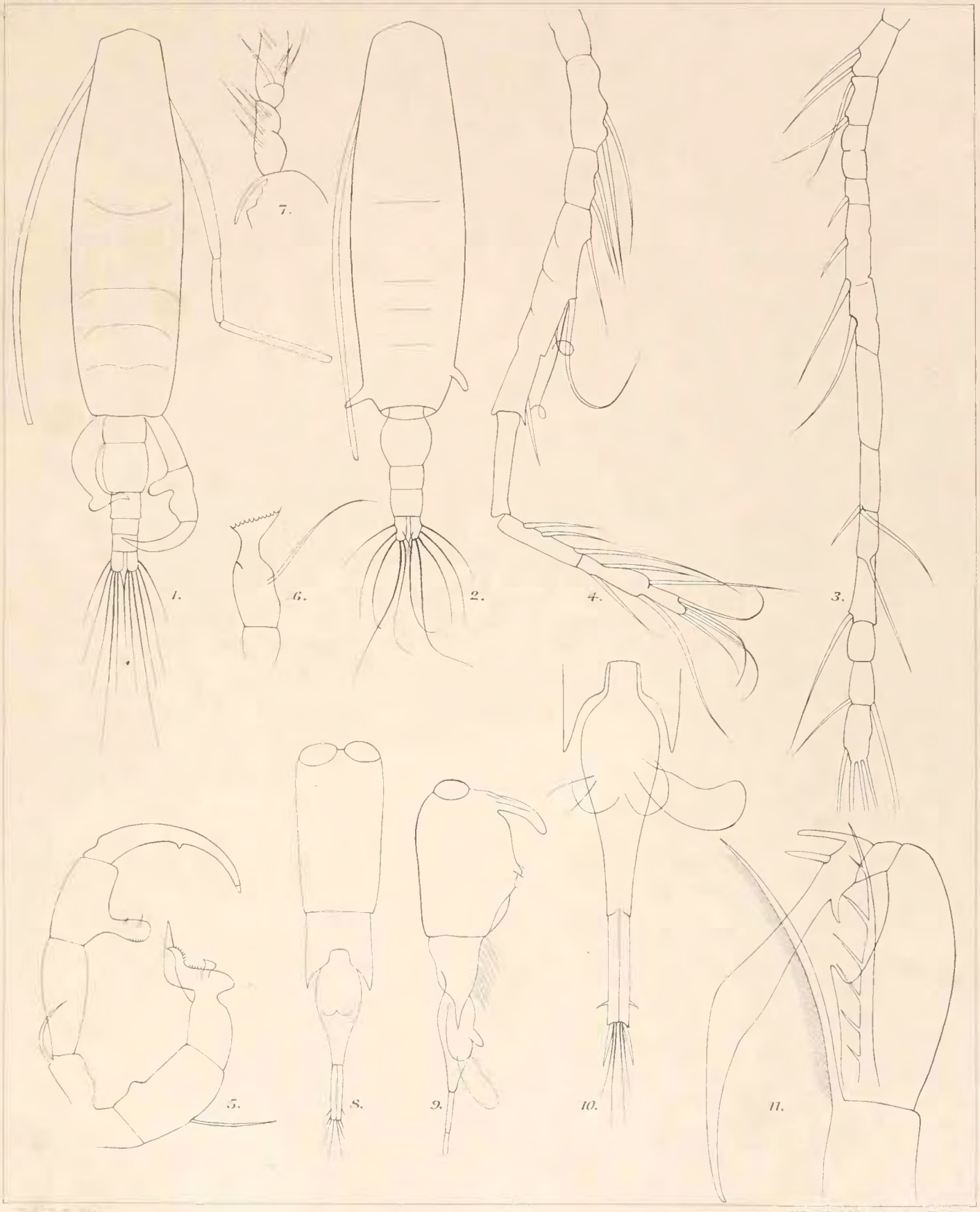
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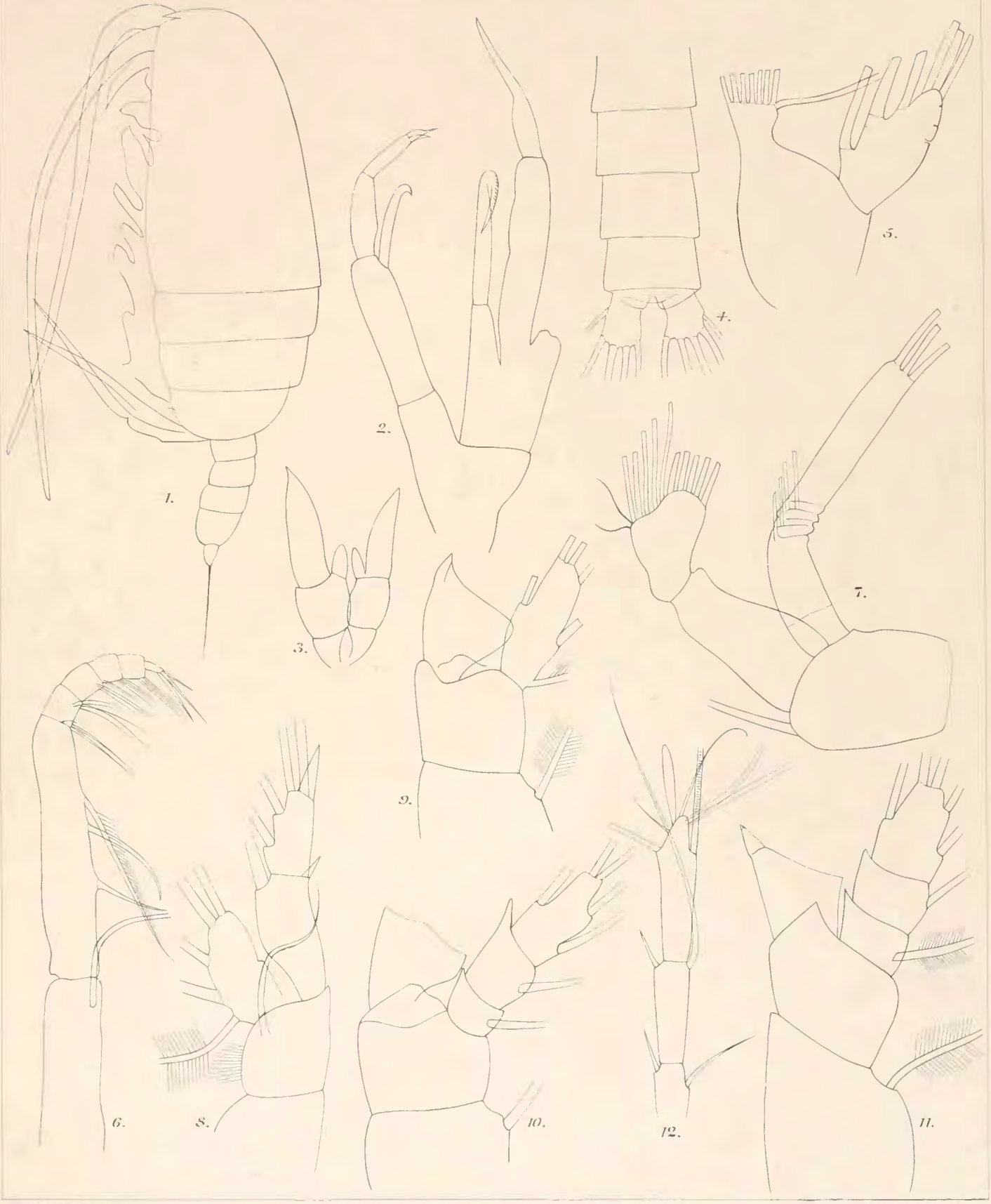
Plate II.

Euchirella rostrata CLAUS.; *male.*

Fig. 1. Outline, lateral . . . . . × 40.
» 2. Fifth foot-pair . . . . . × 85.
» 3. The same from a young specimen . . . . . × 85.
» 4. Abdomen, dorsal . . . . . × 85.
» 5. Mandible . . . . . × 170.
» 6. Second maxillipede . . . . . × 170.
» 7. Posterior antenna . . . . . × 170.
» 8. First foot . . . . . × 170.
» 9. Second foot . . . . . × 170.
» 10. Third foot . . . . . × 170.
» 11. Fourth foot, *B. 1* and *B. 2*, *Ri.* . . . . . × 170.
» 12. End of the left first antenna . . . . . × 85.



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Lith. W. Schlachter Stockholm.

Plate III.

Fig. 1—11. *Oncæa subtilis* GIESBR. *Male.*

» 1. Outline, dorsal . . . . . × 170.
» 2. Outline, lateral . . . . . × 170.
» 3. Left anterior antenna . . . . . × 500.
» 4. Right anterior antenna . . . . . × 500.
» 5. Abdomen and furca, dorsal . . . . . × 300.
» 6. Furca, dorsal . . . . . × 500.
» 7. Abdomen and furca, lateral . . . . . × 300.
» 8. Posterior maxillipede . . . . . × 500.
» 9. Posterior antenna . . . . . × 500.
» 10. Second foot . . . . . × 500.
» 11. Fourth foot . . . . . × 500.
» 12. *Anthocyrtium anthemis* HKL.? . . . . . × 500.
» 13. *Sethoconus crinitus* CL. . . . . × 500.
» 14, 15. *Challengeron brevispina* CL. . . . . × 500.
» 16. *Euphysetta pusilla* CL. . . . . × 500.
» 17. *Spermatogonia antiqua* LEUD. FORTM. . . . . × 500.
» 18. *Sperm. ant.* central capsule(?), treated with soda . . . . . × 500.


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Plate IV.

Fig. 1. *Quadrilonche crux* Cl. . . . . × 500.
» 2, 3. *Lampromitra erosa* Cl. . . . . × 500.
» 4. *Psilomelissa longispina* Cl. . . . . × 500.
» 5. *Dictyoceras neglectum* Cl. . . . . × 500.
» 6. *Sethocyrtis pyrum* Cl. . . . . × 500.
» 7. *Theocyrtis turris* Cl. . . . . × 500.
» 8. *Theoconus junonis* Hkl. affin. . . . . × 500.
» 9. *Clathrocanium minutum* Cl. . . . . × 500.
» 10. *Dictyocephalus cylindricus* Cl. . . . . × 500.
» 11. *Theocyrtis aculeata* Cl. . . . . × 500.

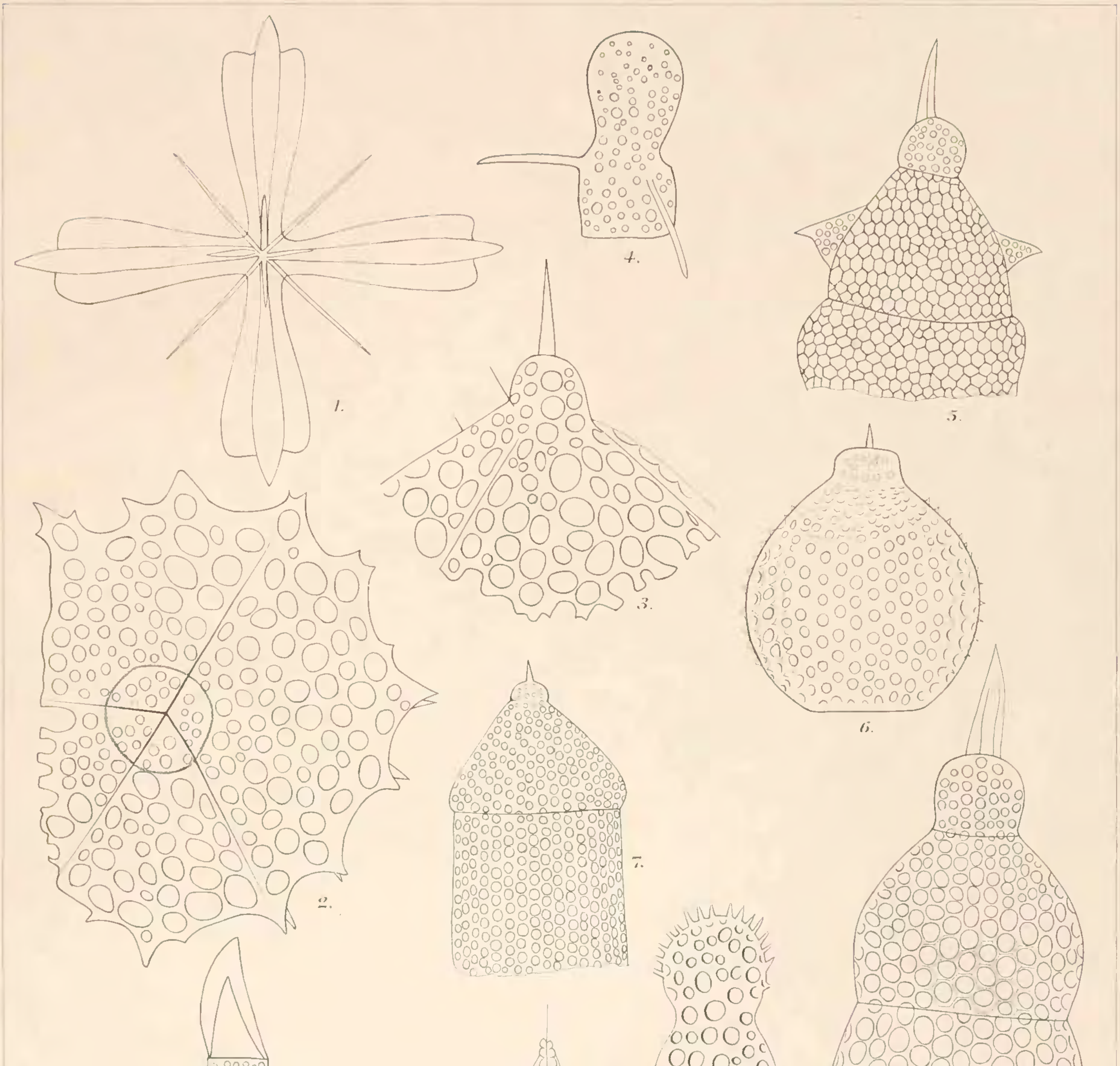
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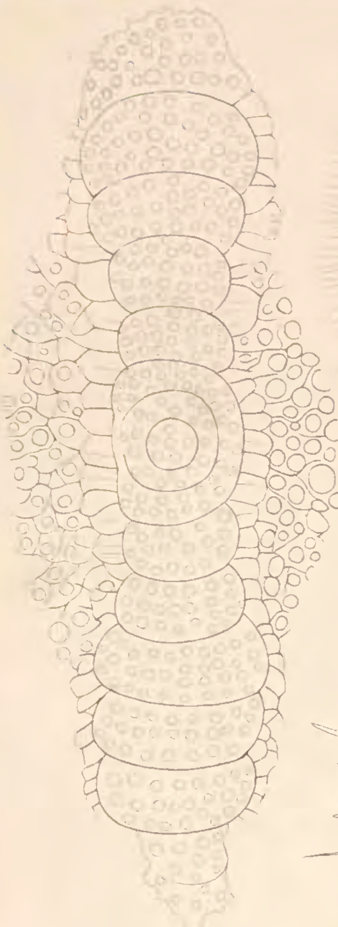
Plate V.

Fig. 1. *Amphihymenium elegans* Cl. . . . . × 500.
» 2. *Actinomma(?) sol.* Cl. . . . . × 500.
» 3. *Actinosphæra trichophora* Cl. . . . . × 500.
» 4. *Haliomma irregulare* Cl. . . . . × 300.
» 5. *Haliomma echinosphæra* Cl. . . . . × 500.
» 6. *Hexacontium setosum* Hkl.? . . . . . × 500.
» 7. *Haliomma spinulosum*, with two exterior shells . . . . . × 300.



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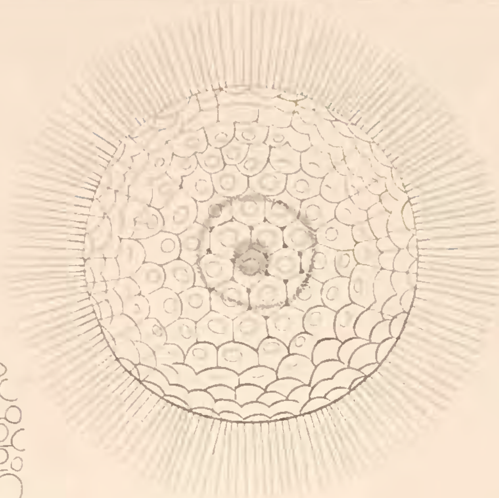

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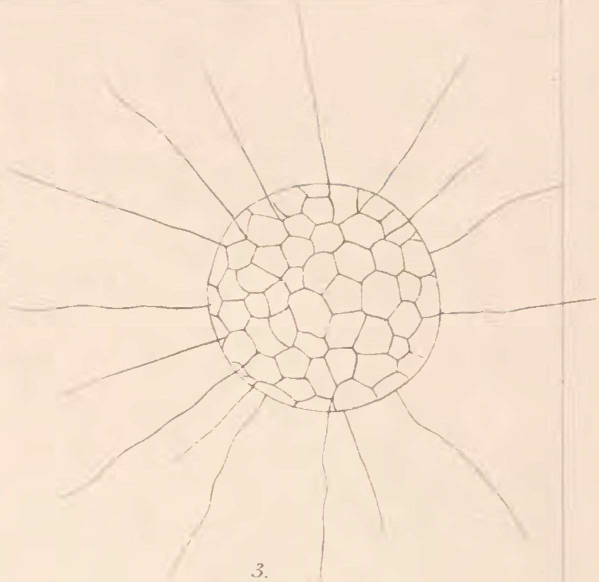

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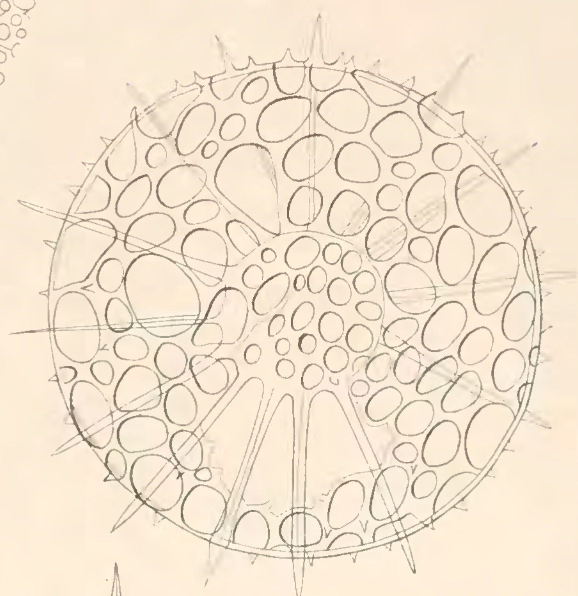

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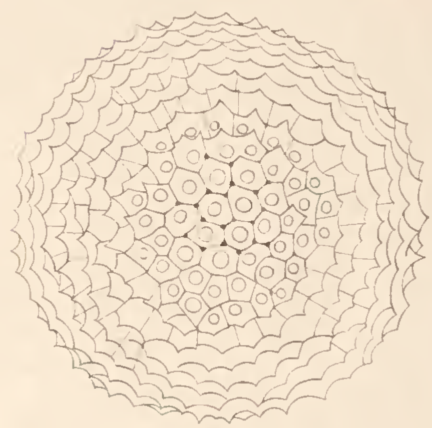

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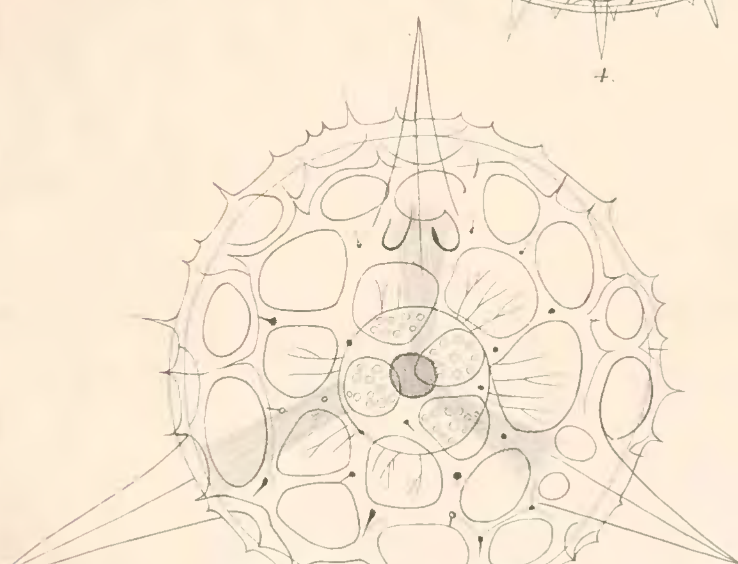

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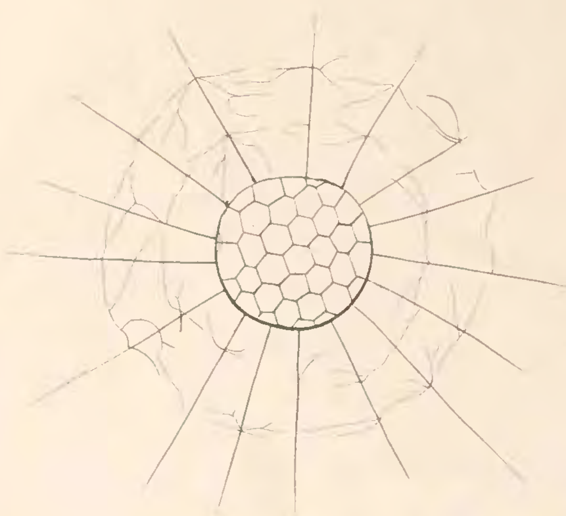

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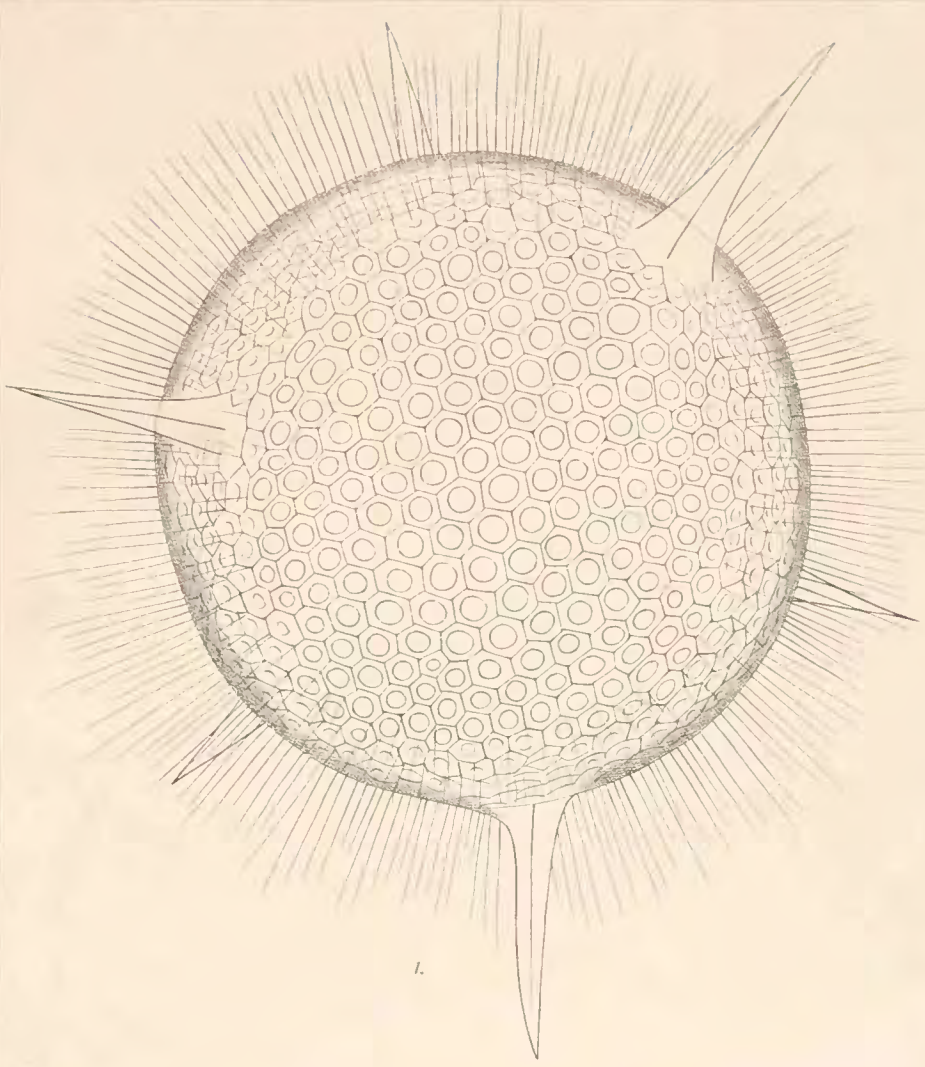
Del. P.T. Cleve. Lith. W. Schlachter Stockholm.

Plate VI.

Fig. 1. *Hexastylus nobilis* Cl. . . . . × 500.
» 2. *Heliosphæra minuta* Cl. . . . . × 500.
» 3. *Trypanosphæra brachysiphon* Cl. . . . . × 300.
» 4. *Hexacontium hostile* Cl. . . . . × 500.
» 5. *Hexacontium armatum* Cl. . . . . × 500.



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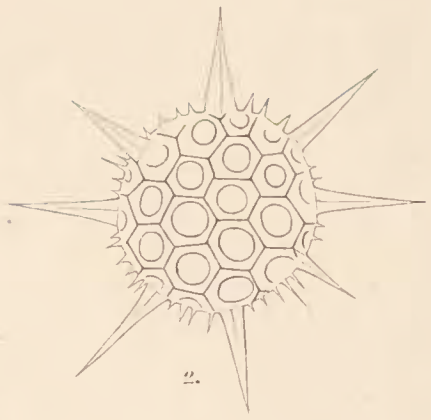

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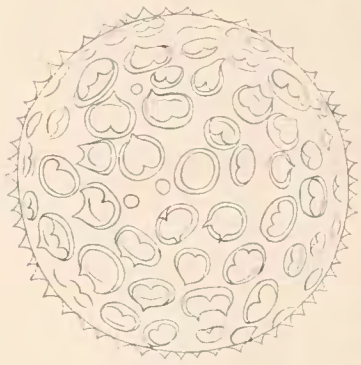

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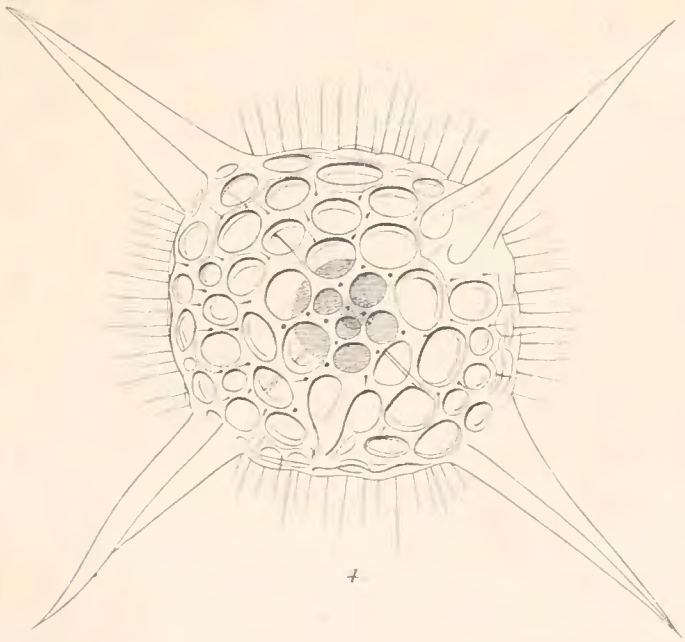

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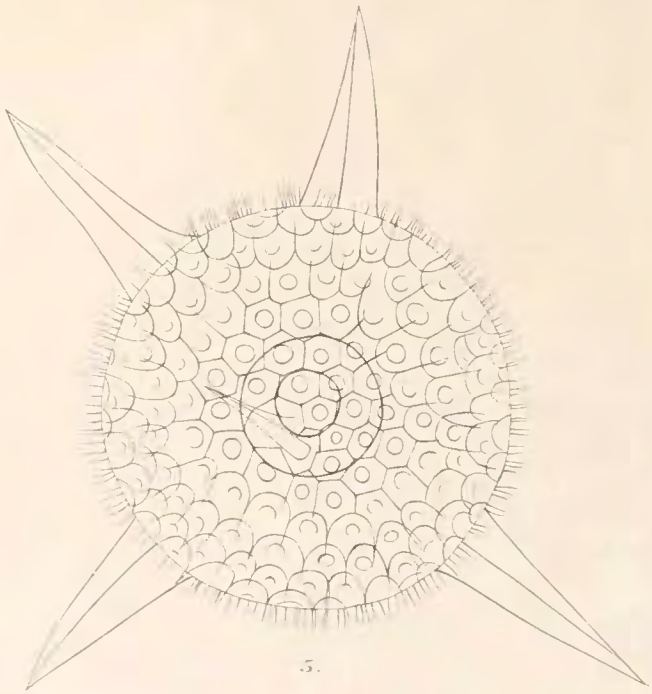

5.

Plate VII.

Fig.	1.	*Ceratium ranipes* Cl.	× 250.
»	2.	*C. curvicorne* v. Daday	× 250.
»	3.	*C. (tripos var.?) arietinum* Cl.	× 250.
»	4.	*C. (tripos var.?) volans* Cl.	× 250.
»	5.	*C. (tripos var.?) vultur* Cl.	× 250.
»	6, 7.	*C. (tripos var.?) azoricum* Cl.	× 250.
»	8, 9.	*C. reflexum* Cl.	× 250.
»	10.	*C. contortum* Gourret	× 250.
»	11.	*C. (tripos var.?) arcuatum* Gourret	× 250.
»	12.	*C. (tripos var.?) flagelliferum* Cl.	× 250.
»	13.	*C. belone* Cl.	× 250.
»	14.	*C. paradoxides* Cl.	× 250.
»	15, 16.	*Peridinium elegans* Cl.	× 250.
»	17, 18.	*P. oceanicum* Vanhöffen	× 250.
»	19, 20.	*P. diabolus* Cl.	× 250.
»	21, 22.	*P pallidum* Ostenf.	× 250.
»	23.	*Pyrocystis hamulus* Cl.	× 250.
»	24.	*Xanthidium paucispinosum* Cl.	× 150.
»	25.	*Chætoceros longisetus* Cl., sterile chain	× 500.
»	26, 27.	*C. longisetus* Cl.; with endocysts	× 500.
»	28, 29.	*C. longisetus* Cl.; terminal setæ	× 1000.
»	30, 31.	*Skeletonema tropicum* Cl.	× 500.
»	32.	*Asterionella notata* Grun	× 250.
»	33.	*Dactyliosolen hyalinus* Cl.	× 250.

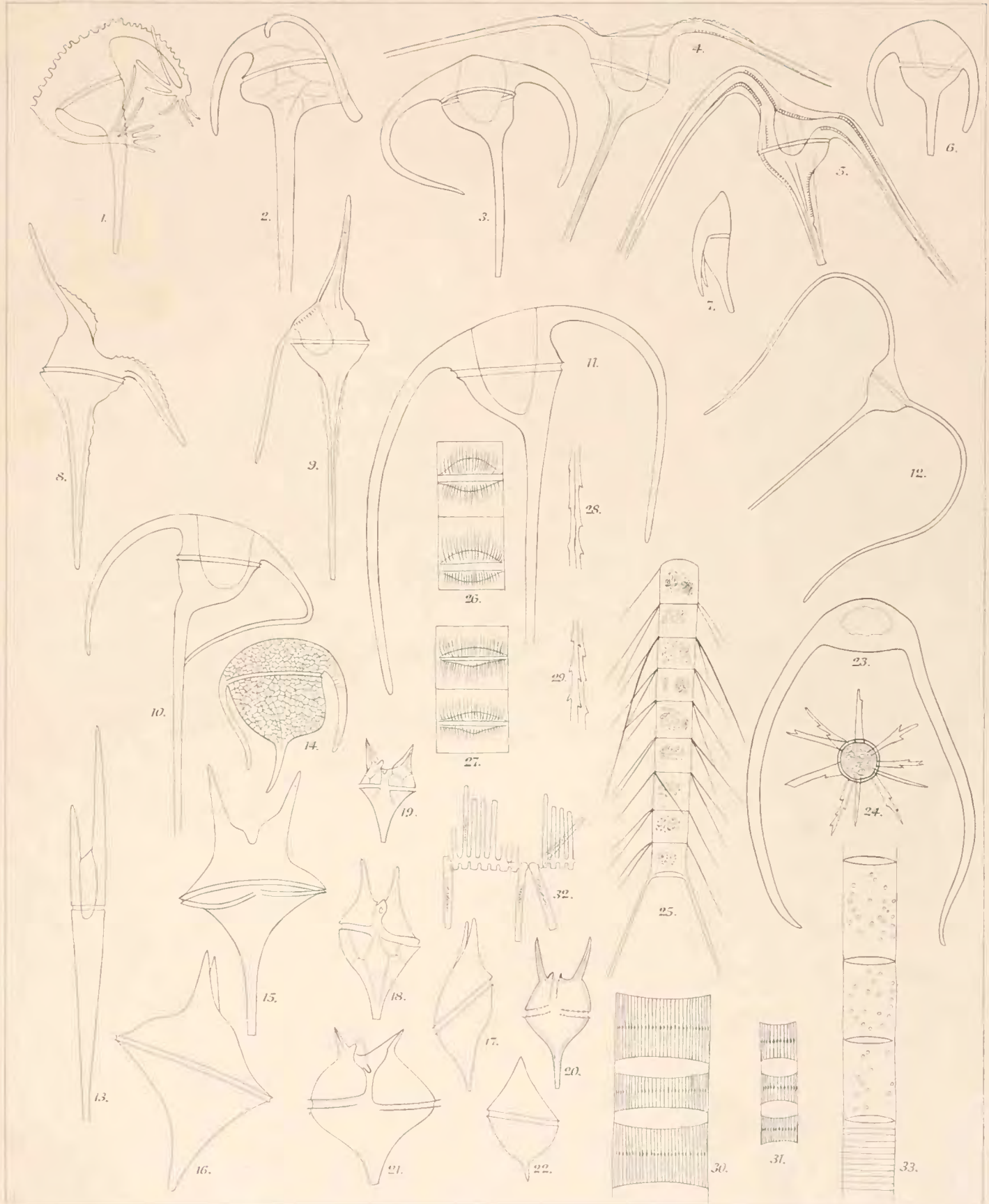
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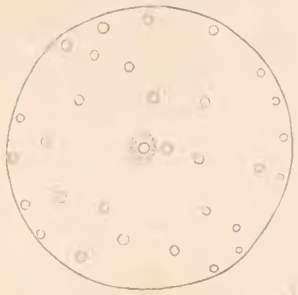
Plate VIII.

Fig. 1, 2. *Hyalophysa delicatula* CL. . . . . × 500.
» 3. *Dinophysis Vanhöffenii* OSTENF. . . . . × 500.
» 4. *Steiniella(?) punctata* CL. . . . . × 500.
» 5. *Peridinium exiguum* CL. . . . . × 500.
» 6. *Asteromphalus heptactis* RALFS. . . . . × 1000.
» 7. *A. atlanticus* CL. from Portugal . . . . . × 1000.
» 8, 9. *A. atlanticus* CL. from N. Atlantic . . . . . × 1000.
» 10, 11. *Phalacroma minutum* CL. . . . . × 500.
» 12. *Thalassiosira condensata* CL.; a chain . . . . . × 500.
» 13. *Th. condensata* CL.; a valve, ignited . . . . . × 1000.
» 14. *Ceratium(?) hyperboreum* CL. . . . . × 500.
» 15. *Pterosphæra Möbii* JØRGENSEN . . . . . × 500.
» 16. *Chætoceros difficilis* CL., sterile chain . . . . . × 1000.
» 17. The same, with endocysts . . . . . × 1000.
» 18. The same, endocysts, from above and from the side . . . . . × 1000.
» 19. *Chætoceros Ostenfeldii* CL. . . . . × 1000.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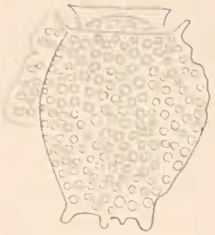
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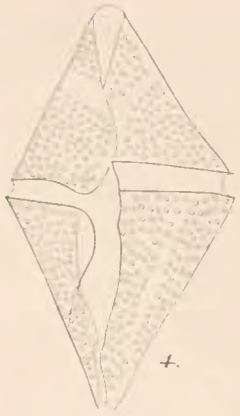
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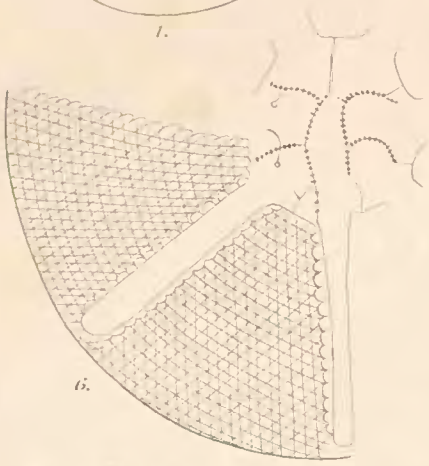
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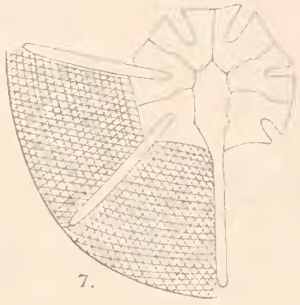
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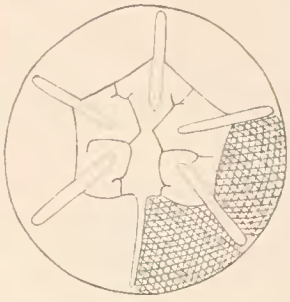
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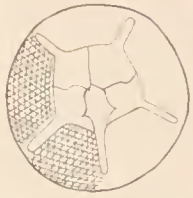
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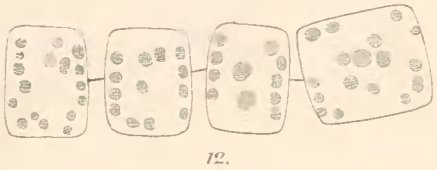
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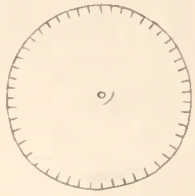
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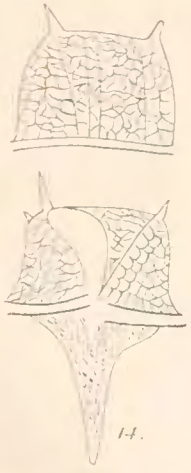
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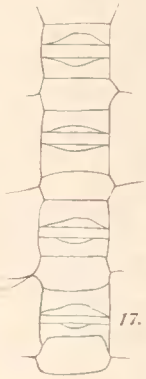
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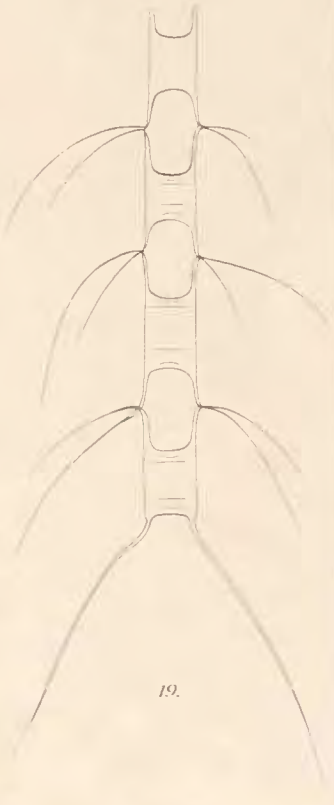
19.