

The Plankton of the Farøe Channel and Shetlands.  
Preliminary Notes on some Radiolaria and  
Copepoda.

By

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(With Plates I.-IV. and a Chart.)

In the year 1899 I commenced a series of tow-nettings round the coast of Shetland, and established four stations—one south of Sumburgh Head (III.), one west of Papa Stour (IV.), one of the northernmost points of Shetland (V.), and one due east of Bressay (VI.). During 1899 my yacht (the *Walwin*), a cutter of forty tons, made the round of these stations once a month during October, November, and December; and in 1900 during January, February, March, April, May, and June. During July, 1900, a passage was made across to Thorshaven (and back to Scalloway, Shetland), where stations were established, numbered respectively A1, A2, A3, A4, A5, A6, A7, A8, A9. (See Chart.) During August, 1900, only a short trip to the first two stations in the Farøe Channel was possible. In October, 1900, January, 1901, April, 1901, the stations round Shetland were visited again, and during May, 1901, a further passage was made to Thorshaven and back to Scalloway, visiting the stations previously fixed in the Farøe Channel. This passage was repeated in June, 1901, and again in July, 1901.

At each station round Shetland a surface haul was made with a fine silk net, followed by a vertical haul with an open net; and in February, 1901, I used for the first time a closing net supplied to me by the Plymouth Biological Station, and designed by my friend Mr. W. Garstang. This has subsequently been used on every occasion, both at the Shetland stations and on each trip to the Farøe Islands.

Thermometers were attached to the net, a reversing thermometer of Negretti and Zambra's pattern, supplied with Knudsen's bulb, and a Miller-Casella minimum thermometer; and the temperatures of each haul have been carefully recorded. In addition to these hauls a mid-water net of Professor McIntosh's pattern, supplied to me from St. Andrews, was used on every occasion where it was practicable. The procedure adopted has been as follows: At the Shetland stations

and the coast of Sumburgh northernmost I. During the round-trip, in April, May, and during the round-trip, in April, 1901, and during the round-trip, in April, 1901, and during the round-trip, in April, 1901.

Shetlands,  
and

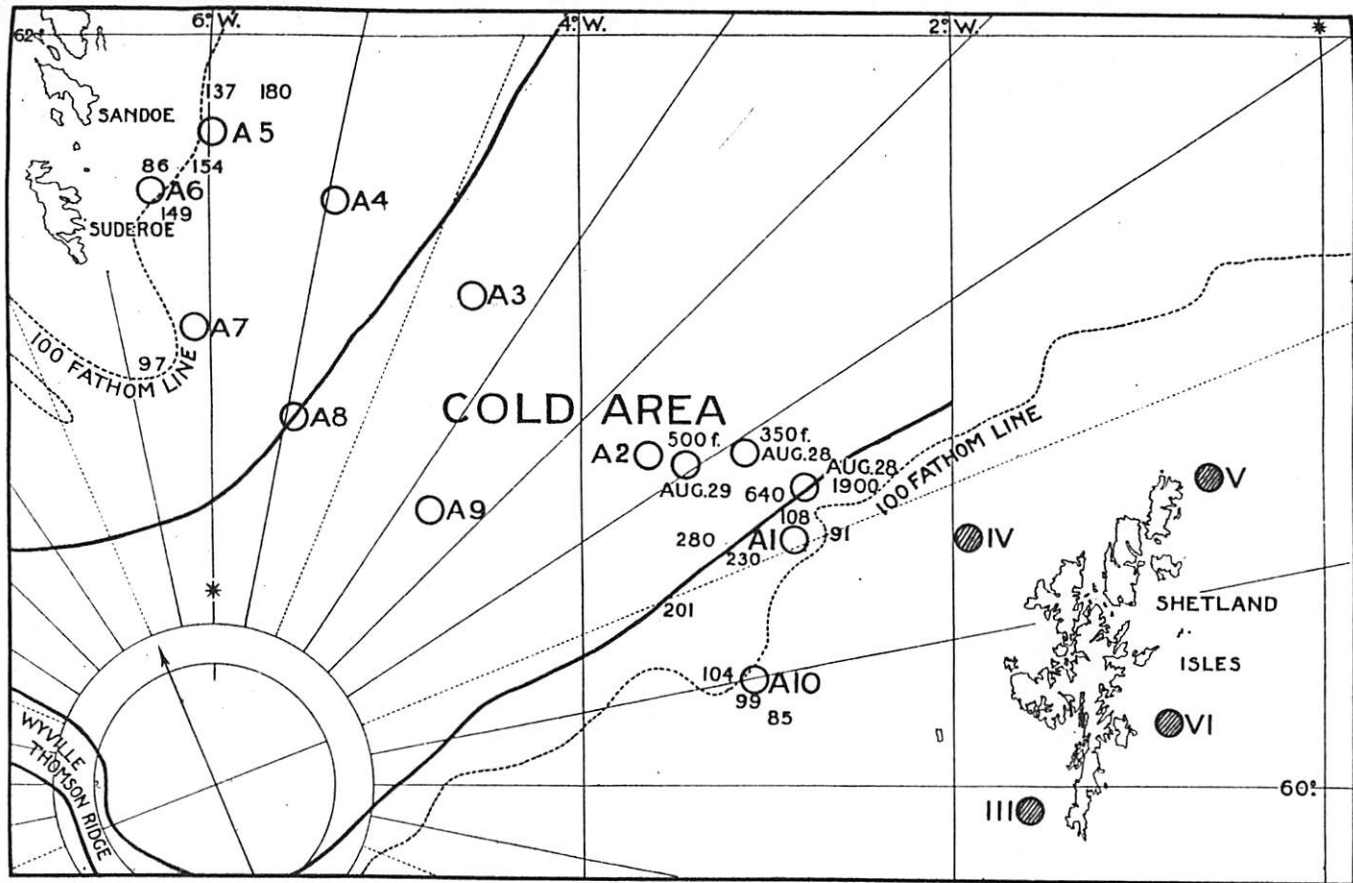


CHART SHOWING STATIONS AT WHICH TOW-NETTINGS WERE TAKEN IN THE FARØE CHANNEL AND ROUND THE SHETLAND COAST BY DR. WOLFENDEN.

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CHALLENGERIA ZETLANDICA (*n. sp.*), Plate II., Fig. 5.

Shell subspherical and strongly compressed (oval seen sideways) with the usual diatomaceous markings. The peristome is long, and at the base nearly as long as the shell, and ovate, and terminates in one bifid tooth. The whole peristome is strongly directed towards the ventral side. The shell is much longer than Haeckel's *Ch. sloggettii*, and the aboral line is rounded, not straight, as in *Ch. sloggettii*. It differs from both *Ch. sloggettii* and *harstoni* in the possession of a single bifid tooth, instead of two parallel teeth.

The shell is also much smaller than any of the Challengerida with which I am acquainted, being only .053 mm. long and the peristome .03 mm. long. The width of the shell (dorsally) is .03 mm.

II. COPEPODA.\*

The Copepoda of the Faröe Channel have been briefly reported on by I. C. Thompson for Fowler (Research Expn. P.Z.S., 1897). In the same paper a list is given of these, with the areas of their vertical distribution. For the present I withhold any comment on these results, my own work in the Faröe Channel not yet being completed, and will only remark that my own captures with Garstang's closing net in the deeper waters of the Faröe Channel have produced results agreeing in the main with those of Fowler. With work which has accumulated during three years it will be readily understood that it must take a considerable time before a complete survey can be given. I append a first list of Copepoda taken during these expeditions:—

IN THE SHETLAND WATERS.

- Calanus finmarchicus.*
- Calanus parvus.*
- Calanus hyperboreus.*
- Pseudocalanus elongatus.*
- Rhincalanus nasutus.*
  
- Eucalanus elongatus.*
  
- Euchata norvegica.*

IN THE FARÖE CHANNEL.

- Calanus finmarchicus.*
- Calanus parvus.*
- Calanus hyperboreus.*
- Pseudocalanus elongatus.*
- Rhincalanus nasutus.*
- "    *cornutus.*
- Eucalanus elongatus.*
- E. attenuatus.*
- E. crassus.*
- Euchata norvegica.*
- E. barbata.*
- E. marina.*
- Euchirella carinata (nov. sp.).*
- E. rostrata (?)*.

\* The Copepoda of the Faröe Channel will form the subject of a subsequent monograph.

## IN THE SHETLAND WATERS.

*Oithona spinifrons.*  
*Acartia clausii.*  
 „ *discaudata.*  
*Oncea mediterranea.*  
 „ *subtilis.*  
*Metridia lucens.*  
 „ *longa.*  
*Temora longicornis.*  
*Anomalocera pattersoni.*  
*Centropages typicus.*  
*Candace pectinata.*  
*Pleuromma abdominale.*

*Ætidius armatus.*  
*Ectinosoma atlanticum.*  
*Thaumaleus longispinosus.*  
*Pseudocyclopia giesbrechtii* (nov. sp.).  
*Cyclopina gracilis.*  
*Sapphirina* (nov. sp.).

## IN THE FARÖE CHANNEL.

*Oithona spinifrons.*  
*Acartia clausii.*  
  
*Oncea mediterranea.*  
 „ *subtilis.*  
*Metridia lucens.*  
 „ *longa.*  
*Temora longicornis.*  
*Anomalocera pattersoni.*  
*Centropages typicus.*  
*Candace pectinata.*  
*Pleuromma abdominale.*  
 „ *robustum.*  
 „ *abyssale.*  
*Heterochaeta clausii.*  
 „ *spinifrons.* [*longicornis*]  
 „ *zetesios* (nov. sp.), (non-  
*Tetragoniceps* — (nov. sp.).  
*Scolecithrix* — (nov. sp.).  
*Ægisthus atlanticus* (nov. sp.).  
*Leuckartia flavicornis.*  
*Augaptilus zetesios* (nov. sp.).  
*Ætidius armatus.*  
*Ectinosoma atlanticum.*  
*Gaidius boreale* (nov. sp.).

I have intentionally not included in this list the Harpacticidæ. It will be noted that several of these Copepods are new species, and I may add that they will form the subject of description subsequently, when the drawings are completed.

There are several additions to the list given in Fowler's paper (*loc. cit.*), notably *Pleuromma robustum*, *Heterochaeta clausii*, *H. zetesios*, *Augaptilus*, *Oncea*, *Eucalanus elongatus* and *crassus*, *Tetragoniceps*, *Scolecithrix*, *Rhincalanus nasutus*, and *Ægisthus*.

The limits of distribution of the following "warm-water species" are extended by these observations:—

*Euchirella*; *Eucalanus attenuatus*, *E. crassus*;\* *Euchæta barbata*; *Heterochaeta clausii*, *H. spinifrons*; *Leuckartia flavicornis*; *Scolecithrix*; *Oncea mediterranea* and *subtilis*; *Pleuromma abdominale*; *Rhincalanus*

\* *Eucalanus crassus*, *Pleuromma robustum*, *Ægisthus*, *Augaptilus* I found in Fowler's collection, the two first also occurring in my own tow-nettings.

*cornutus* and *nasutus*; *Thaumaleus*; *Ætidius armatus*; *Augaptilus*; *Ægisthus*; *Gaidius*.

Perhaps the most remarkable in this list is *Ægisthus*, of which only four examples are recorded by Giesbrecht, the limits of the species being 3° S. and 3° N., 99° W.

The common *Eucalanus* of the Faröe Channel is *E. elongatus*. *E. attenuatus* is very uncommon. *Eucalanus elongatus* is frequently found round the Shetland coast, and on one occasion I took a quantity in Scalloway Deeps.

*Rhinocalanus nasutus*, common in the Faröe Channel, is also often captured off the Shetland coasts. *Pleuromma abdominale* I have only once captured off the north coast of Shetland, and *Pleuromma robustum* is quite as common in the Faröe Channel as *P. abdominale*.

*Oncaea* is common in deep water and up to surface hauls in this region. *Euchaeta norvegica* I have never taken at the surface, though not unfrequently at forty to fifty fathoms' depth, but this being in an open "mid-water net," it may very well have been caught on the way up.

*Scolecithrix* is not uncommon in the Faröe Channel, but I am unable to refer my specimens to any described species. Curiously I have never succeeded in finding (though I have sought diligently) the *Metridia normani* which Giesbrecht records from the Faröe Channel. In few tow-nettings is *M. luccens* (and in deep water *M. longa*) absent, and of very common occurrence is a ♂ *Metridia* with the clasping antenna on the left side, but this species is certainly not *M. normani*. It very greatly resembles *M. luccens*, except for the peculiar position of its clasping antenna (left side).

*Leuckartia flavicornis* and *Thaumaleus* have each been captured only once. The occurrence of such forms as *Ægisthus*, *Augaptilus*, and *Gaidius* in these northern waters is very singular. *Calanus hyperboreus*, which occurs occasionally around the Shetland coast and frequently in the Faröe Channel, is described by Giesbrecht as a distinct species. Thompson, in his report on Fowler's Copepods (*loc. cit.*), is inclined to regard it as merely a larger variety of *C. finmarch.*; but I see no reason to doubt the correctness of Giesbrecht's view, that it has specific differences from the latter.

*Augaptilus*, *Euchirella*, *Gaidius*, and *Heterochæta* appear to be deep-water Copepods, and not to approach the coasts. *Anomalocera* is apparently one of the very few Copepods (not Harpacticidæ) which never descend into deep water, probably never below fifty fathoms.

*ÆGISTHUS ATLANTICUS*, *nov. sp.* (One specimen only, which I found in Dr. Fowler's Research Collection.)

Size 1.45 mm. Tail setæ  $5\frac{1}{2}$  times the length of the whole body, and coalescent throughout their course until just at the end. One is a little shorter than the other, and each ends in a peculiar spine, which articulates with the seta, and probably serves to fix the animal in the mud. This animal, unlike any other Copepod, possesses a sixth pair of feet, each a simple process with two hairs. The fifth feet are characteristic, long, and consist of only one segment. The inner terminal fan differs from Giesbrecht's species *mucronatus* and *aculeatus*, arising more proximately than in either of these, and not reaching the end of the terminal fan. The other feet have three-jointed outer and inner branches, and the second basipodite is joined to the first in quite characteristic manner (see Giesbrecht's figures, Fauna und Flora Neapel, Pl. 49).

The anterior antennæ consist of six joints; on the upper margin of the second joint is a strong spine proximally bent, and a long peculiar process (sensory?) on the third joint, and a similar one on the end joint. The maxilla and post. foot jaw agree closely with *Æg. mucronatus* (Giesbrecht). Of the mandibles only the biting end remains.

The body of the animal is more or less torpedo-shaped, and the head narrows in front, and is produced into a long stout spine, curved downwards and forwards. The animal bears some resemblance to *Æg. mucronatus*, but is little more than half the size, differs in the length and terminations of the tail setæ, the presence of a long sensory process on the last joint of the anterior antenna, the possession of a three-jointed internal and external branch of the second feet (two-jointed in *mucronatus*), the disposition of the fan bristles of the fifth feet, the length of the bristles on the sixth feet (longer than *mucronatus*), the absence of teeth on the posterior edges of Th. 2, 3, and 4.

#### ÆTIDIUS ARMATUS.

The examples captured by me in the Faröe Channel and round the Shetlands fall into two groups, and further study will probably warrant the differentiation of more than one species.

A large number of apparently adult specimens attain a size only of 1.65–1.7 mm., and in these the rostrum is large and strongly chitinised, the anterior antennæ reach quite to, or a little beyond, the end of the furca, and the tenth, eleventh, and twelfth segments are proportionately a little larger than in the second species, and more

or less coalesced. The pointed angles of the last thoracic segment are also dorsally more prominent and the spurs are shorter than in the other group (in which they reach beyond the end of Ab. 2).

In the second group the animals are much larger, 2.0–2.3 mm. long, the rostrum is smaller, the angular point of the last thoracic segment longer, and the antennæ are shorter, reaching only to the end of the first abdominal segment, and the joints 10, 11, 12 are more clearly segmented.

The specimens examined agree more closely with Giesbrecht's description than Brady's (*Challenger Report*), whose drawings and descriptions contain many inaccuracies. Brady gives the size of *Ætidius armatus* at 2.1 mm., Giesbrecht 1.55–1.9 mm., and the latter speaks of the variability in length of the points of Th. 5. These differences may be accounted for by the occurrence of two closely allied species, further discussion of which I defer for another occasion.

GAIIDIUS BOREALE, *nov. sp.*

Half a dozen specimens captured at 300 fathoms at station A2 exhibited the following characters as described by Giesbrecht (*Bull. Mus. Comp. Zool. Harvard*, 1895): Short, one-pointed rostrum; the last thoracic segment produced into a long and sharp point. The inner branch of the posterior antenna : outer half :: 5 : 8. The bristles of the inner branch are 8+6. The head rounded, and without crest. Abdomen of four segments, the genital segment strongly swollen, but quite symmetrical. Of the swimming feet, the first has a two-jointed exopodite and one-jointed endopodite; the second, third, and fourth have three-jointed exopodites, but while the third and fourth feet have three-jointed endopodites, the second foot has an endopodite with only one joint like the first foot. There is an indistinct trace of segmentation into two joints.

The maxilla and mandible resembles Gaetanus. In the posterior foot jaw the second basal, which is longer than the first, is about three times as long as the five-jointed endopodite. The fourth feet have the stiff, broad bristles on the inner margin of the second basal, which slightly resembles the lamellæ of the same foot of *Euchirella rostrata*, and of which Giesbrecht remarks, "Die Fiedern am proximalen Theile des Innenrandes des 1 Basalgliedes sind am 4 Fusse breiter, und, wie es scheint, steifer als an den vorhergehenden Füßen, worin man einen Uebergang zu den Lamellen und Stacheln finden wird, welche sich bei *Euchirella* an der gleichen Stelle finden" (*loc. cit.*).

The size of my animals is 3.55 mm. (♀), while that of Giesbrecht's is 3.2 mm. The limits of distribution of Giesbrecht's species were

35° N. to 125° W. My species differs a little from Giesbrecht's, and may be, from the locality of its occurrence, designated *boreale*. Only a brief description of *Gaidius pungens* is available (*loc. cit.*), the only described species.\*

EUCHIRELLA CARINATA ♂ *nov. sp.*

A male taken at A2, 300 fathoms, measured 3.71 mm. long, the fore-body six times as long as the abdomen. The last thoracic segments are rounded. The head is produced into a curious rostrum rather like *E. galatea* ♀, and dorsally there is a strong crest. There is red pigment about the mouth organs and the mandible chewing end is strongly coloured deep orange-red, the foot jaws having their bristles similarly but slightly coloured. The anterior antennæ reach just to the hind end of the thorax and consist of twenty-three joints. The feet have three-jointed exopodites except the second, in which they consist of only two joints, the endopodites of the first feet have one, those of the second feet two, and of the third and fourth feet three segments. There is a pair of rudimentary fifth feet, consisting each of an exopodite and endopodite. The right foot is a little the largest, its external branch of only one segment, in which are indistinct traces of three joints; the terminal joint ending in a blunt rounded process. The internal branch is of one stumpy rounded segment only. The left foot has a one-segmented outer branch, with blunt rounded end, and a short (not half the size of the opposite foot) rounded segment, like a small stump. Neither foot has any trace of spines or hairs.

The anal segment is very short and tucked into the fourth abdominal segment as in other Euchirellas.

The external branch of the posterior antenna is over three times as long as the inner branch, which carries 6 + 5 bristles at the end.

There are no spines or bristles on the first basal of the fourth foot.

The twentieth and twenty-first joints of the anterior antennæ are not coalesced, but the antennæ strongly resemble those of Euchirella. 8 and 9 and 24 and 25 are joined.

This Copepod agrees with Euchirella in the possession of twenty-three jointed anterior antennæ, the shape and number of segments of the abdomen, the segments of the branches of the feet, and the posterior antennæ. The maxillæ and foot jaws are well developed, the former very similar to the maxilla of the ♀ *E. messinensis*, the second basal joint of the posterior foot jaw is not quite twice as long as the well-

\* The nearest related genus is Gaetanus (Giesbrecht), but this Copepod is removed from it by the absence of any median spine on the head. The indistinct traces of segmentation of the first and second feet cause it to approach the genus Gaetanus, while the lamellæ of the fourth feet (basal joint) again differentiate it. On the whole, it approaches more nearly to Gaidius than Gaetanus.



developed five-jointed endopodite; in the anterior foot jaw the lobes are large, compressed, and the endopodite articulates behind, as in *Ætidius*. The hooked bristle on the fourth lobe is very strong and longer than that in the fifth lobe. This organ greatly resembles *E. rostrata*. The animal resembles no known ♂ *Euchirella* (*E. amœna*, *E. messinensis*, *E. pulchra*), but though comparatively large, it may be an undeveloped ♂. It will be figured and described subsequently.

EUCHIRELLA ? ROSTRATA (? var.) ♀.

Size 3.8 mm. There is no crest, but a one-pointed rostrum. The abdomen and genital segment are quite symmetrical. The anterior antennæ have twenty-three joints. The internal branch of the posterior antennæ is as 5:8, and the end of the endopodite carries 6+5 bristles. The fourth feet have peculiar spines on the inner margin of the first basal joint, four in number, one of which is large (the proximal), the others progressively smaller and further proximally from the stout inner hair than in *E. rostrata*, which it most resembles. The maxilla is very similar to *E. rostrata*, and the mandible is similarly like, except that the inner tooth of the chewing end is much longer and sharper. The absence of a crest and the symmetrical genital segment and spines of the basal joint of the fourth feet differentiate it from *E. pulchra* ♀.

The larger size and number of bristles on the endopodite of the posterior antennæ and smaller number of spines (or triangular lamellæ) on the fourth basal differentiate it from *E. rostrata*, of which, however, it may be a variety. It will be described and figured subsequently.

Two perfect specimens were captured at 300 fathoms.

HETEROCHÆTA ZETESIOS, n. sp. ♂

Length 3.5 mm. This Copepod, found in Fowler's Research Collection, was in very good state of preservation, except that the end segments of the anterior antennæ and tail setæ were damaged. The portion of the anterior antennæ left (nineteen joints) reached a length of 4 mm., so that it was much longer than the whole length of the animal. The geniculation occurs between the eighteenth and nineteenth joints. The basal joint of the posterior foot jaw has bristles, but no long spine, and the last two lobes of the anterior foot jaw carry plain hooks not beset with comb teeth. The fifth lobe is very much longer than any of the others, and its hooked bristle is stouter than that of lobe 4, and is quite without teeth or hairs, while that of lobe 4 is beset with fine short bristles. The mandibles, unlike *H. longicornis* (of which it might possibly be the ♂, but

the ♂ of this species is unknown), are not alike, the chewing end of one carrying two trifold, one single pointed, and one long, stout, pointed outer tooth (four in all), whereas the chewing end of the opposite mandible carries only two slenderer, long, pointed teeth. The exopodite of the mandible carries four extraordinarily long and densely feathered bristles, the endopodite is well developed. The last joint of the outer branch of the fourth feet is of similar form to that of the third foot. The fifth feet are unlike those of any known Heterochaeta, the second basal of the right foot being produced into a long comb-like process with stiff, short bristles on the inner margin, the first segment of the exopodite is small, the second very large and very broad with the internal margin armed with two protuberances, one having a series of short teeth, the other and distal one armed with a few stiff bristles. The second basal of the left foot has a rounded and projecting distal inner margin armed with stiff bristles. The bristles of the posterior antenna are of great length and densely feathered.

In size, length of anterior antennæ, characters of the basal joint of the posterior foot jaw, and of the anterior foot jaw, and normal shape of the third segment of the exopodite of the fourth foot this Copepod resembles *H. longicornis* (Giesb.). The ♂ of this species is, however, unknown, and the example under notice may possibly be this, or a new species. Provisionally I name it *zetesios*.

#### PLEUROMMA ROBUSTUM, *Dahl*.

Many examples of this Copepod have been captured in my Faröe tow-nettings, and I found several examples of it in Fowler's Research Collection. The ♀ averages 4 mm. length, the ♂ 3.5-3.7 mm. The pigment spot is always on the right side of the body, and the clasping antenna on the left. The teeth of the anterior antennæ are small, and both the second feet have excavations and teeth on the first segment of the internal branch. The abdomen is quite symmetrical. Dahl remarks of this species that though found in tropical areas of the ocean singly and in deep water, it has a wide distribution, and in northern regions comes nearer to the surface, having been once taken in the vertical net from 100 metres to the surface. I have taken it several times in the closing net at 100 and 150 fathoms.

#### THAUMALEUS LONGISPINOSUS ♂.

Only the ♂ of *Th. longispinosus* and *Th. thompsonii* are known, and the furca of the former has four bristles, while that of the latter species has only three. If the tail bristles are to be regarded as of constant diagnostic value, this specimen approaches more nearly to *Th. longi-*

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*spinosus* in the possession of four furcal bristles. The whole length of my specimen is 1.19 mm., and the relative length of abdomen to cephalothorax is as 1 to 4, somewhat different from Giesbrecht's measurements, making the body in the Shetland specimen larger in proportion. *Thaumaleus longispinosus* was taken by Bourne at Plymouth in 1890, and *Th. clapedii* by Scott in 1889 in the Firth of Forth, and by Thompson in 1889 in Liverpool Bay; but so far as I am aware no *Thaumaleus* has been captured so far north as Shetland before.

AUGAPTILUS ZETESIOS, *n. sp.* Plate III.

Total length 4.71 mm., of moderate transparency. Head separate from thorax, with weak rostrum situated on a papilla. Abdomen three segments, the genital longer than both the others together. Furcal segment four times as long as broad. Anterior antennæ of twenty-five segments, and reaching considerably beyond the end of the furca. The outer branch of the posterior antennæ is a little the longest. The hairs of the outer branch are very long and feathered; those of the other branch shorter and naked. Mandibles have a long and thin chewing end with two large and one very small teeth. Maxillæ have all the outer and inner lobes except the first (of each) suppressed. The bristles are of very great length. The bristles of the second basal and endopodite of the anterior foot jaws carry two series of the peculiar "hutpiltzformigen Anhänge" characteristic of *Augaptilus* (see Fig. 12). In the posterior foot jaws the bristles of the endopodite are similarly armed. The swimming feet have each three segmented inner and outer branches. The outer spine on the first segment of the exopodite of the first foot is very long and closely haired, and the distal segment carries two long tapering naked bristles. In the second and third pairs the long bristle on the second basal (which is present in the fourth feet) is absent. The third segments of the exopodites of the second, third, fourth, and fifth feet have a very convex outer margin, and the spines are very rudimentary. The bristles at the end (especially in the third and fourth feet) are stiff and curved inwards, with long hairs on the inner aspect, and short stiff hairs on the outer. The fifth feet have a rather longer (proportionally) endopodite, and the last joint of the exopodite is shorter than in the second to fourth pairs, while the distal segment of the inner branch is comparatively longer than in the other feet. The second segment of the outer branch carries a long, stout (at the base), and tapering spine nearly as long as the joint and armed on the inner side with stout teeth from the base to the distal end, and many short teeth on the surface and a few stout teeth on the outer proximal margin. This Copepod bears some resemblance to *Aug. longi-*

*caudatus*, Giesb., but is considerably larger. The genital segment is longer than both succeeding segments; the anal segment is half as long again as the middle segment of the abdomen. The bristles of the mandible and anterior foot jaws, and the proportions of the joints of the posterior foot jaws, also differ. The fifth foot differs in relative proportions, and the spine on the second joint of the exopodite is quite peculiar. It differs from *Aug. megalurus*, especially in the large spine of the fifth foot and the size of the middle segment of the abdomen.

Two specimens were found in Dr. Fowler's collection, one from a bottle marked 19 d.e. Epiplankton, and one from Mesoplankton 20 (stations referred to in his paper in the *Proc. Zool. Soc., loc. cit.*).

PSEUDOCYCLOPIA GIESBRECHTII, *nov. sp.* Plate IV.

Length of the whole animal, .72 mm. (cephalothorax, .575 mm.). Body robust, with a short pointed rostrum, and of four segments. Abdomen slender, of four segments, the first equal in length to the third and fourth. Furcal segment about as long as broad—of the four tail setæ, the two middle of each side are stout, not jointed, and cross-ringed in their whole length, and feathered throughout; the four shorter hairs are cross-ringed only to the joint. The *anterior antennæ* do not reach to the end of the cephalothorax, and contain seventeen joints, the first joint about equal in length to the succeeding thirteen joints. The *posterior antennæ* have only one branch (internal) composed of four joints. The *mandibles* are large, with broad chewing end and two-branched palp. The *maxillæ* and *anterior foot jaws* present nothing unusual, except that the exopodite of the former is suppressed. The *posterior foot jaws* consist of two basal joints and a five-jointed endopodite. The two basal joints are about equal in length. The endopodite is shorter than the second basal joint.

*The Swimming Feet.*—The first pair is short, and has three jointed exopodites and one jointed endopodites; the second pair has three jointed exopodites and two jointed endopodites; the third pair has three jointed outer and inner branches. The internal branch of the right foot is longer than that of the left side, the second segment being longer than that of the other internal branch. The distal joint of the outer branch of the left foot is much longer and broader than that of the foot of the other side, has two stout spines on the outer margin, and a long apical spine twice the length of that of the opposite foot, the terminal joint in which carries only one outer marginal spine and a very short apical spine. The long, stout, naked spine arising from the inner distal margin of the first basal joint is in each foot as long as the internal branch. This foot is very remarkable, and may be an ab-

genital segment is half as long as the first segment. The bristles of the first and second joints of the first pair differs in relative length. The second exopodite is quite as long as the first in the large spine of the abdomen. In addition, one from a Mesoplankton 20 (loc. cit.).

## Plate IV.

Thorax, 575 mm.). composed of four segments. The first in length to the second—of the four joints, and cross-section throughout; the four of the anterior antennæ contain seventeen succeeding thirteen (external) composed of a chewing end and the first three present nothing suppressed. The first and second a five-jointed in length. The

has three jointed and the third pair has three and the third pair has a basal branch of the second segment being distal joint of the first rather than that of the outer margin, the opposite foot, the genital spine and a bristle arising from the first not as long as the second may be an ab-

normality. The fifth feet are very peculiar, consisting each of one branch only, each of the two basal joints and a terminal joint forming three finger-like projections. The second and in greater degree the third and fourth feet have their segments ornamented on the surface with rows of fine spines, and the joints of the endopodites of the third pair are fringed with spines.

The absence of a secondary branch of the posterior antennæ in this species is remarkable. In other particulars, size and spinulation of the feet segments, number of antennæ, joints, etc., it differs from any known species of *Pseudocyclopia*. I have named it after Dr. Giesbrecht, to whom I showed these drawings when recently I visited Naples. It was captured in the surface tow-net off the island of Bressay, Shetland, in March, 1900.

## EXPLANATION OF PLATES I.-IV.,

ILLUSTRATING DR. R. N. WOLFENDEN'S PAPER ON "THE PLANKTON OF THE FARØE CHANNEL AND SHETLANDS."

## PLATE I.

1. *Aulographis furcellata* (nov. sp.), a needle.
- 2 and 2a. *Aulographis tetrancista* (?) (variety).
  2. A short-branched verticil.
  - 2a. A verticil with long branches.
3. A needle of *Aulacantha scolymantha*.
- 4, 4a, 4b. *Aulodendron boreale* (nov. sp.).
5. Needles of *Sphærozoum (ovodimare?)*.

## PLATE II.

## CHALLENGERIDA.

1. *Challengeron walwini* (nov. sp.).
  - 1a. The peristome in different aspect.
2. *Challengeron balfouri* (?) (variety).
  - 2a. The peristome (enlarged).
3. *Challengeron balfouri* (?) (variety).
  - 3a. The peristome seen dorsally.
4. *Challengeria tritonis*.
5. *Challengeria zellandica* (nov. sp.).
  - 5a. Viewed ventrally.

PLATE III.

*Augaptilus zetesios* (nov. sp.).

1. Whole animal, dorsal (2 inch obj. × 5 oc.).
2. Fifth feet ( $\frac{1}{2}$  inch obj. × 5 oc.).
3. Spine on second segment of exopodite of fifth feet ( $\frac{1}{4}$  inch obj. × 5 oc.).
4. Fourth foot ( $\frac{1}{2}$  inch obj. × 5 oc.).
5. First foot ( $\frac{1}{2}$  inch obj. × 5 oc.).
6. Second and third segments of exopodite of first foot ( $\frac{1}{4}$  inch obj. × 5 oc.).
7. Mandible ( $\frac{1}{2}$  inch obj. × 5 oc.).
8. Maxilla ( $\frac{1}{2}$  inch obj. × 5 oc.).
9. Posterior antenna (1 inch obj. × 5 oc.).
10. Anterior foot jaw ( $\frac{1}{2}$  inch obj. × 5 oc.).
11. Posterior foot jaw ( $\frac{1}{2}$  inch obj. × 5 oc.).
12. Processes on bristles of posterior foot jaw ( $\frac{1}{8}$  inch obj. × 5 oc.).
13. Anterior antenna (1 inch obj. × 5 oc.).

PLATE IV.

*Pseudocyclopia Giesbrechtii* (nov. sp.).

1. Whole animal in profile ( $\frac{1}{2}$  inch obj. × 3 oc.).
  2. Abdomen, dorsal view ( $\frac{1}{4}$  inch obj. × 5 oc.).
  3. First foot, dorsal view ( $\frac{1}{4}$  inch × 5 oc.).
  4. Third feet, ventral view ( $\frac{1}{4}$  inch × 5 oc.).
  5. Fourth foot ( $\frac{1}{4}$  inch × 5 oc.).
  6. Second foot, dorsal view ( $\frac{1}{4}$  inch × 5 oc.).
  7. Fifth feet, dorsal ( $\frac{1}{4}$  inch × 5 oc.).
  8. Anterior antenna.
  9. Posterior antenna.
  10. Mandible.
  11. Maxilla.
  12. Anterior foot jaw.
  13. Posterior foot jaw.
- } (All  $\frac{1}{4}$  inch obj. × 5 oc.).

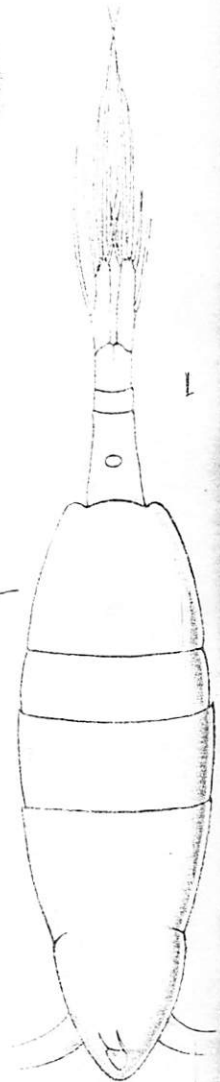
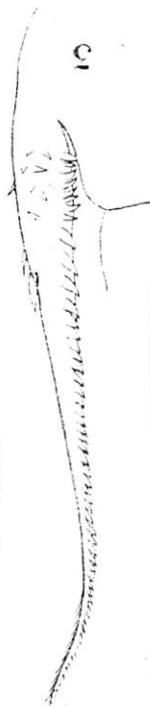
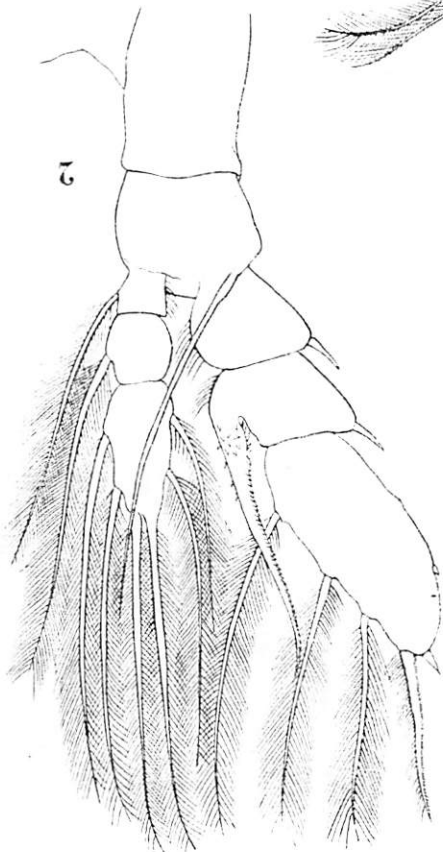
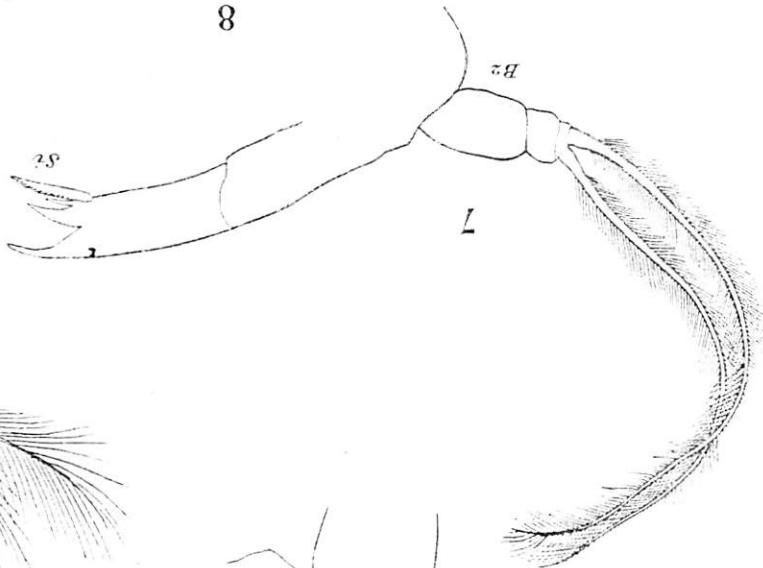
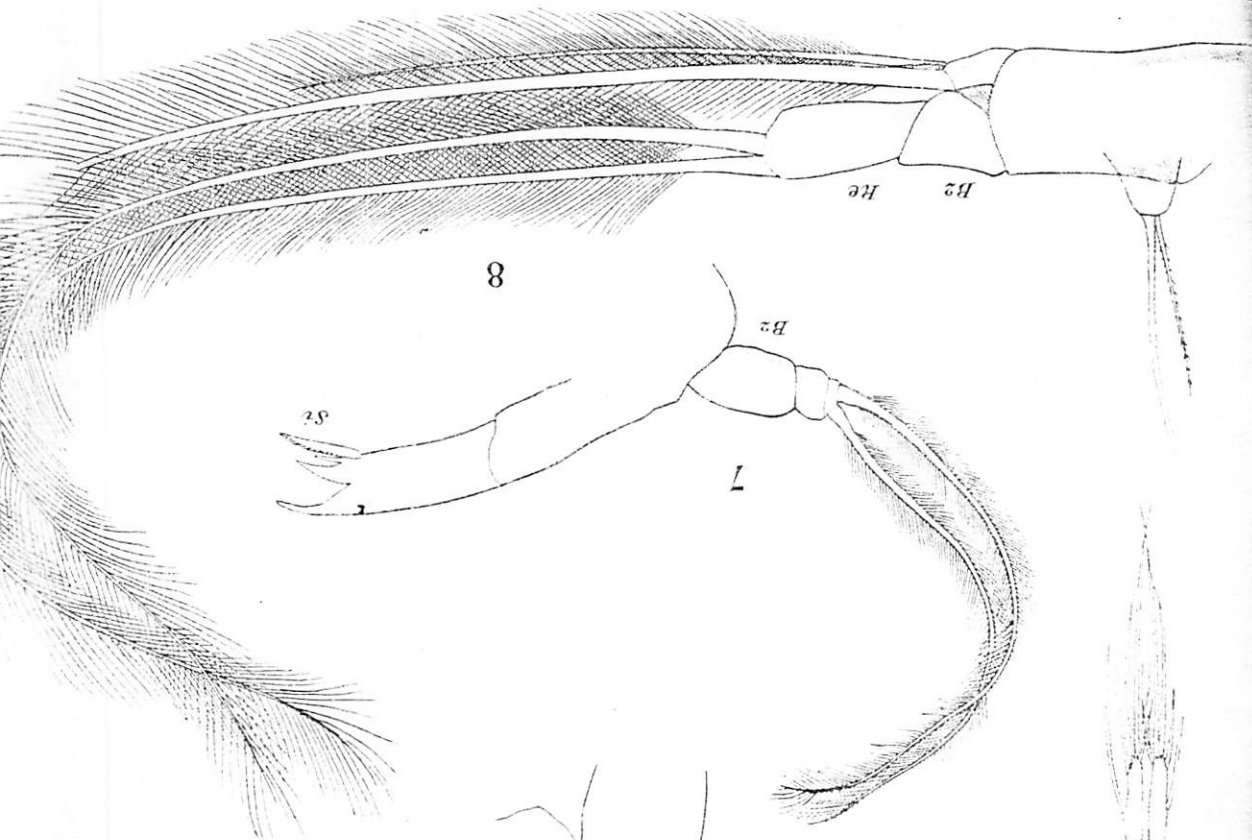
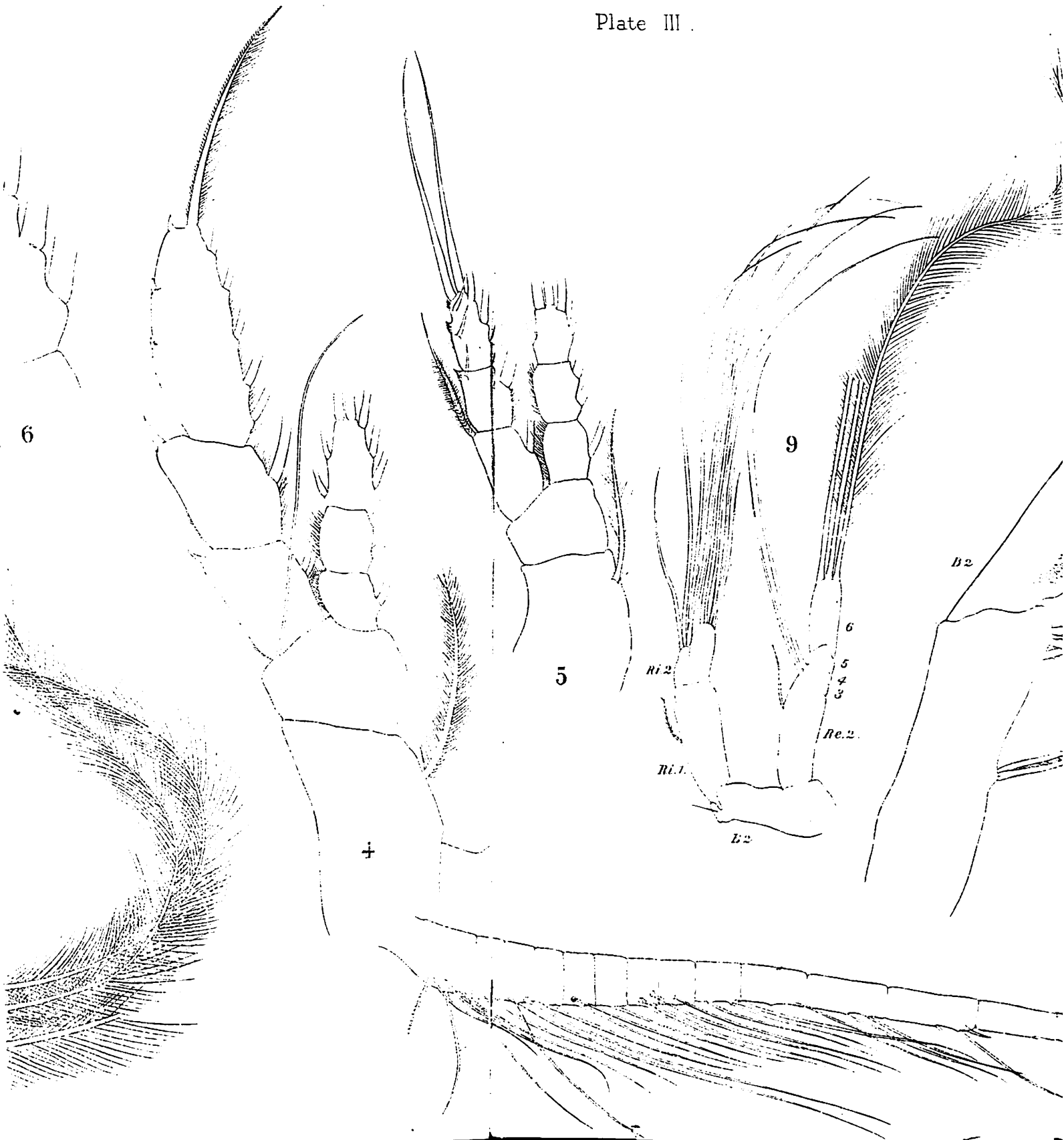
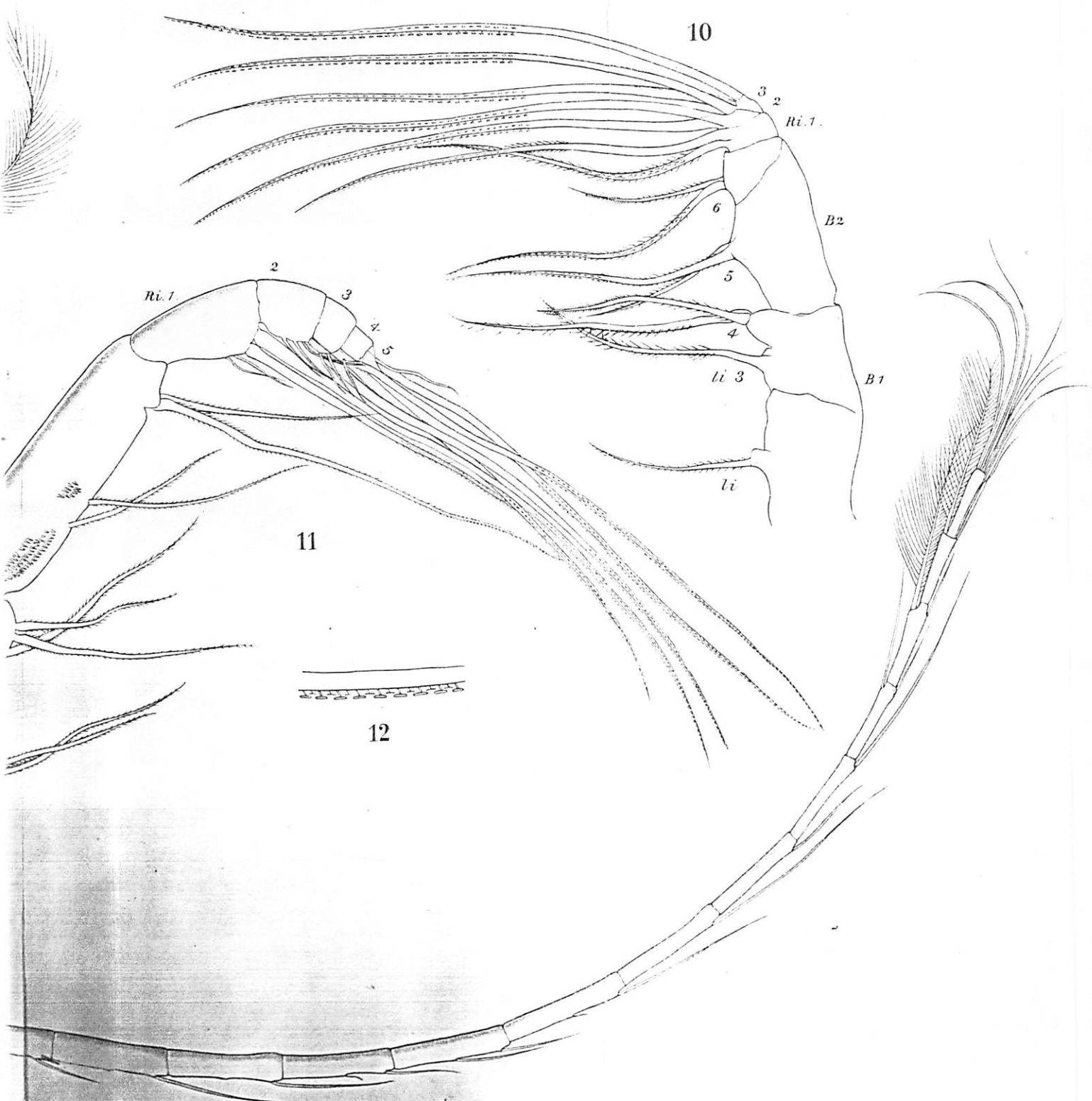


Plate III .

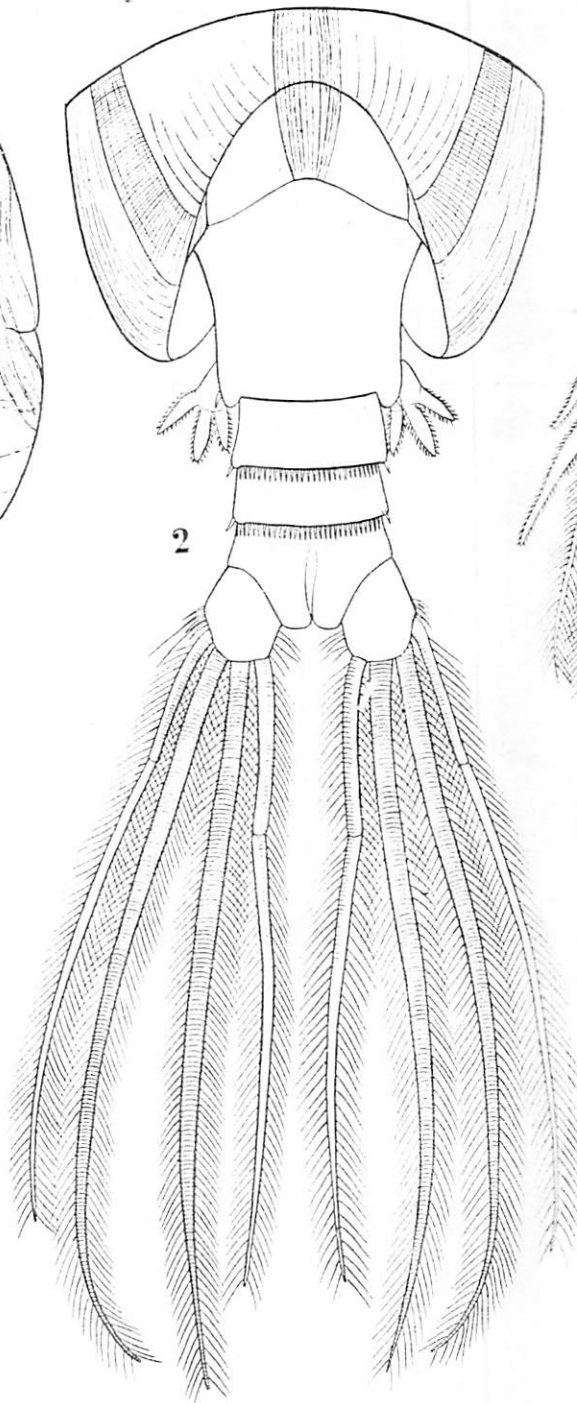




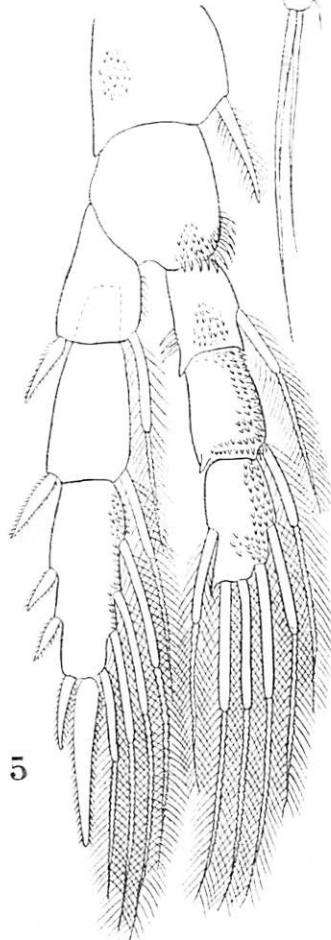




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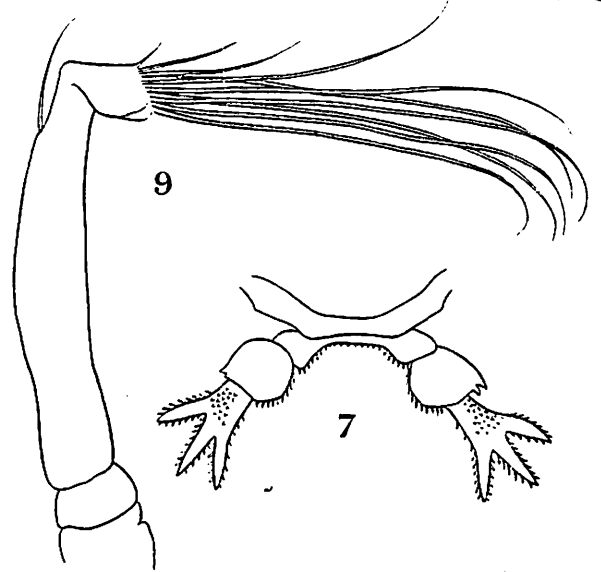
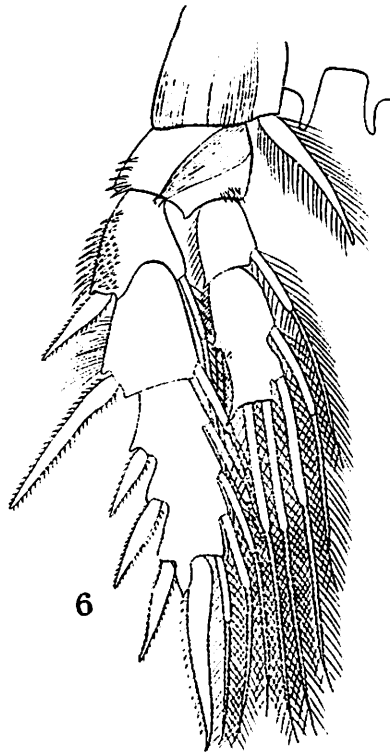
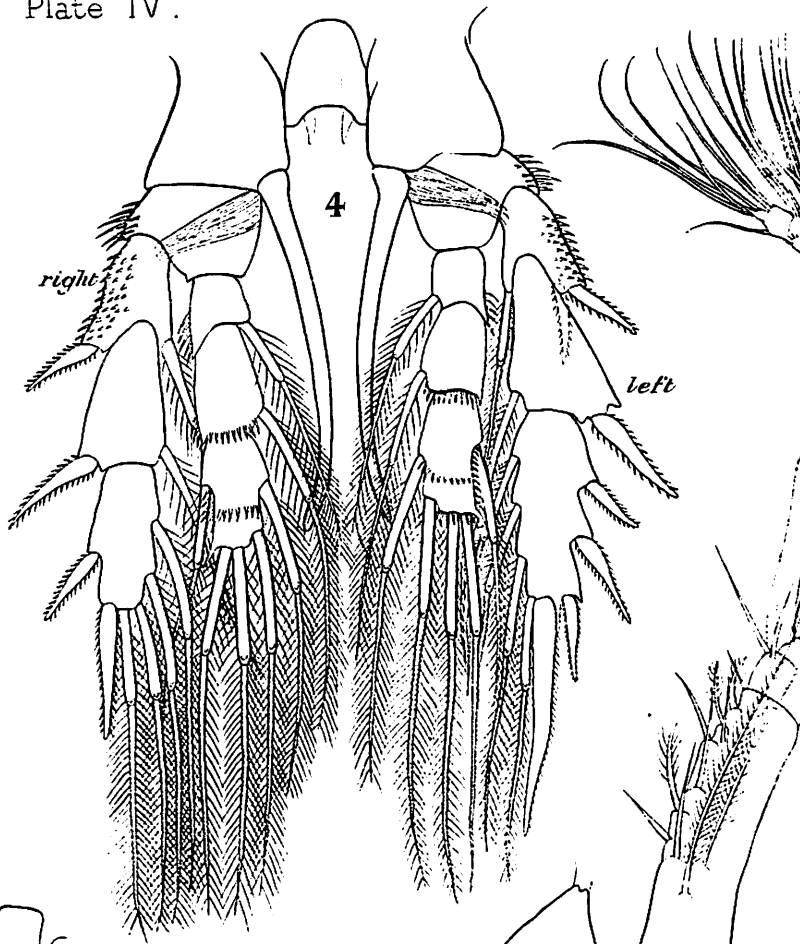
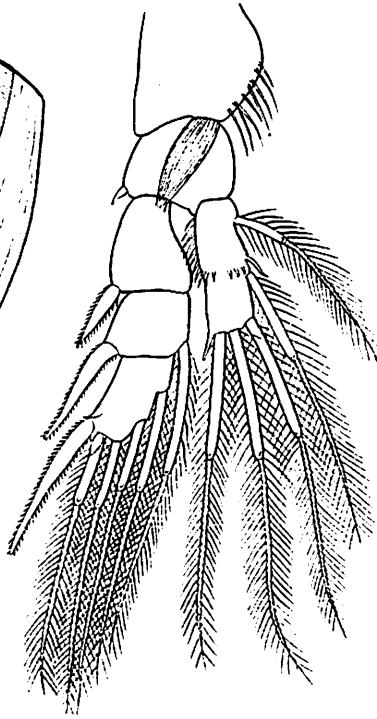
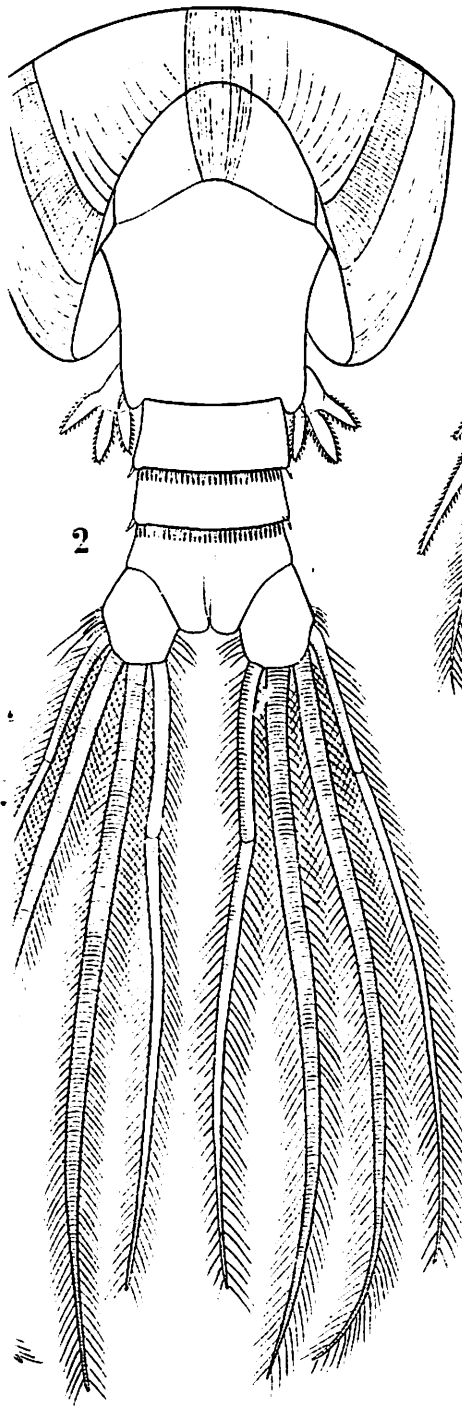


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Plate IV.



late IV.

