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fra Forfatteren.

THE DANISH INGOLF-EXPEDITION.

VOLUME III.

4.

COPEPODA I.

CALANOIDA AMPHASCANDRIA.

BY

CARL WITH.

WITH 8 PLATES, 422 TEXTFIGURES, 1 CHART AND A LIST OF THE STATIONS.

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Introduction.

My studies on the Plancton-Copepods, brought home by the Danish Ingolf Expedition, which were commenced about 1904, have been delayed for several reasons, of which the three principal ones are: in the first place that I for several years was occupied with other topics, in the second place that the rich collections of The Thor Expedition from the waters around Iceland as well as those of the Danish Expedition to East Greenland 1900 have greatly added to the work to be done; the third reason is, that it was my intention to give so full an account of each species as possible, not only of the adult males and females but also of the different stages of Copepodites.

On the Material.

The principal source of material was that of the "Ingolf" 1894 and 1895; the investigation of this expedition "extended over the eastern part of the seas along the west coast of Greenland from a point a little north of the polar circle to about 58° L. N., two degrees south of Cape Farewell, from there in a north-easterly direction towards Iceland, the waters round this island and between Iceland and the Færoes, lastly eastwards to a line drawn almost due north from the Færoes to Jan Mayen". The above quotation is from Hansen's Crustacea Malacostraca I of the Ingolf-Expedition vol. III 2 1908, to the introductory remarks of which paper I partly refer. The southern limitation in the Atlantic was about 60° L. N.

Comparatively few specimens were taken with the trawl; a good many of the samples were gathered with ordinary vertical nets (P and V) in a depth lying between 50—300 fathoms and the surface and a few ones with a closing net in considerable depth; numerous samples were taken at the surface with net marked Pl, Apst and Cyl during the voyage. The Ingolf collections give a very good picture of the plankton copepods, the big as well as the small species, but only down to a depth of 300 fathoms; the deeper layers of these regions are, as shown by the Thor, populated by numerous species, which were not taken by the Ingolf, at least as far as the Atlantic South and west of Iceland is concerned. It is a pity that no deep hauls were made on the West Coast of Greenland; an Atlantic fauna, identical with that mentioned, should certainly be found here. It is rather interesting that in one of the few samples, taken with a closing net at a considerable depth near Jan Mayen St. 118 a new species *Euchæte Bradyi* was found and in another a single specimen of so scarce a species as *Scaphocalanus brevicornis* G. O. Sars was secured.

The Ingolf's material from the Atlantic, rich in specimens, of the bigger as well as the smaller species, which inhabit the intermediate as well as the upper layers, is in a useful way supplemented by the material gathered by the investigation-Steamer »Thor«, the leader of which was Dr. J. Schmidt, in the year 1903—1905. The region investigated by the Thor is the eastern part of Denmark Strait, the Atlantic South of Iceland, the Iceland-Færoe Channel, a few Stations North-east of Iceland and outside the Ingolf area, the Atlantic, South West of the Færoes. The hauls of the Thor were made with the young-fish trawl from the surface down to a depth of nearly a thousand meters (length of the wire out about 1800 meters.)

As the meshes of the young-fish trawl were rather wide, and as I have only examined few of the surface samples, the Thor material gives a rather onesided picture of the fauna of pelagic Copepods from these tracts. Several of the Copepods from the Thor were by Dr. Ove Paulsen sent to Professor G. O. Sars for determination; to the former of these gentlemen I am indebted because he kindly lent me these specimens, to the latter, one of the first anthourities on the Copepods, for much useful information.

The third Danish Expedition to East Greenland under the leadership of the captain in the navy Amdrup and with the late mag. sc. Soren Jensen as zoologist in the year 1900 has gathered numerous samples during the journey. Surface samples were gathered each hour, day and night, from $^{19}/_{6}$—$^{25}/_{6}$ in the western part of the Norwegian Sea from 60° L. N. 3° L. E. to near Jan Mayen; from $^{27}/_{6}$—$^{10}/_{7}$ during the Journey from Jan Mayen to near the East Coast of Greenland (at about 72° L. N. 21° L. W.) in water, which often contained Scattered Ice. During the journey home from $^{30}/_{8}$ to $^{30}/_{9}$ samples were taken generally each second hour of the day in the ocean North-West of Iceland, in Denmark Strait and in the Atlantic South of Iceland as far South and East as 59° L. N. o. 52 L. W.

These surface samples (marked A, B, C, but generally F) as a rule only contain comparatively few specimens and species, but they give nevertheless a very good impression of the diurnal variations in the occurrence of the most common species *Cal. finmarchicus* at least at the surface. The mentioned Expedition has at Jan Mayen as well as near the Coast of East-Greenland taken some vertical hauls with the closing net at moderate depth.

In addition to these I have examined a few samples from East Greenland collected by cand. E. Bay and Dr. H. Deichmann.

Our museum contains a good many samples containing Plancton-Copepods, from the west Coast of Greenland, collected by Bergendal and W. Lundbeck, as well as from the waters around Iceland, brought home by mag. sc. R. Horring, A. Ditlevsen, W. Lundbeck and Lieutenant in the navy E. Jensen.

To discuss the number of species, which has been found in each of the explored regions by the different Expeditions as well as other questions concerning the distribution of the species, will more naturally fall within the next volume of this paper, which will deal with the *Calanoida heterarthrandria*; in the next volume I hope to be able to publish a list, showing the number of species and the proportionate number of the specimens of each successive stage occurring at each Station.

At present I am only going to say a few words about the number of species brought home by each Expedition. I have altogether examined 79 species, which probably belong to the region;

among these 13 were new to science. The Ingolf has only collected 21 species of which 3 were new, the Thor has collected 69 different species (8 however outside the area explored by the Ingolf), of which 11 were new, and the Danish East Greenland Expedition 1900 has only taken 13 different species, of which only one has not been recorded previously. Of the *Calanidae* and related families the Ingolf has taken 7 species, the Thor 9 and the Ø. Exp. 1900 5, of the *Aetidiidae* the three expeditions have taken 6, 29 and 3 species respectively, of the *Euchætidae* the Ingolf has taken 4, the Thor 12 and the Ø. Exp. 3 species and of the *Scolecithricidae* the three expeditions have taken 4, 19 and 2 species respectively. Of species, which by previous authors were recorded from the examined region, only a single one *Udinopsis armata* Vanh. was not taken by any of the expeditions.[1])

On the Literature.

Without underestimating the fine papers by E. Canu and Th. Scott, it must be admitted, that Giesbrecht and G. O. Sars are the two modern zoologists, who have contributed most to the knowledge of the Plancton-Copepods. The work of the former indicates a new epoch in the studies of these animals; unfortunately the arrangement of the topics in his main paper is so unpractical, that it is often very difficult a to derive full advantage from the vast amount of information, which is found in it. Giesbrecht has sometimes been blamed for giving unneccessarily many details for the definition and understanding of the species. I do not share this opinion, as it sometimes occurred to me, that details necessary for the limitation of two nearly related species were wanting in his description. G. O. Sars has in many ways contributed greatly to the study of the Copepods as well as to that of the other Crustacea; his descriptions are lucid and supported by numerous practically arranged figures, but might sometimes be a little more exhaustive.

In the last ten years numerous Plancton-Copepods have been described from the deeper layers of the North-East Atlantic as well as from other ocean tracts; the three principal authors, who have described these species are Farran, Wolfenden and A. Scott. The papers of the first of these naturalists have a direct bearing upon the Ingolf-Investigations; he has given good descriptions of numerous new species and most useful information about the Copepod-fauna of the Atlantic Slope of Ireland. Wolfenden's papers often include a number of useful characters and details, supported by beautiful drawings, but he does not always seem to have accepted the classic rules of nomenclature. A. Scott's main-paper on the Copepods of the Siboga Expedition, which only partly falls within my sphere, contains most useful lists of synonymy, descriptions of numerous new species and several new characters; his descriptions are according to my opinion often a little too meagre for the definition of nearly related species.

When speaking of the studies on the Plankton-Copepods of later years, I think a few words may be added about a most useful paper by Koefoed & Damas on the collections brought home by the duc d'Orléans. It may perhaps be allowed to set forth a few words of criticism. It is a pity that the authors have not wished under each species to give a full acount of the biological facts,

[1]) Wolfenden (1904 p. 112) has from the cold area of the Færoe Channel mentioned four species viz: *Bradyidius armatus* Gbt., *Udinopsis bradyi* G. O. Sars, *Bryaxis brevicornis* Farr., *Ctenocalanus vanus* Gbt. and *Scolecthrix similis* Gbt., but as they are all found south of the 60° L. N. I have not included them in this paper. The same is the case with *Oothrix bidentata* Farr. which according to the duc d'Orléans was secured at 75° L. N. 14° L. W., somewhat north of the area, included in this paper.

relating to depth, salinity and temperature, and that they have missed the opportunity of giving a new description of several species, imperfectly known. In the following I have tried to collect the facts, found under each Station in their paper, under each species, and it will be evident that I sometimes differ from the two authors in their conclusions from these very facts. It seems to me, that these small defects, give prominence to the surprising amount of useful information, which makes this expedition one that may in several ways be regarded as an example.

With the useful papers of Damas, Paulsen, Esterly, Kraeeft and Oberg I am going to deal later on.

On systematic Characters.

In addition to the systematic characters, used by most authors, I think that good characters may be found in several organs, the importance of which has been overlooked or underestimated: viz., the rudimentary appendages of the male, the structure of the genital apparatus in the female, the system of glands in the natatory legs and the more detailed structure of the labrum and labium.

In addition to the good characters, which are generally found in the fifth pair of legs in the males, good characters are f. inst in species of *Euchirella* found in the rudimentary mouth appendages as well as in the first pair of legs, which differs distinctly from that of the female.

It is generally recognised, that the structure of the vulva is most important from a systematic point of view, but as it is often rather complicated, the figures of it are often rather imperfect. In the description of the nearly related species of *Euchæte* I have given a somewhat more detailed description, well aware, that a complete dissection is quite necessary for understanding the morphological as well as the systematic importance of all these lists and bars; a study of this nature would certainly have enhanced the value of this paper but would have delayed its publication too much.

Cutaneous glands and pores, through which their contents are discharged, have been described and mentioned by different authors, who, however, like Giesbrecht took most interest in these organs in species in which they were probably luminous.

The glands which are found in the natatory legs do not seem to have interested the authors very much; Giesbrecht has in his great paper figured glands, filled with globules of oil (?), in the legs of *Euchirella rostrata* (pl. 15 fig. 27) but as far as I know or remember, they have not been mentioned by others. As these glands are often very prominent organs and generally are connected with the ducts, which are often filled with drops of oil, I think they are of great importance for the animals; they are generally not unicellular as several elongated nuclei are often seen at the base of an elongated sac; a study of the anatomy and histology of these glands should be very interesting on fresh material, but did not fall within the scope of this paper. As the glandular ducts open in a rather uniform way in the natatory legs, and as the exact number and position of these glandular pores which are alway placed on the anterior surface sometimes have a systematic importance of no small value, I have carefully examined them in the different species, to the description of which I refer for details. The original number of pores seems to be the following: one near the base of the external spine (Se) of the third basipodite, one corresponding to the Se of the two first outer segments and three, corresponding to the 3 Se of the third outer segment (cf. pl. I fig. 3 e); this number is reduced in most species. The pore in the third basipodite is generally wanting, and so are the two proximal pores in the third segment of the exopodite (cf. pl. II fig. 5 a); in several species the pore of the Re I is wanting in the second pair of legs, but very seldom in the third and fourth pair; this kind of pores was never found in the first pair of legs and is wanting in the fifth pair in species, in which this pair is of no use for natatory purposes. In the *Scolecithricidae* the pores are generally poorly developed. To illustrate the differences which may be found in species, which really are very nearly related I refer to the differences in *Chiridius armatus*, *nasutus* and *modestus* (cf. pl. II fig. 3 a, 4 a and 5 a); the greatest development of the glands and pores is found in *Euchirella*; in *E. rostrata* and *messinensis* the usual pore at the base of Se Re I pes. III was present, but in *E. curticauda* it was wanting. The number of pores in the adult and the young ones of the penultimate stages are generally alike, but in *Euchirella rostrata* the pore, which is found at the base of Se 1 Re III pes. II—IV, is wanting; the younger stages have the number of pores more or less reduced as realised in the decription of the different stages of, f. inst., *Calanus firmarchicus.*

In addition to the mentioned system of pores, a small pore sorrounded by delicate hairs is found on the anterior surface of the third segment of the endopodite in the second to the fourth pair of legs (cf. pl. I fig 3 e; pl. VIII fig. 18 c).

Pores arranged in a characteristic way (pl. I fig. 3 f—g) are found in *Megacalanus* and *Macrocalanus*, to the description of which I refer.

In the first pair of legs pores are often found in the outer margin of the exopodite (cf. pl. VI fig. 2 a).

The mouth of the Copepods shows within the different groups a very different structure, well adapted for the habits of the animals; as far as the parasitic or semiparasitic forms are concerned fairly good descriptions are found in literature.

The Plancton-Copepods probably nourish on extremely small plants as well as on bigger ones, which are extremely well masticated, in a way that the shells or fragments of Diatomes, f. inst, are very seldom found so well preserved, that their exact nature could be determined (cf. Dakin).

The first and I think the most exhaustive account of these organs in one of the *Calanoida* has been given by Moebius for *Euchœte norvegica*, his *carinata* (1875 p. 271; tab. VII); Claus has (1863 p. 25) given a short, but not very good description of the structure in *Pleuromma*, but the following quotation indicates, that he has examined the structure in other forms as well.

»Auf die zahlreichen Modificationen, welche in den einzelnen Gattungen eintreten, im speciellen einzugehen würde zu weit führen und nicht das genügende Interesse bieten, zumal diese Bildungen wegen der Schwierigkeit ihrer Untersuchung nicht leicht systematisch zu verwerthen sind.«

In all the *Calanoida amphascandria*, examined by me, as well as in several of the *heterarthrandria*, f. inst *Pleuromma*, *Metridia, Temora, Bathypontia,* and with a few not very important modifications from a morphological point of view in *Lucicuta*, *Anomalocera* and *Acartia*, the mouth-organs show the following structure. The opening of the intestinal duct is placed between a prominent labrum and less prominent labium, on each side bearing a labial lobe, corresponding to the paragnatha of Claus; the labrum and the labium are on each side connected with a chitinous framework, which forms a bridge over the manducatory part of the mandibulae, and in a way forms the lateral limitation of the mouth.

In front of the labrum a sometimes hairy protuberance is found; this was by Sars in *Euchæte* designated the *epistoma*; I have in this paper followed him, where the organ belonged to the somite of the antennae. The *labrum* proper, which is placed in the mandibular somite is often subdivided and has in the *Euchætidae* and *Scolecithricidae* its free or anterior surface more or less hairy, in a way that often is of systematic importance (cf. pl. VI fig. 2 b, 7 a, 14 a and pl. VII fig. 5 e, 9 b and 7 c); along the hinder margin of the labrum, separating the anterior and the oral surface, marginal bristles are always observed (pl. II fig. 3 b; pl. IV fig. 5 e). The *oral surface* is adorned with a more or less developed chitinous framework, to which longitudinal muscles are fastened; this system is by comparison with fig. 7 f. pl. II and fig. 2 a and 5 e pl. IV seen to be differently developed in the different forms. Along the median line three central circular spots, in the middle with two parallel lines, as well as a fourth more posterior one, with a lateral one on each side are found; laterally a few spots, which may perhaps be regarded as muscular spots, are observed (cf. pl. IV fig. 5 e). About the nature of these four central circular striated spots I do not know anything; they are certainly not muscular spots, perhaps sensory ones. Around or behind the fourth spot a bigger or smaller transverse row or area of spines or bristles is observed; the systematic importance may be realised by comparing fig. 2 a and 5 e pl. IV. The oral surface of the labrum is on each side near the middle adorned with a lateral longitudinal series of bristles or spines, which is again dissolved into five groups, the more detailed variations of which show interesting differences between species and genera, as seen in numerous figures (pl. I—VII).

The *labium* is gradually fused with the posterior wall of the pharynx; it is generally adorned with curious structures. In the middle a compactness in the chitinous skeleton the »*lamina labialis*« is found; in front it is not well separated from the wall of the pharynx, but its hinder margin seems to be partly free, and shows many variations, as seen by comparing the figures (pl. II fig. 7 f, 2 a and 3 c; pl. III fig. 5 e; pl. V fig. 26; pl. VI fig. 3 b, 11 b and 13 b); in the *Scolecithricidae* this organ seems to be wanting or poorly developed (pl. VII fig. 4 e and 7 d).

Laterally to the *lamina labialis* on each side a longitudinal row of 6 generally well articulated spines is found. I have designated it the *serrula sexdentata*, and as it was found in all the examined genera except *Candacia* and *Heterorhabdus* within the Calanoida, but not in any of the few genera of other groups, which were examined, it is certainly of some systematic importance. In front of the lamina labialis and the serrula, curved longitudinal rows of bristles or granules are found, which as seen in the figures show specific as well as generic differences (pl. I fig. 1 c; pl. II fig. 2 a; pl. III fig. 5 e; pl. IV fig. 1 c, 2 c and 3 d; pl. V fig. 2 b and 4 c; pl. VI fig. 1 b, 2 d, 3 b, 5 a and 10 b and pl. VII fig. 2 c, 4 e and 12 c). Behind the *lamina labialis*, more or less well developed areas, covered with granules or spines are found (pl. II fig. 7 f.). The *labial lobes* as well as the area between and behind are covered with series of delicate hairs; the arrangement of these series is different in the various genera, but these differences are probably modifications only of a general system (cf. pl. II fig. 7 f; pl. IV fig. 1 d, 4 c and 5 g; pl. V fig. 1 c and 5 f; pl. VI fig. 5 b). Behind the area labialis in the maxillular and maxillar somites an intricated system of hairy areas is sometimes found, f. inst. in *Calanus hyperboreus* (pl. I fig. 1 d).

In the literature I have found a good descpription of these organs in *Laophonte* and *Hersiliodes*

(Canu 1892), but their structure is quite different from the one described; lately I have examined the labrum and labium in two genera of the *Harpactoida*, in *Oncaea* and in *Oithona*, but only in the latter genus found a structure not quite dissimilar to the one described.

In the nauplius of *Calanus* I have not yet succeeded in elucidating the structure of these organs; in the first postlarval stage of *C. finmarchicus* the structure is in its main feature like that of the adult one.

The structure of the mouth organs in the males is, in species in which the oral appendages are not reduced, scarcely different from that of the female, but in other forms, it is more or less reduced (cf. pl. IV fig. 1 e; pl. VI fig. 3 e).

From the above it seems to me to be evident that the study of these organs in different forms is of no mean importance.

On postlarval development.

Most modern authors, who have studied the Plancton-Copepods from the systematic point of view have only paid attention to the adult males and females, even when younger specimens were present; in later years Oberg has given a description of the larval stages in several species and Kraeeft has paid much attention to the postlarval development in a very interesting paper; Damas, Paulsen and Stephensen have for single species contributed to our knowledge of the development. It is generally understood that Grobben is the first who has described the nauplius in *Calanus finmarchicus* and that Gran was the first to give an account of the postnauplial development; both statements are wrong, as Krøyer, as early as the year 1847, followed the development of *Calanus finmarchicus* from the nauplius to the adult (or more correctly the penultimate stage). In this paper I have not dealt with the larval forms, but I have tried and generally succeeded in determining the postlarval stages; I have named the first postlarval form stage I, and the adult male and female stage VI. About the differences between the different stages in each species, and the reductions in the limbs I refer to the systematic part; the most complete account is found in the description of *Cal. finmarchicus.* The mouth-organs are generally not reduced in the Stages IV—V; the number of setae in the exopodite of the maxillulae forms an exception to this rule. In the adult female the number is 11, in stage V it is 10, in stage IV it is 9, in stage III it is 8, in stage II it is 7 and in stage I probably 6. The main differences between the stages is found in the number of natatory legs and number of somites of the urosome.

Nomenclature.

In the naming of the different appendages I have followed Hansen as well as Giesbrecht, who somewhat later arrived at the same result. Hansen has shown that the *antennae*, *mandibulae* and *maxillipeds* really have threesegmented basipodites. The structure of the *maxillulae* in *Valdiviella insignis* shows clearly, that the basipodite of these limbs are threesegmented; the first basal segment is adorned with the Li I; the second bears the Le and a single Li (II ∾ III); the third basal segment which is distinctly articulated to the preceding one, supports the tvo rami. The natatory legs apparently have only two basal segments; but according to Hansen the first basal segment of the natatory legs is probably fused with the complicated chitinous system of the ventral surface; if this is right, the first basal segment of the authors is really the second, and the second the third. In the description I have followed this nomenclature; the last basal segment is accordingly designated the third one (corresponding to the second one of most authors in the antennae, mandibulae, maxillulae, maxillipeds and natatory legs); the second basal segment in my description corresponds to the first one of most authors in the maxillipeds and natatory legs; the second basal segment of the mandibulae and the first one of the antennae are as show by Hansen poorly developed.

About the different abbreviations used in this paper I refer to the following list.

Plancton nets used by the Ingolf.

V signifies the big vertical plancton net.
V^1 — the smaller one.
V^2 — net with different width of the meshes.
P^1 — Apstein's vertical net (Nr. 20).
Apst. = A. The same net used in the surface.
Pl. — Surface plancton net.
Cyl. — Cylindric net.
Closing net is the net of von Petersen-Chun, modified by Hensen.
Yt is the abbreviation of the youngfish trawl used by the Thor.
Ø. Exp. 1900 is the abbreviation of The Danish Expedition to East Greenland in the year 1900.
A. B. C. D. E. and F. are the different kinds of surface nets used by this expedition.
f♀ = adult female.
f♂ = fullgrown male.
Y = a young specimen.
St. = the stage.
St. I—VI signifies the postlarval development; St. I is the youngest first postlarval stage and St. VI is the adult male or female.
The abbreviations used in the description of the species are those used by Giesbrecht and following authors.
Basp. I—III = The first, second and third basepodite.
Ri = Ramus internus.
Re = Ramus externus.
Ri I—III and Re I—III signifies the number of the segment of the endopodite or exopodite.
$\sim$ signifies that two segments are fused e. g. Re II $\sim$ III and segment 8 $\sim$ 9 of the antennulae.
Si = an interior seta.
Se = an exterior seta.
Sp = a posterior seta.
Sa = an anterior seta.
Spr = a proximal seta (antennulae).
Sd = a distal seta (antennulae).
St = a terminal seta (Re III pes I—V).
L or Lob = lobe.
Le or Li = Lobus externus or internus.
Sp = Spermatophores. Sp. within a bracket indicates that specimens, bearing these structures, were secured.
Sin. and dext. means sinister and dexter.

On the description of species.

As I have personally examined all the samples from the three expeditions myself and have picked out a fairly big number of specimens, generally more than a hundred, if so many were present, adult as well as young ones, I think that we get a fairly good impression of the proportion between the different stages; Paulsen has as far as *Calanus finmarchicus* is concerned picked out a hundred specimens to get an impression of the proportional distribution of the stages. In the systematic part I have given an almost complete description of the species, which were only imperfectly described; in cases, in which good descriptions have been given by previous authors, I have only added features, overlooked, or differing from existing description. Not only the males and females of the last stages have been described, but also the younger stages, as far as they showed features of any interest. The descriptions are as a rule rather long, partly on account of the new characters, which are taken into account, partly because it often struck me, that existing descriptions were often too wanting in details for a sure definition of nearly related species.

Under each species is found a list of synonymy, which I have tried to make as complete as possibly for the years after the publication of Giesbrecht's classical paper; for each species I have given the measurements of each examined stage.

After the description is added a few words of the variations and parasites, if any have been observed. Under occurrence I have only given my personal observations, but under distribution I have dealt with the facts, previously published, relating to the occurrence of each species within as well as outside the explored area. Under remarks the whole systematic position of the species is discussed.

On variation and parasites.

In a good many species viz: *Rhincalanus nasutus, Eucalanus elongatus, Paracalanus parvus, Pseudocalanus minutus, Chiridius armatus, Gaetanus Kruppi, G. pileatus* and *G. latifrons, Euchirella rostrata* and *curticauda, Euchæte tonsa* and *barbata* and *Scaphocalanus magnus* variations of different kinds were observed; most common is variation in a rudementary fifth pair of legs and in the structure of the setae of the furcal branches; several of the variations are probably due to traumata and regeneration, others certainly represent a kind of atavism. To study the whole question of variation within the Copepods or to collect all the published facts (cf. Wolfenden and Steuer) does not lie within the frame of this paper. But as such facts are rather scarce, and as they may be important for a future student of these topics, it seems to me to be the duty of each observer to make his personal observations known, even if they are fragmentary. Negative statements are seldom of much value; but nevertheless I think it rather curious, that abnormal segmentation, which is fairly common in the Arachnids, Insects and Annelids, was never met with in any of the examined, I think several thousand, Copepods; to my knowledge no case of abnormal segmentation has been observed in any of the Crustacea.

In several species parasites of different kinds have been observed; I refer to the description of *Rhincalanus nasutus, Chiridius armatus, Gaidius tenuispinus* and *brevispinus, Gaetanus Kruppi, pileatus* and *latifrons, Undeuchæte superba* and *Chirudina notacantha.*

Fam. I. Calanidae.

I. **Calanus finmarchicus** Gunnerus. (Textfigs 1—5).

1765. Monoculus finmarchicus n. sp. Gunnerus, pp. 175, fig. 20—23.
1842—1845. Calanus spitsbergensis n. sp. Krøyer, pl. 41, figs. 1 a—n.
Calanus affinus n. sp. Krøyer, pl. 41, fig. 5.
Calanus quinqueannulatus n. sp. Krøyer, pl. 41, fig. 3.
1849. Calanus spitsbergensis Kr. Krøyer, pp. 531—542, p. 552.
Calanus affinis Kr. Krøyer, pp. 544—545, p. 553.
Calanus quinqueannulatus Kr. Krøyer, pp. 545—546, p. 553.
1863. Cetochilus helgolandicus n. sp. Claus, p. 171, pl. XXVI, figs. 2—9.
1886. Calanus finmarchicus Gunn. H. J. Hansen, pp. 255—256.
1892. Calanus finmarchicus Gunn. Canu, p. 170, pl. I; figs. 13—19.
1892. Calanus finmarchicus Gunn. Giesbrecht, p. 89, taf. 6—8.
1897. — — — Vanhöffen, p. 278, pl. 1 fig. 7.
1898. — — — Aurivillius, pp. 67—69.
1898. — — — Giesbrecht - Schmeil, pp. 14—15.
1899. ? — — — Brady, p. 32.
1899. — — — T. Scott, p. 90.
1900. — — — Wheeler, pp. 164—165, fig. 1.
1900. — — — G. O. Sars, p. 2.
1901. — — — T. Scott, p. 338.
1902. — — — Gran, pp. 56—65.
1902. — — — Mràzek, pp. 503—519, figs. 1—4.
1903. — — — Jensen, Johansen & Levinsen, p. 303, tab. I.
1903. — — — G. O. Sars, pp. 9—11, pl. I—III.
1903. Calanus finmarchicus Gunn. I. C. Thompson, p. 15.
1903. Calanus helgolandicus Claus. G. O. Sars, pp. 11—12, pl. IV.
1903. — — — Thompson & Scott, p. 241.
1904. Calanus finmarchicus Gunn. Wolfenden, pp. 126—127.
1905. — — — G. O. Sars, p. 1.
1905. — helgolandicus Claus. G. O. Sars, p. 1.
1905. — — — Th. Scott, pp. 221.
1905. Calanus finmarchicus Gunn. Farran, p. 30.
1905. — — — Damas, pp. 1—23.
1905. — — — Esterly, pp. 125—126; fig. 1.
1906. Calanus septentrionalis Goodsir. Norman & Scott, p. 126.
1906. — helgolandicus Claus. Pearson, pp. 4—5.
1906. — finmarchicus Gunn. Paulsen, pp. 1—21.
1906. — — — Williams, pp. 639—640.
1907. — — — Damas & Koefoed, pp. 382—93; 405.
1908. — — — v. Bremen, pp. 7—8; fig. 1.
1908. — helgolandicus Claus. v. Bremen, pp. 8—9; fig. 2.
1908. — finmarchicus Gunn. Farran, p. 20.
1910. — — — Steuer, p. 21.
1910. — — — Sharpe, pp. 409—410.
1911. — — — Farran, pp. 83—89.
1911. — — — Esterly, pp. 140—151.
1912. — — — Esterly, pp. 282—295.
1913. — — — Stephensen, pp. 308—310.
1913. — — — Stephensen, p. 71.

Giesbrecht refers this species to *Monoculus finmarchicus* Gunnerus, (p. 32—33). Krøyer (1848 p. 528) has already shown that Gunnerus species was a *Calanus*, but he thinks that the decsription is too incomplete for a sure indentification. In contrast to Giesbrecht I think that it is quite impossible to tell if the species belongs to *Cal. finmarchicus* or to young specimens of *Calanus hyperboreus*. The one figure in natural size shows a small animal (c. 2 mm. long) even less robust than most specimens of *C. finmarchicus*; this figure and the author's remarks about »quite small animals« certainly speaks against its identification with *Cal. hyperboreus*, but the remark about, the very pellucid, shining colour without indication of the reddish tint which is most often found in *Cal. finmarchicus*, especially the antennulae, does not bear out the same opinion. The biological conditions under which the two species are found in the polar region, are almost identical, and do not allow any conclusion. But as the name *Cal. finmarchicus* has been once recognized, and as it cannot with better, probably with smaller, right be applied to *Cal. hyperboreus*, I think it right to follow Giesbrecht. In other respects as far as the synonymy is concerned I refer to Giesbrecht; as I have however

As I have had the opportunity of examining Krøyers original specimens of *Cal. carinatus* and *cristatus*, I think that a few words of their systematic position would not be superfluous, even if these species belong to another geographical region.

Calanus carinatus Krøyer.

1849. Calanus carinatus n. sp. Krøyer, p. 554.
1856. — brevicornis n. sp. Lubbock p. 11.
1860. — — Lbk. Lubbock, p. 117.
1892. — — Lbk. Giesbrecht, p. 90; taf. 6, 7, 8.

Of this species Krøyer has examined a single not very well preserved adult female from the coast of Brazil. In spite of the differences enumerated below I think it is identical with the midatlantic species, which Giesbrecht has referred to *C. brevicornis* Lubk. The total lenght was 2·0 + 0·6 = 2·6 mm. The marginal frontal keel is more prominent than figured by Giesbrecht (t. 6, fig. 7) and the rostral spines are more stiff, but the lateral outline of the labrum shows the same characteristic structure as figured by Giesbrecht. The fourth abdominal somite is dorsally 1·2 as long as the fifth one as shown in Giesbrecht's fig. 18, but in contrast to his text, in which he writes that the fifth somite is a little longer than the fourth.

The antennulae extend a little beyond the tip of the fourth abdominal somite; the segment VIII—IX are less well separated than the rest. The distal setae of segm. VIII and XII are not spinelike. The measurements are at least different from Giesbrecht's figure of the male (taf. 8 fig. 5); the segment 24 is a little shorter than the 23, which is scarcely as long as the 22. The 25 segment is rather mutilated, but seems scarcely to be half as long as the preceding one.

No marginal setae were found along the inner margin of the second basipodite of the pes II, IV and V, and no teeth. The first Se of the Re III divides the outer margin in equal parts in the second pair of legs but in the fourth pair the portion, proximal to Se 1 is 1·7 (not 1·4 as in *brevicornis*) as long as that distal to it.

Calanus cristatus Krøyer.

1845. Calanus cristatus n. sp. Krøyer, pl. 41, figs. 6 a—k.
1849. — cristatus Kr. Krøyer, pp. 546—550, p. 553.
1884. — — Kr. Poppe, pp. 282—286; taf. XX, fig. 1—6.
1892. — — Kr. Giesbrecht, p. 91, t. 6, figs. 14—15.

Of this species I have examined 14 young specimens (Krøyers original ones), of which 12 belonged to pernultimate stage and a single to stage IV. They were all rather mutilated, but nevertheless it is scarcely doubtful that Poppe's and Giesbrecht's rather imperfect descriptions refer to this species. Total length is 8·6 (7·0 + 1·6). Shape of the head is alike Giesbrecht (fig. 14—15); the lateral corners are rounded and not produced. The antennulae extend with the 25 segment beyond the end of the abdomen. The segment 8 ∾ 9 are only indistinctly separated and together just as long as the segment 21, which is 1·15 as long as the segment 22. The latter is 1·1 as long as the 23 and 25 segment, which is 1.3 as long as the 24. The mouth-appandages scarcely provide features of interest. The Ri of pes I—IV possess no Si The Re III pes II is by the Se I divided into a proximal shorter and a distal almost 1·2 as long; the exopodites of the three last pair of legs are wanting. The inner margin of the first basipodite of the fifth pair of legs is smooth.

had the opportunity of examining Krøyer's original specimens of this species, I do not find it out of place to add a few remarks.

Krøyer's description and figure of *Cal. Spitsbergensis* apply without doubt to the mature females; his description is clear and remarkably exhaustive; he has seen and described the receptacula seminis; his original specimen is a *Cal. finmarchicus*. Krøyer's description and figure of *Cal. affinis* applies to young specimens (St. V), but of his 3 original specimens the two belong to the fourth stage. The description and figure of *Cal. quinqueannulatus* refer without doubt to the male of *Cal. finmarchicus;* Kroyer's original specimens were not preserved, but a number of specimens, determined by Krøyer as *C. quinqueannulatus*, were males of *Cal. finmarchicus*.

As Krøyer had unfortunately not examined mature specimens of *Cal. hyperboreus,* but only young animals, he was obliged to establish his species on specimens of stage V; accordingly he did not realise that the number of abdominal somites is not a systematic character, and was not able to understand the full cyclus of development from nauplius to fullgrown animal of *Calanus finmarchicus* ∾ *hyperboreus*. He realised that is was too difficult for him to distinguish the earlier stages of these two nearly related species. Starting from the stage V of *Cal. hyperboreus* he regarded the stage IV as the oldest larve; he has given fairly good figures and clear descriptions of stage I—IV; he has recognised the nauplius and metanauplius as forming part of this cyclus. I think that Krøyer was the first to set forth the almost complete development of one of the Calanoid; so full a description of several features does not seem to have been published for this species in spite of its importance (cf. Damas p. 8, who thinks that Gran is the first to recognise the larval stages).

As I have been obliged to examine a big number of specimens of this species from the wide area investigated by the Ingolf, the Thor and the East-Greenland Expedition, I have felt it necessary to try to solve the question whether Sars is right or wrong in establishing the two species *Calanus finmarchicus* and *C. helgolandicus*[1]). According to Sars:

The female of the more southern form *C. helgolandicus* is about 3 mm. long, the male 2·8 mm., while *C. finmarchicus* is 4 and 3·6 mm. respectively; the former species is more narrow in form with more angularly produced head. The urosome is in *Cal. finmarchicus* about half the length of the metasome, and the caudal rami are somewhat longer than the anal somite, while *Cal. helgolandicus* has the urosome exceeding half the length of the metasome and the caudal rami scarcely longer than the anal segment. In *Cal. helgolandicus* the antennulae extend only 2 segments beyond the caudal rami but 3 in *Cal. finmarchicus*. The most important difference is found in the fifth pair of legs of the male, which are more asymmetrical in *Cal. helgolandicus* with the Ri sin. extending a little beyond the Re I (not beyond the middle of Re II) and with the Re III scarcely exceeding half the length of the Re II (not nearly so long).

The difference in size does not, as suggested by Sars, always correspond to a more northern or southern distribution as pointed out by several authors. Mràzek (p. 502) has in the same samples from Spitzbergen found mature females varying in size from 3·4 to 5·2 mm., Damas and Koefoed have from the same locality seen specimens varying from 3·2 to 5·4 mm. (cf. p. 382). Giesbrecht's spec-

[1]) A name, which Norman & Scott with good reason propose to replace with *Cal. septentrionalis* Goodsir.

imens varied from 2·7 to 4·5 mm. I have found the same to be the case in several samples from the west coast of Greenland.

In a sample from Jakobshavn I found 100 specimens (f♀) varying in size from 3·3, 3·5, 3·8 to 4·1 and 4 specimens 4·6 to 5·3 mm. long; a young female from the same sample measured 3·9 mm., 19 young ones measured about 3 mm. From Ingolf St. 28 f♀ of size from 3·5 to 5·1 and young specimens from 3·5 to 4·8 were taken.

By comparing the length of the urosome and anterior portion in specimens from different localities and of different size etc. it was quite impossible for me to find any character of value. In specimens of f♀ from the west coast of Jutland (Thyborøn, Thor $^{17}/_{3}$ 04) the head was certainly more produced than in specimens taken 73° L. N. 8° L. E. by Johannes Petersen, but in the former the caudal rami were scarcely as long as wide, and a little longer than the anal somite, and in the latter distinctly 2·1 as long as wide. In 3 of the mentioned specimens from Denmark the antennulae reached three segments beyond the tip of the urosome, but in 2 other specimens two only; in specimens from Spitzbergen (c. 3·4 mm) they extended three segments beyond the end of the urosome, but in a big specimen from Greenland (5·3 mm) with the head even less produced than the specimens from Spitzbergen the antennulae extended only two segments beyond the urosome.

As far as the shape of the head is concerned the differences between the different types are better marked in the males than in the females; as far as the characters found in the fifth pair of legs are concerned I first tried like Mràzek to find a character in the variations of the spinulation of the inner margin of the second basipodite, but like him without success.

In Sars' figures of *C. finmarchicus* the pes V does not extend to the end of the abdomen; in none of my specimens the pes V is so short as figured by Sars; in all my specimens they extend to or almost to the end of the abdomen. In all the examined males (from Denmark, Greenland or Spitzbergen) except in a single one from Denmark, the Ri III sin. reached beyond the middle or almost to the end of Re II. In a single specimen from Denmark the Re II sin. was 1·7 as long as the Re III, but in most other specimens the Re II was 1·4 or 1·5 as long as Re III; the last segment differs from Sars' figures by a more or less marked rounded protuberance basally and inwards.

Scott (1905), followed by Pearson (p. 5), has accepted Sars' two species, but most authors agree in regarding the proposed characters as insufficient f. inst. Wolfenden (1904 pp. 126—127), Farran (1905 p. 30) and Gough (1905). Mràzek has (1902 pp. 502—506) without knowledge of Sars' point of view tried to solve the question. Without result he tried to find characters in the dentation of the inner margin of the first basipodite of the fifth pair of legs. He writes p. 504: »Etwas konstanter erwiesen sich die Längenverhältnisse der vorderen Antenne. Die Länge derselben ist der Länge des Körpers umgekehrt proportionell.« He also found differences of some value in the armature of the legs, and the relation between the length of the different parts of the body; but he rightly thought, that a detailed study of a larger material, consisting of specimens, originating from a different region of the ocean with statistical methods of studying the limit of variation, would scarcely solve the question, without at the same time studying material from well defined geographic regions. The question ought soon to be properly investigated, for if *Cal. finmarchicus* and *helgolandicus* should really be proved to belong to two different species, a good deal of the vast amount of knowledge about the biology and distribution, collected in the last years, is in danger of losing considerably in value. All questions regarding development, propagation and distribution should in most regions be extremely difficult to investigate, if we instead of a single well defined species had two very badly limited.

Description ♂—♀. Size: f♀. 2·8—5·5 mm. f♂. 3—4·4 mm. (Smallest specimens Færoe Iceland Channel; largest Davis Strait).

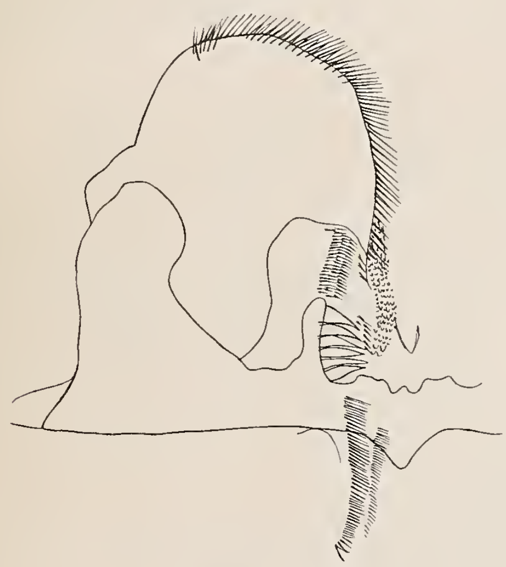
The number of secretory pores scarcely differed in the males and females, or in specimens from different localities. In the first pair of legs no secretory pores were found; on the anterior surface of Ri I, at the base of Se, sometimes a minute pore (?) was seen. In pes II—V a minute pore was found on the anterior surface at the base of a minute Se of third basipodite; in the Re I—II a more or less distinct pore was found at the base of Se in the four last pair of legs, and a distinct one was found at the base of the Se 2—3 Re III, but in addition to these in the pes III—IV a pore was found corresponding to the missing Se 1 Re III, in pes II this pore was most often wanting. The shape of the labrum etc. (cf. textfig. 6) is somewhat different from Sars' fig. (pl. I). Between the insertion of the antennulae a small elevation is found, which by a transverse groove, less prominent than shown in the figure, is divided into a shorter anterior portion (a) and a longer posterior one (b). Separated from this by a narrow groove and between the insertion of the antennae a low elevation (c), slightly convex from before backwards and from side to side is seen. In front limited by a transverse groove, behind by the free posterior margin and laterally gradually continued into the transverse chitinous bar, situated between the articular cavity of the antennae and mandibulae respectively, the labrum proper is found. The mentioned chitinous bar is medially to the articular cavity of the mandibulae connected with the area labialis, thus forming the chitinous bed, in which the manducatory portion is situated (cf. Sars' fig. pl. II). The *labrum* proper has in front, in the middle, a prominent tumulus, beset with a number of long bristles directed backwards. On each side of the process an oblique series, directed outwards and backwards, sometimes fused with the lateral marginal row, is found; it consists of short spinelike hairs. In front of hinder margin on each side a group of fairly long setae, beginning in the middle and directed backwards and outwards, is observed and laterally a marginal row of rather short spinelike hairs is found.

The *oral surface of the labrum* shows an arrangement alike that of *Cal. hyperboreus* (pl. I fig. 1 b), but the enlarged group in front is less developed (differing on the two sides in the two examined specimens), the first group is converging anteriorly, the second group is medioconvex, well separated from the first group, but only indistinctly from the third one; the third to the fourth groups are partly fused and consist of several rows of hairs. Transversely between the last series only a few teeth are found.

The *lamina labialis* (textfig. 1), which seems to form a part of a transverse chitinous system, has posteriorly a median tooth, and on each side two or three teeth (often assymmetrical). In front of the lamina labialis a delicate granulation is found in the middle between a median series of shorter and a lateral of longer hairs. Behind the lamina and between the serrulae 6dentatae an outer group of fairly delicate hairs and a median one of thick granules, fused with a group between the labial lobes are found. The arrangement of hairs on the labial lobes and the somites behind seems, as far as made out, to be like that of *Cal. hyperboreus*. In several specimens it was seen that the transverse line, which limits the maxillar somite posteriorly, is continued just in front of the articular cavity of the maxillipes and laterally into the membrane, dorsally and posteriorly limiting the head. Accordingly the first, thoracic somite bear two pair of limbs viz. maxillipeds and pes I, and thus corresponds to two somites (cf. Hansen 1893).

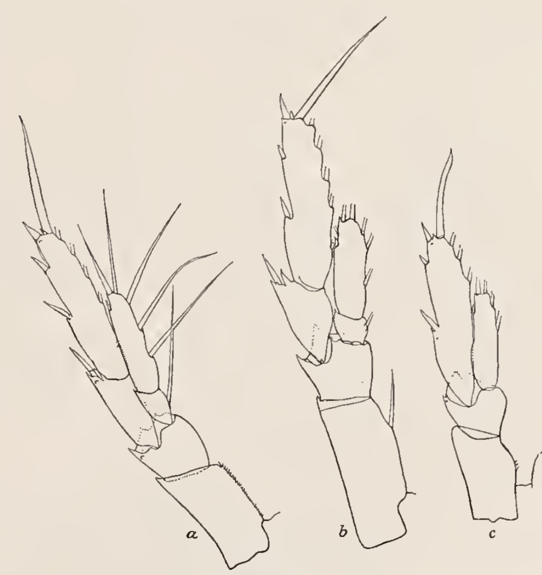
By examining females from Denmark I did not find any difference from those described except in the arrangement of the hairs of the ventral surface of the maxillar and maxillular somite, which is less complex than those figured.

The only difference between males and females seems to be the more prominent median process of the labrum in the former sex.



Textfigure 1.

Calanus finmarchicus G. ♀. Labial lobe seen from in front with lamina labialis and serrula 6dentata etc. × c. 170.



Textfigure 2.

C. finmarchicus G. ♀. (Stage IV—V).
a. Pes V sin. (stage V) in anterior view × 85.
b. Pes IV sin. (stage IV) in anterior view × 85.
c. Pes V sin. (stage IV) in anterior view × 85.

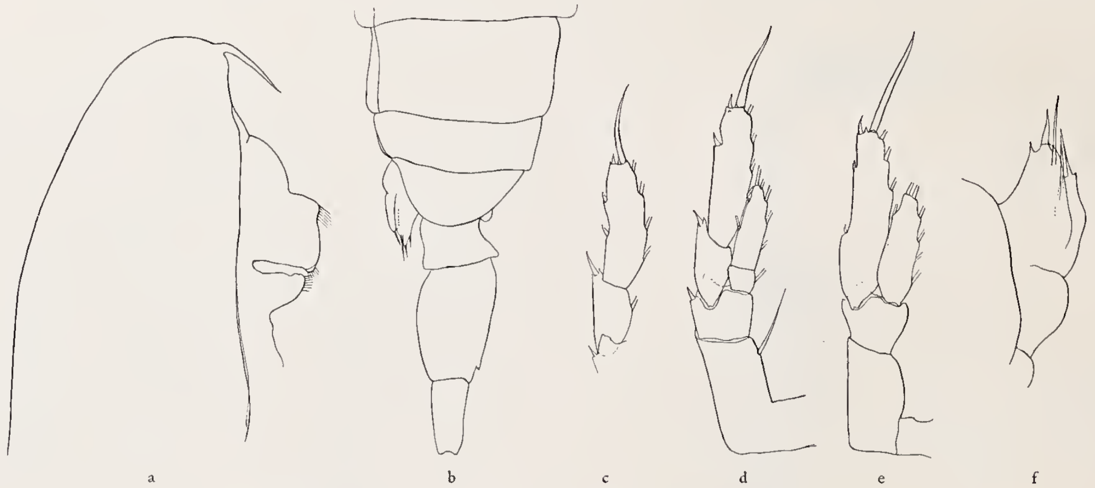
Y. (St. V). Size: Varying from 2·2 (Egedesminde, Davis Strait), 2·5 (73′ L. N. 8′ L. E.) — 4·8 mm. (Davis Strait). Gran's specimens (÷ urosome) varied from 2·1—2·6 and the specimens from duc d'Orléans 3—4·5 mm.

This stage, in which I have not been able to distinguish males and females, is easily distinguished by 4 abdominal somites of which the second is the longest, 2·7 as long as the first and 1·4 as long as the anal somite. The mouth-appendages are scarcely different except the maxillulae, which have only 10 instead of 11 setae in the exopodite. The four pair of natatory legs are scarcely different from those of the mature female, but pes V differs by fused Ri II—III without indication of Se II but with the number of Si 7 as usual, and by the fused Re II—III with 5 Si and well developed Se Re II (textfig. 2 a). Number of secretory pores seem to be alike f♀ in pes II—III, but in pes IV no secretory pore corresponding to Se 1 Re III was seen and in Re II ∾ III pes V only a single pore is found at the base of Se 3.

The labrum shows in lateral view complete similarity to Sars' figure pl. I but has the anterior process less prominent than in most f-♀ examined by me.

Y. (St. IV). Size: Varying from 2 (63° 43 L. N. 0·26 L. E.), (1·8 + 0·6) = 2·4. (South West of Iceland), 2·6 (Davis Strait), 2·8 mm. (64° 56 L. N. 36° 19 L. W.) to 2·9 mm. (Jan Mayen). Gran's specimens (÷ urosome) varied from 1·4—1·83 and specimens from duç d' Orléans from 2—3·5 mm.

This stage is easily distinguished by 3 abdominal somites, of which the third one is the longest, being 1,3 as long as the second one, and 2·6 as long as the first one. The number of setae in the furca is scarcely different. The antennulae (with 25 segments) and mouth-appendages (including



Textfigure 3. *Cal. finmarchicus* G. ♀. (Stage III).
a. Head from the right. × 85. b. Abdomen from the left. × 85.
c. Pes II dext. Re in post. view. × 110. d. Pes III sin. in anterior view. × 110.
e Pes IV sin. in anterior view. × 110. f. Pes V sin. in lateral view. × 150.

the labrum, exteriorly as well as in oral view) except the Le of the maxillulae, which only possess 9 setae, are scarcely different from f♀. Pes I has the Ri II—III fused and an indistinct articular membrane between Ri I and II; the Re II—III are also fused but in other respects this appendage is scarcely different. Pes II—III have the same segments fused, the Se Ri II is missing, but Ri has 10 setae as usual; the Re II ∾ III have only 5 Si. The pes IV differs from the preceding pair by 8 setae only of Ri (textfig. 2 b). The pes V is more clumsy than in stage V with undivided Ri with 6 setae and undivided Re with 4 Si and 3 Se. The inner margin of basipodite II has 3 teeth (textfig. 2 c). Secretory pores are in pes II—IV wanting in Re III, corresponding to Se 1 - 2, but found at Se Re II and at Se 3 Re III; in pes V secretory pores are found at base of Se Re I and Se 3.

Y. (St. III). Size: Varying from 1·4 (Davis Strait), 1·7 (1·3 + 0·4) (63° L. N. 15° L. W.) — 2·4 mm. (Davis Strait). Gran's specimens (÷ urosome) of his stage IV varied from 1·05—1·44 and specimens from duc d' Orléans 2—2·2 mm.

The body appears more slender than in the preceding stage; the urosome consists of 2 somites; the Se of furcal rami is missing (textfig. 3 a—b). The antennulae, which consist of 23 segments, extend 3 segments beyond the tip of the abdomen. The antennae and other mouthlimbs except the maxillulae, in which the Le has 8 setae and the Re 8, are scarcely different. The lateral outline of the labrum is as shown in textfig. 3 a alike stage V, but the frontal protuberance is less prominent. The oral surfaces of the labrum and the labium are in their main structures alike f♀.

Pes I = St. IV. Pes II in main features alike St. IV, but Ri with 8 setae and Re II ∾ III, which is less slender, with 4 Si only (textfig. 3 c). Pes III is comparatively shorter than II, and the Re II ∾ III has only 2 Se (fig. 3 d). The pes IV (fig. 3 e) has no seta in basipodite II, 7 setae in unsegmented Ri and 3 Si + 3 rather short Se in Re. The pes V (fig. 3 f) is represented by a wide indistinctly divided basal part, which is distally attenuated, and here subdivided into longer outer branch with at least 3 setae decreasing outwards and a shorter inner branch with 2 fairly long setae. Secretory pores were with certainty only observed at the base of Se 3 Re II ∾ III in pes II—III.

a b

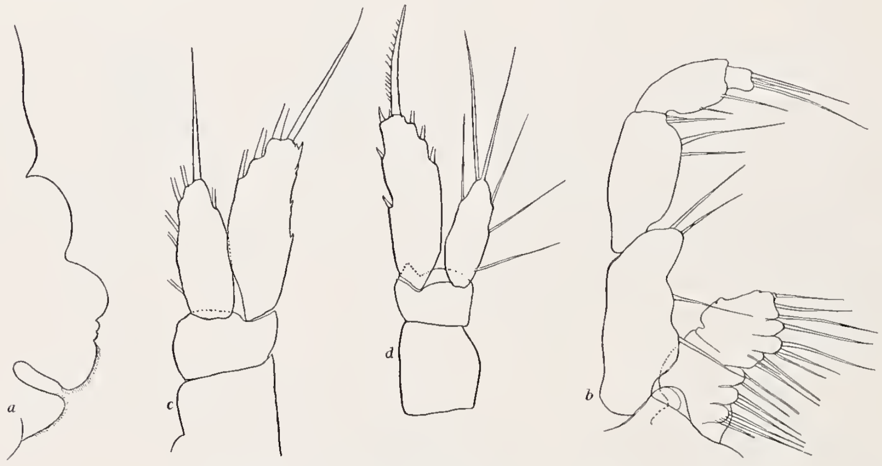
Textfigure 4. *Cal. finmarchicus* G. ♀. (Stage II).
a. In lateral view × 85. b. Pes IV × 225.

Y. (St. II). Size: Varying from 0·9 (S. W. Iceland), 1·1 (Davis Strait), 1·3 (1 + 0·3) (Jan Mayen) — 1·6 mm. (Jan Mayen). Gran's specimens (÷ urosome) of his stage V varied from 0·78—1·01 and specimens from duc d'Orléans from 1·4—1·8 mm.

The body is more slender than in the preceding stage (textfig. 4 a). The head is sometimes indistinctly separated from the first thoracic tergite, in addition to which 3 somites are found, of which the last one only bears a rudimentary pair of legs. The antennulae, which reach about one segment beyond the tip of the furca, consist of 18 segments only, as the segments proximal to the 11 are more or less fused. The antennae and mandibulae are practically alike those of the f♀. The number of setae of the maxillulae is comparatively small; Le has only 6 setae, Li I has only 10 spines, basipodite III has 3, Ri I 1, Ri II 2, Ri III 5 and Re 7 setae. The maxillae are in the main features alike the f♀. The maxillipeds are in shape alike the preceding stages, but the Basp. III has in the middle only 2 Si, as the basal one is wanting, Ri I has a single seta, Ri II (probably Ri II ∾ III) is rather elongate with a median and a distal Si and the following segments are fused with 4 setae. The labrum is scarcely different from the preceding stage. Pes I is in the main structured as in the two preceding stages, but the Si of basp. II is very delicate, the Ri has a fairly well developed articular membrane between the Ri I and Ri II ∾ III. The pes II is practically alike the pes III of the stage III, and the pes III alike pes IV (cf. fig. 3 e). The pes IV is alike the pes V of stage III and the pes III of stage I (textfig. 4 b).

Y. (St. I). Size: Varying from 0·8, 0·9 (0·7 + 0·2) — 1·1 mm. Specimens from duc d'Orléans were 1 mm.

The head is more produced than in the following stage without distinct filaments; behind the head 3 fairly distinct somites are seen in addition to the two somites of the urosome. The antennulae, which scarcely reach the end of the urosome, consist of 11 segments only; proximally 3 indistinct segments are found, the segments 11—18 are probably fused and the segments 19—25 are free. The antennae and mandibulae are practically as in f♀. The maxillulae are alike those of preceding stage but the number of setae seems to be somewhat smaller. The maxillae are in main as shown in textfig. 5 b alike f♀. The maxillipeds are even more reduced than in the preceding stage, as easily recognised by studying fig. 5 b. The Ri, which is only $^2/_3$ as long as the basipodite III, consists of the long basal segment with two 2 Si and shorter terminal segment with 4 setae.



Textfigure 5. *Cal. finmarchicus* G. ♀. (Stage I).
a. Lateral view of the labrum × 225; b. maxilla and maxillipes × 225; c. pes I (perhaps somewhat flattened by the pressure of the glasscover) × 225; d. pes II sin. in anterior view. × 175.

The lateral outline of the labrum and labium are, as seen by comparing textfig. 5 a with 3 a, somewhat different from stage III, the longitudinal series of hairs on the oral surface are in the main arranged as in the preceding stages, but the hairs are very short. The lamina labialis, the longitudinal series of delicate hairs in front of it and the serrula sexdentata are scarcely different from preceding stages. The pes I fig. 5 c has 2 wide basal segments without Si. The undivided Ri has 7 setae and the Re has 3 Si and 3 Se. The pes II (fig. 5 d) is less slender but in other respects alike pes IV stage III. The pes III is alike pes V stage III. No secretory pores were observed.

Occurrence etc. *Calanus finmarchicus* Gunn. was, as there was good reason to expect, found all over the area explored by the different expeditions. As I have examined a great number of this species from several hundred of samples, I thought it worth while to examine the proportion of the different stages in each sample. As the number of specimens, which were originally picked out from the samples, were not selected from this point of view, and as the istruments, by which the different hauls are made, are widely different, the results arrived at are only to be compared with caution, and are not expected to give more than an impression. For getting an exact knowledge of the vertical and seasonal distribution of a species like *Calanus finmarchicus*, we are obliged to have at our disposal numerous samples taken with a closing net at the different hours of the day, and in the succeeding months of the year at the same localities, scattered over a wide area. Most of the samples at my disposal are surface ones; the vertical hauls are not procured with a closing net. Like most expeditions in these regions the Ingolf Exp. etc. has only taken plankton samples in the months of the summer (May to September) and seldom in different months in the same region.

West coast of Greenland. The Ingolf Expedition has in the months of June and July 1895 taken several samples with *C. finmarchicus*.

Number of samples in which each stage occurred in 17 samples June and in 15 samples July.

Stage		June	July
St. VI	♂	0	4
	♀	11	13
V		7	12
IV		9	13
III		8	12
II		6	8
I		4	7

Table showing the proportion, in which the different stages were found.

Date 1895.	L. N.	L. W.	Station of Ingolf.	Depth in fathoms.	Temp. Surface.	Percentage of different stages. St. VI ♂	St. VI ♀	V	IV	III	II	I	Number of specimens examined.
18/6 4 p. m.	60°29	34°14	St. 19	V^1 300—0	9° C.	..	31	64	5	..	..	..	100
26/6 2 p. m.	63°30	54°25	St. 25	V^1 200—0	2·9° C.	..	17	24	19	15	13	12	200
26/6 3 p. m.	63°56 5	52°41	St. 26	V^1 20—0	2·9° C.	..	1	1	2	14	52	30	130
1/7 8 p. m.	65°17	55°42	St. 28	V^1 100—0	1·15°C.	..	1	21	57	20	1	..	65
5/7 3·30 p. m.	65°34	54°31	St. 29	V^1 50—0	3·5° C.	0·3	3	32	22·3	23·4	18	1	340
11/7 8·40 p. m.	66°35	55°54	St. 31	V^1 50—0	2 6° C.	..	0·3	0·3	18	36	45	0·4	230
6/7 11 p. m.	Holstensborg.		..	Pl. 31	1·5° C.	0·5	2	91·5	2	4	..	..	100
18/7 3 p. m.	65°17	54°17	St. 34	V^1 100—0	5·1° C.	..	4	15	20	30	29	2	50
28/7 7 p. m.	61°50	56°21	St. 19	V^1 100—0	8·5° C.	..	3	47	47	2	1	..	200

The following table shows the number of the mentioned 9 samples, in which a certain percentage of the different stages were found.

Stage.	VI	V	IV	III	II	I
Percentage.						
0%	0	0	0	1	2	4
0—5	7	2	3	2	2	3
5—10	0	0	0	0	0	0
10—20	1	1	3	3	2	1
20—50	1	4	2	3	2	0
50—75	0	0	1	0	1	1
75—100	0	1	0	0	0	0

From the above it is impossible to draw any conclusions except that all stages occur fairly frequently in the months of July and June. As mature males have been found in four samples (in addition to the 2 mentioned: $^{1}/_{7}$. St. 27. 64°54 L. N. 55°10 L. W. V¹ 200—0 and $^{26}/_{6}$. St. 26. Pl. 25. 63°57 L. N. 52° L. W.), in the month of July it is safe to conclude that propagating takes place at that date. From the North of Greenland Lundbeck and Bergendal have 1889 and 1890 ($^{6}/_{5}$—$^{6}/_{6}$) taken 7 samples, which all contained mature females. The other stages were less frequent. In the samples from August and September the mature were found in comparatively few samples; in the two examined samples, with numerous specimens, the stage IV formed the majority.

	Lundbeck $^{6}/_{5}$—$^{6}/_{6}$ 1889—90 7 Samples.	Bergendal $^{6–26}/_{8}$ 1890 8 Samples.	Bergendal Lundbeck. $^{6}/_{9}$ $^{14}/_{9}$.		Percentage of each stage.						Number of specimens examined.
					VI	V	IV	III	II	I	
VI	7	3	....	Lundbeck $^{6}/_{6}$ 90. 65°27 L. N. 53°48 L. W.	2%	0	19	27	27	25	> 100
V	2	5	2	Lundbeck $^{14}/_{9}$ 1890 Diskobay.	..	35	60	5	..	..	> 100
IV	4	7	2	Bergendal $^{6}/_{9}$ 1890 Diskobay.	..	14	81	5	..	..	> 100
III	2	7	2		..	..	..	..	..	..	....
II	2	5	....		..	..	..	..	..	..	....
I	2	1	....		..	..	..	..	..	..	....

Mature males were taken by Lundbeck $^{19}/_{5}$ 89 (57°08 L. N. 49° L. W.); females with spermatophores $^{23}/_{5}$ 89 (59°12 L. N. 52°05 L. W.). In addition to these localities, males were taken by Søren Hansen $^{18}/_{7}$ 85 (59° L. N. 51°18 L. W.), and males are mentioned under the name of *C. quinqueannulatus* by Krøyer from Greenland.

Denmark Strait. The Ingolf Expedition has $^{22}/_{5}$—$^{18}/_{6}$ 1895 and $^{25}/_{6}$—$^{28}/_{6}$ 1896 taken 28 samples containing *C. finmarchicus*. The different stages were distributed in the following way.

Stage.	Number of samples.	Date.	Ingolf.	Lat. N.	Long W.	Depth in fathoms.	Temperat at surface.	Percentage of each stage.							Number of specimens.	Percentage of specimens in 5 samples.	Number of Samples.						
								VI		V	IV	III	II	I			VI		V	IV	III	II	I
								♂	♀								♂	♀					
VI ♂ VI ♀	2 24	6½ p. m. $^{20}/_{5}$ 1895	St. 9	64°18	27°10	V¹ 100—0	7·9° C.	2	28	7	13	23	23	4	c. 200	0	3	..	..	..	..	2	3
V	18	$^{21}/_{5}$ 1895	St. 11	64°34	31°12	V¹ 200—0	7·0° C.	1	70	16	6	4	1	2	175	0—5 6—10	2	3	 2	 1	2	2	2
IV	19	8·30 a. m. $^{5}/_{6}$ 1895	St. 16	65°28	27°05	Pl.¹ 11	8° C.	..	1	27	48	20	4	..	70	11—20	..	..	1	1	2	..	..
III	18	4—6 p. m. $^{15}/_{6}$ 1895	..	63°43	24°20	Cyl. 10	..	..	3	6	74	17	..	..	86	20—50	..	1	2	1	1	1	..
II	9	3 a. m. $^{28}/_{6}$ 1896	St. 96	65°24	29°00	P. 100—0	7·9° C.	..	1.5	39	58	1.5	..	..	64	50—75	..	1	..	2	..	..	..
I	5	...	..	..	..	...	..	..	..	..	..	..	..	..	..	75—100	..	..	..	..	..	..	..

The S/S Thor has from $^{18–20}/_{6}$ 1904 taken 14 samples containing *Cal. finmarchicus* with the young-fish trawl from deep water, in addition to several from the surface, which have been examined by Paulsen (cf. 1906 p. 10).

The East-Greenland Expedition 1900 has in the Denmark Strait from $^{8}/_{9}$—$^{22}/_{9}$ between 65° Lat. North and 62°45 Lat. North, and between 35 and 26° Long. W. taken 50 samples (F. 312—366), of which 30 contained *C. f.*; the hauls were made each second hour day and night at the surface.

Stage.	Number of samples.	1904.	S/S. Thor.	L. N.	L. W.	Depth in metres.	Percentage of each stage. VI ♂	VI ♀	V	IV	III	II	I	Number of specimens.	Percentage of specimens in 4 samples.	Number of Samples. VI ♂	VI ♀	V	IV	III	II	I
♂ VI	9	$^{19}/_{6}$	St. 152	65°00	28°10	Yt. 200 M. Wire	6.5	57	36	0.5	..	..	..	130	0	1	..	..	4	..	..	..
♀ VI	14	$^{20}/_{6}$	St. 153	65°20	27°12	Yt. 800 M. Wire	11	60	27	2	..	..	..	100	0—5	3	..	1	2	..	..	..
V	10	$^{20}/_{6}$	St. 154	65°27	27°10	Yt. 15 M. Wire	..	97	3	..	..	..	..	130	6—10	1	..	1	..	..	..	..
IV	4	..	..	..	..	Yt. 75	1	92	7	..	..	..	..	100	11—20	1	..	1	..	..	..	..
	..	..	..	..	..	Yt. 80	4	78	18	..	..	.	..	175	20—50	..	..	3	.	..	..	..
	..	..	..	..	..	Yt. 800	2	52	46	..	..	..	..	100	51—75	..	3	..	..	..	..	..
	..	$^{18}/_{6}$	St. 149	65°52	26°12	Yt. 250	2	58	40	..	..	..	..	80	76—100	..	3	..	..	..	..	..

From the following list it seems to be fairly safe to conclude that the *C. f.* in the month of September is more common at night than in the day time at the surface, and that the stage IV—V is the most common. In no sample I have examined more than 30—40 specimens; in the few ones containing that number the percentage of the stage IV—V was greatest. Only a single fullgrown female was found in a day sample.

Stage.	Number of samples in which specimens of each stage were found.	The time at which samples were taken by the Danish East-Greenland Expedition 1900 from $^{8}/_{9}$—$^{22}/_{9}$.	Number of samples without *C. f.*	Number of samples containing *C. f.*
VI	8	Taken between 4·05 morning and 7·55 evening	18	8
V	25			
IV	23	Taken between 8 evening and 4 morning	3	21
III	13			
II	7			
I	7			

For drawing any conclusion from the material from the Ingolf and the Thor Exp. at the present time the material is too scanty. But it can not be denied that the percentage of mature specimens is bigger in the August-June samples, and that propagating takes place about the month of June, as fullgrown males or females with spermatophores were found $^{16}/_{6}$ 1892 (Lundbeck Dyrefjord), c. $^{20}/_{5}$ 1895 and $^{20}/_{6}$ 1904; no males were found September 1900.

South of Iceland. In the Atlantic south of Iceland from about 28° Long. W. to the Færoe-Channel, and as far South as 60° Lat. North, the Ingolf Exp. has $^{12}/_{5}$—$^{16}/_{6}$ 1895—96 taken about 55 samples containing *C. f.*, and in August 1895—1896 about 10 samples.

Date.	Ingolf.	L. N.	L. W.	Depth in fathoms and net.	Temp. at Surface.	Percentage of each stage. VI ♂	VI ♀	V	IV	III	II	I	Number of specimens.
4—8 a. m. 14/6 96	..	61°30	27°25	Cyl. 25	8·8° C.	..	4	..	30	60	6	..	109
7 p. m. 14/6 96	St. 83	62°25	28°30	P. 100—0	9·2° C.	..	..	10	13	5	22	50	60
11·50 p. m. 8/6 96	St. 73	62°58	23°28	V. 100—0	7·3° C.	..	0·5	6	11	63	19	0·5	135
8 p. m. 8/6 96	..	..	..	Pl. 11	8·3° C.	..	..	2	38	48	12	..	217
9/6 96	St. 74	62°17	24°36	Pl. 12	8·3° C.	..	..	4	7	81	4	4	100
3·30 a. m. 3/6 96	St. 69	62°40	22°17	V. 100—0	?	..	..	15	29	51	5	..	100
3 a. m. 3/6 96	St. 67	61°32	22°29	Pl.	8·6° C.	..	..	..	1	49	43	7	71
10 p. m. 31/5 96	St. 62	63°18	19°12	Pl. 10	7·7° C.	..	..	20	39	40	1	..	136
7·30 p. m. 1/6 96	St. 63	62°40	19°05	V. 100	8·3° C.	..	2	31	33	34	..	..	100
3 p. m. 1/6 96	St. 64	62°06	19°00	A. 16	8·6° C.	..	..	9	49	34	8	..	178
3 p. m. 18/5 96	St. 54	63°08	15°40	Pl. 5	9° C.	..	2	2	32	9	33	22	233
19/5 96	St. 55	63°33	15°02	V. 100—0	8·4° C.	1	..	28	21	27	21	2	100
1 p. m. 16/5 95	St. 6	63°43	14°34	V. 50—0	?	..	76	4	5	13	2	..	168
3 p. m. 16/5 96	St. 53	63°15	15°07	V. 100—0	8·8° C.	..	..	..	8	10	61	21	70
8·30 a. m. 13/5 96	St. 49	62°07	15°08	V. 100—0	9·3° C.	..	29	2	7	16	25	21	77
? 15/5 96	St. 52	63°57	13°32	V. 200	8·3° C.	1	8	7	10	13	53	8	100
7 a. m. 20/5 96	St. 57	63°37	13°02	V. 100	8·2° C.	26	26	2	6	19	14	7	50
8 a. m. 20/5 96	St. 57	..	..	A. 11	8·5° C.	13	15	32	8	32	..	..	50
1·30 p. m. 9/8 96	St. 133	63°13	11°24	P. 100—0	10·8° C.	..	5	88	7	..	..	..	403

Stages.	Number of samples in which each stage was found. 12/5-16/6	August
♂ } VI	5	..
♀ } VI	25	6
V	39	10
IV	46	8
III	38	5
II	30	6
I	12	4

Percentage of specimens in 19 samples.	Number of samples. VI ♂	VI ♀	V	IV	III	II	I
0	15	9	3	..	1	3	9
0—5	2	5	6	2	1	4	3
6—10	..	1	4	7	2	2	3
11—20	1	1	2	2	4	3	..
21—50	1	2	3	8	7	5	4
51—75	..	..	..	..	3	2	..
76—100	..	1	1	..	1	..	..

The Thor Expedition has in 1904, south of Iceland, taken 1 sample in May, 5 in July and 2 in September.

Stage.	Number of samples. 24/5.	2-11/7.	1-2/9.	1904.	S/S. Thor.	L. N.	L. W.	Depth in metres.	Percentage of each stage. VI ♂	VI ♀	V	IV	III	II	I	Number of specimens.
♂	..	3	2	2/7	St. 171	63°46	22°56	?	11	52	37	..	..	..	..	70
♀	1	5	1	11/7	183	61°30	17°08	Yt. 1800 M. W.	1	90	9	..	..	..	..	500
V	..	5	1	1/9	285	62°49	18°46	Yt. 100 M. W.	2	89	9	..	..	..	..	100
IV	..	..	..	..	..	..	..	...	..	..	..	..	..	..	..	..
III	..	1	..	..	..	..	..	...	..	..	..	..	..	..	..	..
II	..	1	..	..	..	..	..	...	..	..	..	..	..	..	..	..
I	..	..	..	..	..	..	..	...	..	..	..	..	..	..	..	..

The East Greenland Expedition 1900 has south of Iceland (62°—60° Lat. N., 21°—8° Long. W.) from 23–28/9 (F 367—430) taken 63 samples of which 22, contained *C. f.*, but only a few specimens, seldom 20 and only once 46.

In addition to the localities mentioned, specimens in propagating have been found by Lundbeck $^{18}/_{5}$ 1890 55°25 Lat. N. 29°05 Long. W. (5 ♂; 25 ♀; 5 (V); 15 (IV); 5 (III); 1 (II)), $^{11}/_{7}$ 1893 between Talkna and Arnarfjord (1 f♂; 8 ♀; 2 (III)).

Stage.	Number of samples containing the different stages.		The hours at which the samples were taken by the Danish East-Greenland Exp. 1900 $^{23-28}/_{9}$	Number of samples without *C. f.*	Number of samples containing *C. f.*
	4·05 a. m. —7·59 p. m.	8 p. m. —4 a. m.			
VI	7	7	Taken between 4·05 morning and 7·59 evening.	29	12
V	7	7			
IV	4	5	Taken between 8 evening and 4 morning.	12	10
III	4	..			
II	..	..	...	..	..
I	..	..	...	..	..

By S/S Thor several males and (St. 183) once females with spermatophores were found in July, and even $^{1}/_{9}$. By the Ingolf Expedition it has been found propagating in several samples from May 1896 and $^{6}/_{6}$ 1896 (Cyl. 12 62°17 Lat. N. 28°03 L. W.).

When the material collected in May—June is compared with that collected August and September, one is struck by the fairly equal representation of the different stages in the spring, and by the preponderance of the stage V—VI in the August—September samples. When the difference between day and night-samples is compared with that from Denmark Strait, it is seen to be less marked; in the number of specimens of the different stages no marked difference was found day and night.

Iceland-Færoe-Channel. The Ingolf Exp. has South-East of Iceland in May 1895—96 taken 9 samples containing *Cal. f.* and in August 1896 7 samples.

Stage.	Number of samples.		Date.	Ingolf.	L. N.	L. W.	Depth in fathoms.	Temp. at surf.	Percentage of each stage.							Number of specimens.
	May 1895—96	Aug. 1896							VI		V	IV	III	II	I	
									♂	♀						
♂ } VI	4	1	$^{13}/_{5}$ 95 2½ p. m.	St. 4	64°07	11°12	V.[1] 100—0	..	2	95	1	..	1	1	..	100
♀ }	11	5	$^{12}/_{5}$ 95 5 p. m.	St. 2	63°04	9°22	V. 30—0	9·5° C.	0·5	79·5	4	4	2	5	5	100
V	8	7	$^{11}/_{5}$ 95 8 p. m.	St. 1	62°30	8°21	V.[1] 50—0	10° C.	1	25	18	20	24	12	0	100
IV	5	7	$^{20}/_{5}$ 96 9 a. m.	St. 59	65°00	11°26	A. 12	1·5° C.	..	98	2	..	..	..	..	100
III	5	4	$^{10}/_{8}$ 96 7 p. m.	St. 139	63°36	7°30	A. 80	9° C.	..	2	20	49	14	13	2	100
II	5	3	$^{10}/_{8}$ 96 10 p. m.	..	63°45	7°25	A. 81	8·5° C.	..	4·5	47	19	15	10	4·5	100
I	3	3	$^{10}/_{8}$ 96 2·30—4·30 p. m.	..	63°30	7°40	Cyl. 40	10·5° C.	1	5	13	..	..	..	..	..

From the Thor expedition 1904 I have only examined specimens from 4 samples, 3 containing males or eggs.

$^{5}/_{5}$ 04. St. 63. 64°05 Lat. N. 0°38 Long. W. Yt. 300 M. Wire 7 f♀ (2 with spermatoph.); 3 f♂; 2 V.

$^{9}/_{5}$ 04. St. 70. 63°35 Lat. N. 6°20 Long. W. Yt. 100 M. Wire 17 % f♂; 80 % f♀ (1 f♀ with sperm.); 3 % V.

$^{22}/_{5}$ 04. St. 99. 61°15 Lat. N. 9°35 Long. W. Yt. 100 M. Wire 90 % f♀ 10 % V.

My material from Ingolf and the few samples from Thor confirm Paulsen's result that the propagating in this region takes place in the beginning of May. It is rather curious that a single male was found in September. Compared to the May samples those from September show a preponderance of Stage IV—V.

South-West of the Færoes. In the Atlantic, South-West of the Færoes, about 8 samples with *C. f.* were taken $^{30}/_{5}$—$^{26}/_{6}$ 1905 by the Thor.

Stage.	Number of samples.	1905.	Thor.	L. N.	L. W.	Depth in metres.	Stage. VI ♂	Stage. VI ♀	Stage. V	Number of specimens.
♂	3	..	..	..	..	...	..	..	..	..
♀	7	$^{8}/_{6}$ 05	St. 72	57°52	9°53	Yt. 600 M. W.	8	92	..	50
V	6	$^{21}/_{6}$ 05	St. 90	47°47	8°00	Yt. 300 M. W.	15	60	25	75
IV	1	..	..	..	..	...	..	..	..	..

In addition to the two mentioned localities a male was found ($^{24}/_{6}$ 49° L. N. 12° L. W.), and females with spermatophores ($^{30}/_{5}$ 59°49 L. N. 8° L. W.). Propagation accordingly takes place as far South as 47° Lat. North $^{21}/_{6}$. In this connection ought to be mentioned that the S/S Thor (St. 223 B. $^{17}/_{3}$ 1904) at Thyborøn, Denmark, has taken 50 f♀, 5 f♂, 10 (V), 1 (IV); and that Rink $^{18}/_{3}$ 1858 has taken 1 f♂, 12 f♀, 16 (V), 5 (IV), 1 (III) at the Orkney Islands.

South-East of the Færoes. The Ingolf Expedition has South-East of the Færoes, as far South and East as 57°53 L. N. 7°39 L. E. from $^{5-7}/_{5}$ 1895 and $^{4-6}/_{5}$ 1896, taken 10 samples containing *C. f.*, and from $^{10-15}/_{8}$ 1895 and $^{19}/_{8}$ 1896 9 samples; they were almost all taken with *Cyl.* and contained generally 10—30 specimens (cf. tabula).

Stage.	Number of samples from Ingolf. May.	Number of samples from Ingolf. Aug.	Number of samples containing each stage taken by Ø.Exp. 1900. Night 8 p. m. —4 a. m.	Number of samples containing each stage taken by Ø.Exp. 1900. Day 4 a. m. —8 p. m.	The hours, at which samples were taken by East-Greenland Exp. 1900 $^{29-30}/_{9}$.	Samples without *C. f.*	Samples with *C. f.*
VI	6	1	..	2	Taken between 4·05 morning and 7·59 evening.	11	4
V	6	8	0	4			
IV	7	6	..	2	Taken between 8 evening and 4 morning.	8	0
III	8	2	..	..			
II	5	5	..	..	...	..	..
I	..	1	..	..	...	..	..

In the May samples from the Ingolf the different stages seem to be equally well represented in contrast to those from August, in which the stages IV—V are best represented. In this region the Thor has in 1905 collected some fullgrown males viz: 1 f♂, 2 (V) ($^{21}/_{7}$ 1905 St. 120 59°54 Lat. N. 1°19 Long. E.), 1 f♂, 2 (V) ($^{17}/_{7}$ 1905 St. 119 59°54 Lat. N. 4°00 Long. E. Yt. 500 M. W.), 1 f♂, 15 f♀, 12 (V) ($^{6}/_{9}$ 1905 57°33 Lat. N. 4°26 Long. E.).

The East Greenland Expedition 1900 has $^{29}/_{9}$—$^{30}/_{9}$ (59°33 L. N. to 59° L. N.; 3°24 L. W. to 0°05 L. W.) (F: 431—453) collected 23 samples, of which only 4 day-samples contained a few specimens of *C. f.* (cf. tab.).

Norwegian Sea. The East Greenland Expedition has from $^{19}/_{6}$—$^{24}/_{6}$ 1900 crossed the Norwegian Sea from 60°26 Lat. North, 3°10 Long. East to 69°06 Lat. N. 6°12 Long. West. In the samples taken with the net F. (F. 1—89) 79 were found containing *C. f.* but only 5 without any specimens. In addition to these, 5 samples, taken with a closing net and 6 samples with net A and B were taken. The proportion between the different stages in 39 samples from the whole region which were examined in this respect was a follows.

VI	17	The number of samples (altogether 33) in which each stage occurred.
V	26	
IV	26	
III	22	
II	14	
I	7	

No males were found at the surface in the explored region. As I have unfortunately not examined the proportion between the stages in all the 79 samples, and have not with security classified the larval stages, the following remarks are set forth with due reservation. In the more southern part of the region (to 64° N. F. 38) the stage IV—V were found in 14 samples of 16, the f♀ only in 4 (1—2 specimens) [F. 27: 10 (V), 6 (IV); F. 29: 8 (V), 16 (IV)]. In a few samples (between 64° N.—65° N.) the younger stages were well represented f. inst. [F. 51: 4 (V), 20 (IV), 20 (III), 18 (II), 11 (I); F. 52: 2 (V), 10 (IV), 14 (III), 10 (II), 20 (I)].

In 10 samples taken between 67° L. N. and 69° L. N. (F. 62—81) f♀ were found, in fairly big numbers (5—10), but only in a single one of these (F. 64 6 f♀; 2 (V) 1 (IV)) stage IV—V were found and in another stage I—II (F. 66 2 f♀ 5 (II), 15 (I)); in the latter sample as well as in most of the ten mentioned above and in several others often large numbers of eggs and larval stages of Calanus, certainly of *Cal. finmarchicus*, as no *Cal. hyperboreus* was found in this region, were observed. It seems to be probable that propagation took place in this region c. $^{24}/_{6}$ 1900, in a similar way, as Damas has found out with a more southern and eastern region. Whether the propagation between 62—67° Lat. N. has taken place at an earlier date, or if the juniores there found are born in the region explored by Damas, it is at present impossible to tell.

Near Jan Mayen. In the ocean tract passed by the Danish East Greenland Expedition from $^{28}/_{6}$ 11 p. m. 1900 to $^{9}/_{7}$ 9 a. m. from near Jan Mayen to 74°15 Lat. North 12°21 Long. West (F. 91—F. 243) about 145 samples were found, of which only 4 contained a few specimens of *C. f.* viz. F. 92 $^{28}/_{6}$ 11 p. m., F. 96 $^{30}/_{6}$ 4 a. m. and F. 91 $^{28}/_{6}$ 11 p. m. with 5 f♀, 2 (V), 1 (III) near Jan Mayen, and F. 143 $^{2}/_{7}$ 8 a. m. 72°30 L. N. 0°41 L. W. 1 f♀. In the samples F. 153—243, which were taken between scattered ice or along the ice-edge no specimens of *C. f.* were observed, but 17 samples with a few specimens of *C. hyperboreus*. A few vertical hauls in the region near Jan Mayen show that the fauna of *C. f.* in deeper waters was probably richer.

		♂	♀	V	IV	III	II
$^{25}/_{6}$ 1900 Jan Mayen	50—60 f.	..	21	56	14	2	..
$^{25}/_{6}$ 12 a. m.	at the surface	..	10	8	..	..	..
12 p. m.		..	5	2	..	..	..
$^{28}/_{6}$		..	12	11	..	..	..
$^{1}/_{7}$ 1 p. m. Closing net	100—50 f.	..	1	3	..	..	..
	50—25 f.	1	1	3	1	1	1
$^{4}/_{7}$	300— 0 f.	..	1	3	..	..	..

It is worth noticing that a f♂ was found between 50—25 fathoms. In this connection it may perhaps be of some interest that Johannes Petersen $^{11}/_{7}$ 1901 73 Lat. N. 8° Long. E. caught a big sample consisting almost exclusively of *C.f.*: the proportion between the stages was the following: f♀ 52 %; V 42·5 %, IV 3 %, III 1 %, II 0·5 %, I 1 %.

Jan Mayen to East Greenland. From $^{9}/_{7}$ 10 a.m. to $^{17}/_{7}$ 5 a.m. taken in the sea north-west and west of Jan Mayen between 74°28 Lat. N. 15°03 Long. W. and the coast of East Greenland at 70°29 Lat. N. 21°21 Long. W. I have examined 13 samples (F. 244—262), of which only 5 contained *C.f.* viz. St. VI in 3 samples, IV in 1, II, in 1, I in 1.

East Greenland. The East Greenland Exp. has, near the coast of Greenland, taken some samples containing *C.f.* in vertical hauls. viz.

		VI	V	IV	III
$^{10}/_{7}$ 6 a.m. 1900 72°28 Lat. N. 15°30 Long. W.	Closing net 6— 0 f.	3	9	2	..
6 a.m.	120— 0 f.	1	12	..	..
	Closing net 110—40 f.	10	6	1	..
$^{16}/_{7}$ 1900	— 35—10 f.	8	18	..	..
$^{29}/_{7}$ 1900 Stewards country		6	..	..	9
$^{28}/_{8}$ 1900 Forblas Fjord		1	1	..	..
$^{28}/_{7}$ 1891 E. Bay. 72°26 Lat. N. 19°56 Long. W.		70	30	..	..

On the voyage home between Forblas Fjord, Antarctic harbour, and 70° L. N. 18° L. W. from $^{30}/_{8}$ 9 p.m. to $^{2}/_{9}$ 9 a.m. 1900 the East Greenland Expedition collected 20 samples (F. 265—278), of which 12 night samples contained *C. f.* in different stages, while 4 day samples only contained a few specimens (St. I—II), and the remaining 4 nauplii only.

Stage.	8 p.m. 4 a.m.	3 a.m. 7 p.m.
VI	2	..
V	2	..
IV	4	..
III	9	..
II	8	3
I	8	3
Nauplius	12	8
Eggs	5	0

Date.	Ø. Exp. 1900.		Percentage of each stage. VI	V	IV	III	II	I	Number of specimens.	Naupl.	eggs.
$^{30}/_{8}$ 10 p.m.	F. 266	Forblasfjord	1·5	9·5	3	10	32	44	75	c	c
11 p.m.	F. 267	...	3	6	11	49	16	15	85	c	c
$^{31}/_{8}$ 8 p.m.	F. 277	...	..	..	..	49	25	26	50	c	..

	÷ *C.f.*	+ *C.f.*
Taken between 3 a.m.—7 p.m.	4	4
Taken between 8 p.m. and 4 a.m.	0	12

The vertical hauls show that stages IV—V of *C.f.* are fairly frequent in the month of July. As no *Cal. hyperboreus* were found in any of the samples, and as the younger stages of Copepodites of *C.f.* were common, there is every reason to regard the nauplii and eggs found in large numbers all over the surface as belonging to the same species. Accordingly there is no reason to doubt that an important locality for the propagation of *C.f.* is sometimes found in this region. The few samples and the small number in which the f♀ were found suggest that the f♀—♂ are either exstinguished or living in deeper strata.

North of Iceland. The East Greenland Expedition has in the region crossed from $^{2}/_{9}$ 10 a. m. to $^{4}/_{9}$ 10 p. m. between ca. 70° L. N. and 67° L. N. and between 17° L. W. and 23° L. W. taken 27 samples (F. 284—310), of which only 8 (taken in the night) contained *C. f.*

Number of samples at which each stage was found.		Ø. Exp. 1900.	Number of samples with *C. f.* ÷	+	Date.	Net.		VI	V	IV	III	II
VI	2	Taken between 3 a. m.—7 p. m.	17	0	$^{3}/_{9}$ 10 p. m.	F. 299	c. 68° L. N. 17° L. W.	..	4	2	..	1
V	5				10 p. m.	F. 300	...	1	17	1	..	..
IV	4				$^{4}/_{9}$ 2 a. m.	F. 301	...	1	21	21	..	..
III	2	Taken between 8 p. m.—4 a. m.	2	8								
II	3											
I	2											

The contrast to the previous group is well marked by the preponderance og stage IV—V, and by the fact that no nauplii were found (cf. p. 21 about their occurrence in Denmark Strait).

The Ingolf Exp. has from $^{18}/_{7}$—$^{3}/_{8}$ 1896 collected 9 samples with *C. f.* north and east of Iceland (as far south as c. 65° north) and 17 from $^{10-25}/_{7}$ between Jan Mayen and north-east of Iceland (including St. 101, 121 and 107).

Stage.	In 9 samples $^{18}/_{7}$—$^{3}/_{8}$.	In 17 samples $^{10-25}/_{7}$.	1896.	Ingolf.	L. N.	L. W.	Depth at fathoms.	Temp. at surface.	Percentage of each stage. VI ♂	VI ♀	V	IV	III	II	I	Number of specimens.
♂ VI	0	1	$^{2}/_{8}$ 96 10 p. m.	..	66°40	22°15	A..73	7° C.	..	..	30	45	20	3	2	75
♀ VI	4	12	$^{10}/_{7}$ 4·30 p. m.	St. 101	66°23	12°05	V². 100—0	5·5° C.	2	20	9	20	35	14	..	150
V	7	8	$^{10}/_{7}$ 5 a. m.	St. 102	66°23	10°26	V². 100—0	4·3° C.	..	84	16	..	..	..	..	50
IV	7	14	$^{11}/_{7}$ 4·20 a. m.	St. 104	66°23	7°25	P. 100—0	6·3° C.	..	1	1	6	16	55	21	75
III	7	12	$^{25}/_{7}$ 11 a. m.	St. 120	67°29	11°32	V². 100—0	5·1° C.	..	0·5	0·5	20	49	28	2	133
II	6	12	$^{24}/_{7}$ 3·30 p. m.	St. 117	69°13	8°23	V². 100—0	4·1° C.	..	20	75	2	..	2	1	150
I	6	9														

The S/S Thor has in 1904 taken two samples with *C. f.* viz. $^{22}/_{7}$ St. 214 67°19 L. N. 17°55 L. W. Yt. 800 M. Wire 4 f♀, 14 (V), and $^{23}/_{7}$ 1904 St. 216 66°15 L. N. 12°13 L. W. Yt. 600 M. Wire 1 (V). As a f♂ was taken $^{10}/_{7}$ 1896 and by the East Greenland Expedition near Jan Mayen $^{1}/_{7}$ 1900, and as Copepodites of stage I—II and nauplii of *C. f.*? were taken at several stations, there is reason to think that propagating takes place in this region in the month of July.

Distribution etc. About the distribution of *Cal. finmarchicus* I refer to the able account of Farran (1911). It has "been recorded from the South Atlantic off Cape Colony, the west coast of North and South America, the Mediterranean, the Adriatic, the Red Sea and the Polar Ocean." In the Pacific it has been found abundantly by Esterly in the Bay of California. „In the North Atlantic it is distributed over the whole of the area north of about 55° N." It is sometimes found in great numbers along the east-coast of North America and is, to the east, distributed as far as the western part of the Baltic.

To deal with the vast topic of its seasonal occurrence in the area investigated by the International Commission does not fall within the scope of this paper, and has fortunately been as well done by Farran as the in several respects incomplete material allowed. As, however, the important contributions to the biology of *Calanus finmarchicus* by Damas, Damas & Koefoed and especially by Paulsen are based upon material from the regions investigated by the Ingolf Exped., and as all the conclusions, to which these authors have arrived, do not quite stand criticism in details, I feel obliged to deal rather exhaustively with these papers.

About the vertical distribution of the different stages it seems to be a general rule, that the younger the stage of development the nearer the surface do the specimens live, as pointed out by Damas, Paulsen and Farran; the fullgrown females and males are generally spawning on the surface in every case in the northern seas, as set forth by Damas & Koefoed, who write (1907 p. 393) "La ponte de *Calanus finmarchicus* s'opère visiblement à une profondeur d'autant plus grande que la région considérée est plus méridionale. Par la même, la distance de la côte où it se reproduit augmente progressivement; autrement dit, cette espèce prend un caractère océanique de plus en plus accentué." About the vertical distribution of the *C. f.* within the day I have only found observations by Esterly, who writes (1911 pp. 140—151) as his conclusion:

1) *C. f.* is most abundant at the surface about 7—8 p. m. during June and July.

2) It has begun to leave the surface by midnight and is most abundant at a depth of 5—10 fathoms about midnight.

3) The plurimum during the day (6 a. m.—6 p. m.) is probably 200 feet.

He thinks that the effect of light upon the "geotropisme of animals is probably the main factor involved". On a much bigger material (1912, pp. 282—95) he arrives at almost the same result.

Unfortunately he has not examined the part which the different stages play in these diurnal migrations.

My material was not well adapted for solving this question, but the difference in the number of specimens taken by the Danish East Greenland Expedition in Denmark Strait ($^{23-28}/_{9}$) cf. tab. p. 21, from North-East Iceland ($^{2-4}/_{9}$), but especially from East Greenland (cf. tab. p. 26), indicate that all stages inhabit the surface-layers in the night in some regions and at some seasons, in which only the youngest Copepodites or the larves are frequent in the day.

It must accordingly be admitted that there is a source of error in comparing the relative proportion of the different stages contained in surface samples, as Paulsen has possibly done, as he does not state whether the hauls are made in the day or in the night.

It may perhaps be allowed to set forth one more general remark against Paulsens conclusions, that they are often based upon a too scanty material; even if, f. inst., five samples from a certain region show almost the same proportion between the stages, it is not at all inprobable, that the next 5 will show quite another result.

Paulsen thus summarises (1906 p. 7) his results based on the Thors material from April 1904. "In April, there are many adult *Calanus finmarchicus* and *Nauplii* at the surface of the sea to the south of Iceland, many *Nauplii* (Sample 10) west of Iceland likewise on the surface. North of Iceland there are but few adults and probably no *juniores*. Along the east coast of Iceland *C. f.* seems for the most part to be absent." On p. 6 "I thus venture to conclude that stage III [my IV] has been predominant along the west coast of Iceland in April". Only 2 samples (7 and 9) bear out this opinion; sample 1 but especially 10—12 (taken same date and locality with different nets), when rightly interpreted, shows the species in propagation. The conclusion, as far as the North is concerned, is based on several hauls with negative result and 2 samples taken with young-fish trawl and with c. 95 % f♀; to bear out this conclusion much more material is needed.

His conclusion for May reads. "Whereas the Atlantic and the waters between the Færoes and Iceland are rich in *C. f.* the waters on the east and north coast of Iceland are poor, of the west coast we know almost nothing." The Ingolf material from May and June 1895—96 (cf. tab. pp. 20—22) confirms this view, and shows the species in full propagation especially in the latter half of May. The same is the case in the middle of Denmark Strait. Paulsen's conclusion from north Iceland is placed on far too scanty material.

Paulsen's conclusion for June reads. "To the south and west of Iceland there are great quantities, mainly *juniores*, — west of Iceland considerable quantities of adult both ♂ and ♀ . . . On the western part of the north coast of Iceland, where the water is warmer, many *juniores* were also found, on the eastern part, where the water is colder, few or none" (1906 p. 12). The Ingolf material (cf. p. 22) from the south of Iceland confirms the conclusion that the juniores predominate; the great number of St. I—III probably indicates the new generation. My own samples from the Thor and in a less degree from the Ingolf (cf. p. 20) tell the same story as far as the west coast is concerned. Paulsen thinks that the adult males and females probably belong to the new generation, "as they occur along with a number of juniores, most of which are in the larger stages". This proportion between the stages, which f. inst. is not found in a sample (Ingolf St. 9 $^{20}/_{5}$), seems just as much to speak for referring them to the old as the new generation. The hauls from the north coast are so few, that it must be admitted that our knowledge about the occurrence of *C. f.* in the month of June is too incomplete for any conclusion as far as this region is concerned.

The author writes (1906, p. 13). "Summarising the conditions in July we find that *Calanus finmarchicus* has increased more in the south than in the north, and that individuals on the easterly north coast are larger than those of the westerly north coast on the one side, and than those on the east coast on the other." The greatest number of specimens of the south coast belong to the stage V—VI; Paulsen's suggestion that deep hauls with the young-fish trawl would show a considerable amount of males is shown to be right by tab. pag. 22; whether these specimens belong to the elder or the new generation is impossible to tell. The two samples (Nr. 3—4) from the north western coast do not allow any conclusion, but the preponderance of St. IV (50—90 %) in 9 of 10 samples, scarcely without any adult, is very remarkable, but does not give any information about the origin of the specimens; 4 samples from the east coast show not much similarity to each other or to 2 samples, from the Ingolf (St. 101—102) with a considerable number of adult specimens. Paulsen concludes (p. 14). "As there are practically no *Calani* on the greater part of the North coast at the end of May and beginning of June, and as Nielsen has shown with certainty, that the water here is renewed from the west, we are entitled to conclude that the large quantity of *Calani* on the north coast, as also the young of the cod, have come with the Irminger current from the west." Before accepting this theory, a much larger number of samples from May and June must be examined. Personally I think that surface plancton like the *Nauplius* of *C. f.* are carried by the current from the south to the north, increasing in size during the carriage, but also that not the smallest amount originates where it lives, and begins to prosper when the Atlantic current makes its influence felt. Paulsen's conclusion that from August stage V is predominant south of Iceland is proved by a big and varied material; a few samples taken by the Ingolf south-east of the Færoes and of Iceland tells the same story.

Paulsen has from the month of September examined a few samples from the north coast with St. V in the majority. Samples taken by the East Greenland Expedition north-west of Iceland, in Denmark Strait and south of Iceland tell the same story.

Damas has in his interesting paper shown that the propagating of *C. f.* took place $^{21-30}/_{6}$ 1904, south of 67° L. N. where the Atlantic and the North Polar current meet. The material brought home by the Amdrup Expedition tells exactly the same story for $^{19-24}/_{6}$ 1900, but as far north as 69° L. N. Damas suggested that the majority of the specimens of *C. f.*, which inhabit the Northern Ocean took their origin from this region, and, by the Gulf-Stream, were scattered all over the ocean. He writes (1905 p. 19) "Il est donc extrêmement probable que nous avons par là reconnu le chemin suivi par le renouvellement printanier des Calanides et l'origine des masses considérables de Calanus qui peuplent en été le Nord de l'Océan et y jouent un rôle si important." Gran had, however, in his well known paper (1902 p. 64), found the *C. f.* in full propagation on the north-west coast of Norway in April—May, Paulsen has from Lofoten examined specimens in propagating from $^{24}/_{1}$—$^{16}/_{3}$ 1899 and Damas and Koefoed (1907 p. 390—391) have found it spawning not only along the coast of Norway but also in the fjords of Spitzbergen ($^{26-28}/_{6}$ 1905). The Duc d'Orléans has taken *C. f.* ♂—♀ near Cap Bismarck (76°49 L. N. 18°13 L. W.) $^{27}/_{7}$ 1905 in a depth of 100 meter, $^{31}/_{7}$ at St. 42 (78°06 L. N. 15°06 L. W.) 44—280 m. *C. f.* was found cc (♂—♀) and at St. 47 (76°47 L. N. 15°21 L. W.) $^{8}/_{8}$ 60—170 meter *C. f.* was found cc (♂—♀). Even if no eggs or larvæ were found together with the adults at these localities, their presence confirms my view that propagation of *C. f.* sometimes takes place on a large scale on the east coast of Greenland.

Paulsen suggests in his concluding remarks "that the spring is perhaps not the only reproductive period of *Calanus finmarchicus*, for the reason that we also find the adults of both sexes at other times of the year almost everywhere, where fishing has been carried out in deep waters".

In this he is probably right. He agrees with the different authors "that this species has its principal reproductive period at any rate in the spring" (1906 p. 19). He is only right, if the spring is defined as the period at which the waters reach a certain temperature and salinity, and which varies according to the latitude from March (February?) to August (East Greenland).

2. **Calanus hyperboreus** Krøyer.

(Plate I figs. 1 a—d; textfigs. 6 a—b).

1838. Calanus hyperboreus n. sp. Krøyer, pp. 84, tab. IV, fig. 23.
1842-45. — — Kr. — pl. 41, figs. 2 a—g.
1849. — — Kr. — pp. 542—543, 559.
1892. — — Kr. Giesbrecht, p. 91, taf. 6—8.
1898. — — — Aurivillius, pp. 88—89.
1898. Calanus hyperboreus Kr. Giesbrecht & Schmeil, p. 15.
1899. — — — Th. Scott, pp. 90—91.
1897. — — — Vanhöffen, p. 278.

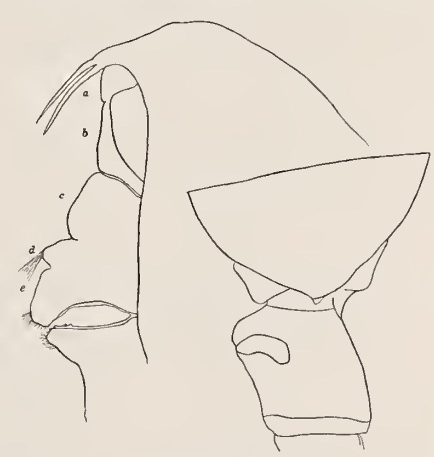
1900.	Calanus hyperboreus Kroyer,	G. O Sars, p. 2.
1901.	— — —	Th. and A. Scott, pp. 338—339.
1902.	— — —	Th. Scott, p. 450.
1902.	— — —	Mràzck, pp. 506—507.
1903.	— — —	Jensen, Johansen, Levinsen, p. 303.
1903.	— — —	G. O. Sars, pp. 12—13, pl. V.
1903.	— — —	Norman, p. 135.
1904.	— — —	Wolfenden, pp. 112.
1905.	Calanus hyperboreus Kroyer,	Th. Scott, p. 221.
1905.	— — —	G. O. Sars, p. 1.
1907.	— — —	Damas & Koefoed, pp. 352—358, 405.
1908.	— — —	Farran, p, 20.
1908.	— — —	v. Bremen, pp. 8—9, fig. 3.
1911.	— — —	Farran, pp. 89—90.
1913.	— — —	Stephensen, p. 71.
1913.	— — —	Stephensen, pp. 307—308.

Description. f♀. Size varies from 7·5—9 mm.

The number of secretory pores differs from that of *Calanus finmarchicus* by the presence of a "secretory pore", (not in all specimens, as far as I was able to find out) laterally a little removed from the base in Re III pes II in stead of corresponding to the wanting Se I; in pes III—IV the pore was found at the same place as in *Cal. finmarchicus,* but was more distinct.

In the serration of the second basipodite of pes V it is, as shown by Giesbrecht (taf. 8 fig. 21, 23), distinctly different from that of *Cal. finmarchicus*, in which species a serrated lamina is found; in *Cal. hyperboreus* the number of teeth are smaller (about 25—35) and they ar not fused basally.

As far as the shape of the *labrum* etc. is concerned I refer partly to the description of the preceding species; only a few minor differences are dealt with here. The anterior process of the labrum is more produced (text-fig. 6 a (d)). In the longitudinal series on the oral surface (figs. 1 a—b) the two first groups are seen to be fused and are diverging towards the free margin. In front of the lamina labialis no granulation was observed.



Textfig. 6 a—b.

Calanus hyperboreus Kr.
6 a. Head in lateral view. × 85.
e. First abdominal somite. × 85.

Behind the lamina labialis (fig. 1 c) and between the serrula bidentata a dense group of hairs, medially more like short spines is found; the arrangement is, as seen in the figure, somewhat different from that of *Cal. finmarchicus* G. Behind, the group is separated into two, of which the inner is continued between the lobi labiales, while the outer is continued on the anterior surface of the lobe and thus fused with the inner series of the lobes. The labial lobes (fig. 1 d), bear 4—5 longitudinal series, of which the inner is the longest and has the longest hairs; behind they are more or less fused with the group between the lobes. Behind the transverse list, between the mandibular and the maxillular somites, laterally on each side are found two groups of hairs, forming together a semicircular figure. Between these groups, in the middle, a group, which is in front triangularly pointed and behind the transverse line, which probably indicates the limitation between the maxillar and maxillular somites, is widened out and divided into two portions, between which a triangular median group of dense hairs is found. More posteriorly a square group of densely placed short setae is found in addition to one of fewer hairs just in front of the hinder limitation of the maxillar somite. Laterally as seen in fig. 1 d a few groups are found.

Y. (St. V). Size. 6 — 6·8 mm. (4·5 + 1·3).

This stage shows the same differences from the mature females as in *Cal. finmarchicus* G., it differs from that species, as in the adult females, by a pointed lateral corner, fewer teeth in the basipod. II pes V marginally, by larger size and greater transparency.

Y. (St. IV—I). Size. of St. IV 3·7 mm. (2·9 + 0·8) — 4·5. Difference from *Cal. finmarchicus* as in preceding stage, but number of spines at inner margin of basipodite II pes V 2—3. The stage III, which varies in size from 2·6—3 (2·4—0·6) mm., the stage II, which varies from 1·8—1·9 mm. and the stage I, of which I have not examined any specimen, seem only to be distinguished from the corresponding stages of *Cal. finmarchicus* by larger size, as the character found in the pointed lateral corner is wanting.

Occurrence. Specimens of *Calanus hyperboreus* have been taken all over the area investigated by the different expeditions as far south as 51°00 L. N. 11°43 L. W., the S/S Thor has ${}^{15}/_{6}$ 05 taken a single f♀. (St. 82. Jt. 1200 M. W.)

West Coast of Greenland. On the west coast of Greenland it has been found by the Ingolf Expedition from ${}^{22}/_{6}$—${}^{18}/_{7}$ 95 in 10 samples in the depth of 200—0 fathoms. The stage IV has been found in the greatest number of samples, but the stage V in the largest numbers; of the adult females and stage III only single specimens were found; the youngest Copepodites seem to be wanting:

Stages.	Number of samples in which each stage is found.	Number of specimens examined in 10 samples.	Date 1895.	Ingolf.	L. N.	L. W.	Depth in fathoms.	Temp. at surface.	Percentage of stages.			Number of specimens examined.
									VI	V	IV	
VI	4	6	${}^{25}/_{6}$95	St. 24	63°06	56°00	V.1 200—0	4·2° C.	1	96	3	105
V	8	200	${}^{22}/_{6}$95	St. 22	58°10	48°25	V.1 200—0	5·4° C.	5	88	7	65
IV	9	30	..	..	..	..	...	..	..	..	..	...
III	3	10	..	..	..	..	...	..	..	..	..	...

Bergendal has at Jakobshavn ${}^{21}/_{8}$ 1890 taken a single f♀.
Lundbeck has from ${}^{19}/_{5}$ 1889. 58°21 L. N. 48°43 L. W. 1 f♀.
from ${}^{23}/_{5}$ 1889. 59°12 L. N. 52°05 L. W. 3 f♀, 3 V.
${}^{26}/_{5}$ 1890. 57°08 L. N. 49°04 L. W. 10 f♀, 10 V.
Søren Hansen ${}^{18}/_{7}$ 1885. 59°14 L. N. 51°18 L. W. 4 V, 10 IV.
Eberlein ${}^{12}/_{7}$ 1882. Umanakfjord. 1 f♀, 4 (V), 1 IV.

Denmark Strait. The Ingolf Expedition has south-west of Denmark Strait (between 62° L. N. and 58° L. N. and between 40° L. W. and 26 L. W.) ${}^{12}/_{6}$ 1895 and from ${}^{16}/_{6}$—${}^{20}/_{6}$ 1896 taken 4 samples of which 3 contained together 6 f♀, 3 respectively 12 V and 9 IV, and only 2 samples containing 3 specimens of stage III. The same expedition has in the Denmark Strait ${}^{26}/_{6}$ 1896 taken 5 f♀ and 25 V, ${}^{4}/_{5}$ 1895 1 f♀ and ${}^{21}/_{5}$ 1895 3 V + 3 IV.

The Thor has from ${}^{18-21}/_{6}$ 1904 in Denmark Strait in 6 of 7 samples collected 180 f♀ and 104 V, but in 4 of 7 samples only 10 IV. At St. 154 ${}^{21}/_{6}$ 67°27 L. N. 27°10 L. W. the percentage of 196 specimens examined was f♀ 67 %, V 30 % and IV 3 %.

South of Iceland. The Ingolf Expedition has south of Iceland $^{13}/_{6}$ 1896 St. 68 taken 2 V and $^{18}/_{5}$ 1896 St. 54 3 f♀ + 3 V. The Thor has $^{24}/_{5}$ 1904 (St. 104, 62°47 L. N. 15°03 L. W. Yt. 1500 M. Wire) taken 25 f♀ and $^{11}/_{7}$ 1904 (St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. W.) taken 20 f♀, 10 V and 1 IV. As the Danish East Greenland Exp. from $^{8-28}/_{9}$ 1900 has taken 50 samples (F. 312—366) at the surface from Denmark Strait and 63 (F. 367—430) in the Atlantic Ocean south of Iceland without any specimens, it is certainly right to conclude, that *C. hyperboreus* is only seldom found in these regions at the surface.

Iceland-Færoe Channel. In the Iceland-Færoe Channel the Ingolf Exp. has from $^{11-16}/_{5}$ 1895 taken 3 samples of which 2 together contained 8 f♀ and 2 V, one contained a single IV and one 3 III; 19 f♀ and 29 (V), contained in 4 samples, taken from $^{15-21}/_{5}$ 1896, were examined, but only 4 IV (found in 2 samples) and a single (III). The Thor has $^{5}/_{5}$ 1904 (St. 63, 64°05 L. N. 9°38 L. W. Yt. 300 M. Wire) taken 10 f♀, 10 (V), 1 (IV), $^{22}/_{5}$ 1904 (St. 99, 61°15 L. N. 9°35 L. W. Yt. 1000 M. Wire) 16 f♀ + 7 (V) and $^{9}/_{5}$ (St. 70, 63°35 L. N. 6°20 L. W. Yt. 100 M. Wire) 175 f♀. From $^{4}/_{8}$ 1904 (St. 230, 63°10 L. N. 7°31 L. W. Yt. 1200 M. Wire) 1 f♀, 1 V and 1 IV were found. As far south as 57°52 L. N. 9°53 L. W. Yt. 1500 M. Wire the S/S Thor has $^{8}/_{6}$ 1905 taken 16 f♀ + 20 (V).

North Coast of Iceland. The Ingolf Exp. has on the north-west coast of Iceland collected a large number of *Cal. hyperboreus* $^{27}/_{7}$ 1896 St. 125 with the stage V in majority; north-east of Iceland as far north as Jan Mayen 11 samples with *C. h.* were taken from $^{10-24}/_{7}$ 1904; 7 of these contained f♀, 7 (V), 4 (IV), 3 (III) and 2 stage II; in all samples but one the stage IV—V formed the greatest percentage.

Date.	Ingolf.	L. N.	L. W.	Depth in fathoms.	Temp. at surface.	VI	V	IV	III	II	Number of specimens.
$^{29}/_{7}$ 1896 4 p. m.	St. 125	68°08	16°02	Apst. 68	2·1° C.	25 %	74 %	1 %	..	..	224
$^{10}/_{7}$ 1896 4·30 p. m.	St. 101	66°23	12°05	V¹ 100—0	5·5° C.	14	16	1	7	5	..
$^{20}/_{5}$ 1896 12·15 a. m.	St. 59	65°00	11°16	P. 100—0	1·6° C.	87 %	12 %	1 %	..	..	91
11.15 p. m.	..	..	..	Apst. 12	1·5° C.	24	21	..	..	..	..
$^{24}/_{7}$ 1896 3·30 p. m.	St. 117	68°13	8°03	V² 100—0	4·1° C.	14 %	13.5 %	36 %	35 %	1·5 %	150
Thor $^{22}/_{7}$ 1904	St. 214	67°19	17°55	Yt. 800 M.W.	...	20 %	27 %	53 %	..	..	75

Norwegian Sea etc. In the western part of the Norwegian Sea between 60° L. N. 3° L. E. and 69° L. N. 6° L. W. the Danish East Greenland Expedition has not in any of the 84 surface samples (F 1—89), which were collected from $^{19-24}/_{6}$ and contained plenty of *C. finmarchicus*, found *C. hyperboreus*. With E. 14 a single f♀ was taken $^{21}/_{6}$ c. 64° L. N. 0·51 L. W. The same expedition has near Jan Mayen with a closing net made several vertical hauls, and a few horizontal ones with a big net, which makes it evident that the species was rather common in this region.

Of 5 samples from Jan Mayen (25/6 1 a. m.—5 a. m.) 4 contained f♀ (21 specimens), 5 (V) (34 specimens) and 3 stage (IV) (6 specimens only); of 8 day samples 5 (taken 6 a. m. to 11 p. m.) did not contain any specimens, but 3 (12 a. m.—3 p. m.) contained together 9 f♀.

Date.		Ø. Exp. 1900 at Jan Mayen.	VI	V	IV	III	II	I	Number of specimens examined.
25/6 12·30 night	Horizontal net.	At the Surface	87 %	13 %	..	..	..	..	100
25/6	Closing net.	50—60 fathoms	10	17	1	..	..	..	...
28/6	?	...	20	2	3	4	8	..	...
1/7 1 p. m.	Closing net.	25 —10	10 %	40 %	21 %	29 %	..	..	60
...	...	50 —25	1	3	..	..	..	..	...
...	...	100—50	1	4	..	..	..	..	...

From the 28/6 10 p. m.—1/7 1900 the East Greenland Exp. has near Jan Mayen collected c. 40 samples (F. 90—135); 27 day samples (6 a. m.—7 p. m.) were taken, of which only F. 125 (1/7 1912 mid-day 71°31 N. 7°43 L. W.) contained a single f♀; of 13 night samples the 4 following contained *C. h.*, and the f♀ most abundantly.

		Ø. Exp. 1900.	VI	V	IV	Number of specimens examined.
28/6 10 p. m.	Jan Mayen	F. 90	85 %	15 %	..	106
11 p. m.	..	- 91	5	4	1	...
12 p. m.	..	- 92	40	4	..	...
29/6 1 a. m.	..	- 93	3	15	6	...

In the ocean tract crossed by the East Greenland Expedition from 2/7 1 a. m. to 9/7 12 p. m. between 73° L. N. 4° L. W. and 74° L. N. 11° L. W. 109 samples (F. 136—244) were taken, partly along the ice-edge or among scattered ice. As is easily seen in the following table the adult females are the most frequent; the species is rather scarce at the surface and there is not seen to be any marked difference in its occurrence in different times of the day.

Ø. Exp. 1900 2-9/7.	Number of samples without *C. h.*	Number of samples containing *C. h.*	Number of f♀.	Number of stage V.
Number of samples and specimens taken { 5 a. m.—7 p. m.	43	16	54	6
Number of samples and specimens taken { 8 p. m.—4 a. m.	40	10	12	6
Summa	83	26	66	12

That the species was well represented in the greater depth even at localities in which it was scarce at the surface is shown by a few vertical hauls (cf. table p. 35).

By Deichmann 3 f♀ + 5 (V) were taken as far north as 75°37 L. N. and 6°40 L. W. As the Danish East Greenland Expedition from the coastal waters only took the species in the few above mentioned samples, and as not one was found in 13 surface samples (F. 244—262) taken from 9/7—17/7 in the

Date.	L. N.	L. W.	Ø. Exp. 1900.	VI	V	IV	Number of specimens.
4/7 3 p. m.	73°32	3°30	300—0 m.	83 %	16 %	1 %	114
8/7 2 p. m.	74°09	11°31	400—0 m.	23	1	3	..
10/7 6 a. m.	74°28	15°36	110—0 m.	7	15	1	..
16/7	72°02	21°20	35—10	2	1	..	..

sea north-west and west of Jan Mayen, and as not one was collected in 47 samples (F. 265—310) taken on the voyage home from 30/8—4/9 between Forblasfjord and 67° L. N. 23° L. W., there is reason to suggest that the species was not very common in the mentioned period.

Distribution. This species has its main area of distribution in the North-Polar Basin, (but has at the present only been found as far east as 136 L. E.), where its propagation probably takes place; it is found at the surface as well as in the lower layers. In the waters, which connect the polar seas, it is equally found viz. the Bering Strait (von Bremen), the Barents Sea, the Davis Strait (Ingolf Expedition, Vanhöffen and Stephensen in Karajakfjord), but especially in the ocean between Spitsbergen and the east coast of Greenland. It was here found from the surface or 5—10 met. below it, when there was floating ice, down to about 1000 meters. Probably carried by the north polar current it was found in the North Sea, but generally in small numbers and in the lower layers. The area around Iceland in which it occurs in abundance "coincides almost exactly with the path of the east polar current and takes the form of a broad tongue passing in a south-easterly direction between Iceland and Jan Mayen and reaching almost as far as the Færoes" (Farran p. 89). By the south-going bottom current it is probably carried over the Wyville Thomson's and the Iceland-Færoe ridges, and is accordingly found scantily in the deeper layers of the North Atlantic as far south as 54° L. N. on the west coast of Ireland. By the assistance of the Labrador- and the Kuro-Sivo currents the species is probably in a similar way distributed over the West-Atlantic and the Pacific. In the Skager Rak and the deep fjords at the west coast of Norway it is sometimes found abundantly, according to Sars, as a relict fauna. If he is right, it should be possible to find it in propagation here. It should be interesting to know, if the species in the deep Atlantic is sometimes propagating, or if the stock must be renewed. The temperature under which this species is found abundantly, lies between ÷ 1·9 and + 6·0, the salinity between 33·15 ‰ and 35·18 ‰. About the details in the biology and distribution of this species I refer to the papers of Farran and Damas-Koefoed.

Remarks. This species is in the three last stages easily distinguished from *Cal. finmarchicus.* But the distinction in the earlier stages, in which the difference is only found in the size etc., may, as pointed out by Damas & Koefoed, be very difficult if not impossible, especially in the polar sea, where *Cal. finmarchicus* attains a size of 5 mm. or more.

Macrocalanus G. O. Sars.

1883. Calanus pars Brady.	1907. Megacalanus G. O. Sars.
1905. Macrocalanus G. O. Sars.	1908. Megacalanus Farran.
1906. Megacalanus Pearson.	1909 Bradycalanus Scott p. 14.
1906. Heterocalanus Wolfenden.	1911. Heterocalanus Wolfenden p. 201.

Since Wolfenden, as the first, established a new genus, *Magacalanus*, for a big Calanoid from the deep Atlantic, four other genera viz. *Macrocalanus* G. O. Sars, *Heterocalanus* Wolfenden, *Bathycalanus* G. O. Sars, and *Bradycalanus* Scott, more or less related to the original one, have been established. A good deal of confusion about the right definition of these genera has risen. Scott and Wolfenden have both tried, but only with partial success, to find the right names for the most natural groups of species.

About the genus *Bathycalanus* G. O. Sars not much discussion in necessary. By Sars it was characterized by the ribbon-shaped and densely-ciliated bristles on the lobes of the maxillae and maxillipeds, and by the two-segmented Re of pes I; the described species (*B. Richardi*) has 2 distinct spines covering the rostral filaments and "assez grêles" rostral processes. As Wolfenden has examined a specimen of *B. Richardi* G. O. Sars with indication of segmentation between Re II and III pes I, and as his other species *B. maximus* Wolf. has a three segmented Re pes I (without Se as in the other species) and with long and stiff rostral processes, he regards the structure of the maxillae + maxillipeds and the frontal teeth as the most important character (p. 198). Scott (1909 p. 11) is certainly wrong in not accepting *Bathycalanus maximus* Wolf. as belonging to Sars' genus on account of the differences in the segmentation of Re pes I.

Wolfenden writes (1911 p. 201) "Ob die Charaktere dieser drei Gattungen genügen, um ihre Abtrennung von einander zu rechtfertigen, kan Ansichtssache sein; wenn aber die generische Unterscheidung von *Bathycalanus* und *Megacalanus* anerkannt wird, so erscheint auch die Abtrennung von *Heterocalanus* als eigene Gattung berechtigt, denn *Heterocalanus* unterscheidet sich von jeder der beiden andern Gattungen deutlich durch die Bewaffung der Maxillipeden, die Form des Kopfes und den Bau des 5 Fusspaares". From this point of view Wolfenden as well as Scott (1903 p. 11) are right, and Sars wrong in referring his *Macrocal. princeps* and *longicornis* to the same genus, but his *Bathycalanus Richardi* to a new genus. The genus *Megacalanus* Wolf. with *M. princeps* Wolf. as the type is characterized by the hook on the anterior surface of the Basp. III pes I and the slender bristles of the maxillae. Wolfenden, who rightly recognised that Brady's *Calanus princeps* is nearly related if not identical with his *Heterocalanus medius*, ought in every case in his later publications to have accepted Sars name *Macrocalanus*, which according to the general rules of nomenclatures had priority, especially as *Mac. princeps* Brady is naturally regarded as the type of the genus and as the name *Heterocalanus* has been previously used for anothed genus of Calanoids. In the Report from the Siboga Expedition, Scott (p. 44) established a new genus *Bradycalanus* with a single species *B. typicus*, which differs from *Heterocalanus* by the head without crest, by the pointed lateral corners of the last thoracic somite, and by the well developed Se of Re I—II pes I and 2 Se Re III of pes I. He writes: "I think that it is probable that Brady's *Calanus princeps* belongs to this genus rather than to *Bathycalanus* or *Heterocalanus*"; accordingly, instead of establishing a new generic name, he ought to have accepted *Macrocalanus* G. O. Sars.

Scott suggest that *Heterocalanus medius* Wolf. is identical with Kröyers *Calanus cristatus*; this species, of which I have examined the type specimens, is however a true *Calanus* (cf. p. 11).

On account of the existing confusion I think the following synoptic key will be useful.

1. Strong hook on anterior surface of basp. III pes. 1; pes I—IV with 3 segmented Re and Ri. The maxillae without densely plumous setae in distal lobes *Megacalanus* 2.
1. Strong hook on anterior surface of basp. III pes I wanting 3.
2. 3 Se of Re III of pes II—IV *Megacalanus princeps* Wolf.
2. 2 Se of Re III of pes II—IV *Calanus gracilis* Dana.
Calanus robustior Giesb.
3. Maxillae without densely plumous setae. 2 Se of Re III of pes II—IV *Calanus*
3. Maxillae with densely plumous setae. 3 Se of Re III of pes II—IV 4.
4. Maxillipeds with slender setae *Macrocalanus*. 5.
4. Maxillipeds with densely plumous setae. Re pes I without Se. Front with 2 conical processes *Bathycalanus* G. O. Sars. 6.
5. Frontal crest. Rounded lateral corner. Pes I has no Se in Re I—II, one Se in Re III *Macrocalanus (Heterocalanus) princeps* Brady.
5. Frontal crest wanting. Pointed lateral cornes. Pes I has 1 Se in Re I—II, 2 Se in Re III *Macrocalanus (Bradycalanus) typicus* Scott.
6. Re pes I two segmented. Rostral processes rather slender *Bathycalanus Richardi* G. O. Sars.
6. Re pes I with 3 segments. Rostral processes long stiff rounded *Bathycalanus maximus* Wolf.

3. **Macrocalanus princeps** Brady.

(Pl. I figs. 2a—b; textfigs. 7a—b).

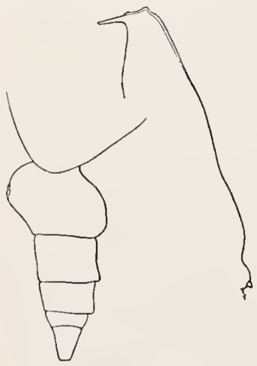
1883. Calanus princeps n. sp. Brady, pp. 36—37, pl. IV figs. 3—7.
1904 nec. Megacalanus princeps n. sp. Wolfenden pp. 112—113.
1905. Macrocalanus princeps Brady. G. O. Sars p. 7.
1905 nec. Megacalanus princeps Brady. Wolfenden pp. 3—5 pl. I figs. 7—9.
1906. Megacalanus princeps Brady. Pearson p. 6.
1906? Heterocalanus medius n. sp. Wolfenden pp. 27—28. pl. VIII figs. 1—5.
1908. Megacalanus princeps Brady. Farran p. 21.
1911 nec. Megacalanus princeps Wolf. Wolfenden pp. 196—198.
1911? Heterocalanus medius Wolf. Wolfenden pp. 201—202 taf. XL figs. 1—5.

Description f♀. Size. Anterior division 5·5 + 5 mm; posterior 3 mm; total length 13·5 mm. The body is slender, as the anterior division is about 2·5 as long as wide. The first as well as the fifth somite, the lateral corner of which is regularly rounded (fig. 7b), are well distinguished. The head has a low crest terminated by a small frontal process. The rostrum consists of two powerful rounded spines, parallel and directed downwards. At the base slender rostal filaments protected above by low processes. The hinder margin of the head has dorsally a small elevation bearing a conical process. The urosome consists of four somites, of which the first — the genital one —, ventrally produced in front, dorsally behind, is distinctly wider and deeper than long, and distinctly twice as long as the following somites. The furcal rami are a little shorter than the third somite and 1·2 as long as wide.

The antennulae project at least 6 segments beyond the tip of the furca; they consist of 25 segments, of which, however, the 8 and 9 are less well separated. The segments increase in length from the 8 to the 17 segments, but decrease from the 20 to the 24, which is scarcely half as long as the 23, which is of almost equal length to the 25. In the basal segment only 2 terminal setae are observed; the second segment bears three tritheks, and the following 17 segments bear a single one, consisting of rather delicate setae; the 20—23 segments have only 2 terminal setae (Sd + "Æsthetasken"), the 24 segment has a single long and slender seta and the 25 segment has 6. Segment 22 has a delicate posterior seta (Sp.) and the two last segments each bear a powerful, ringed plumous one, at least twice as long as the two segments combined.

Antennae are in the main alike *Calanus*, but the Si of the Basipodite II is very short and the Re I and II have no Si, but the latter segment has two processes medially.

Mandibulae: The manducatory part is rather short with the first to the fifth serrations well developed without accessory teeth; the sixth to the eighth serrations are only poorly developed. The four partly plumous setae, of about equal length, are shorter than the width of the segment. The Ri I has only 2 setae and the Ri II has 8 setae anteriorly and a single one posteriorly.



Textfig. 7. *Macrocalanus princeps* Brady. a. Head of adult male. × 8·5. b. Abdomen. × 8·5.

Maxillulae: The Le I has the 2 first setae extremely short, almost rudimentary, and the following 7 long and plumous; the Le II is only indistinct without any seta. The Li II, which does not bear any seta, is comparatively shorter than Li III, which is fairly slender with 2 setae only. The Basp. II has 2 moderately slender setae (Sp.?); the Ri I—II which are indistinctly separated from each other as well as from the basipodite, have a single seta each, while the well distinguished Ri III bears 4 long and one single rather short seta. Re, which has the usual eleven plumous setae, extends a little beyond the end of the endopodite.

Maxillae are in most respects alike *Calanus*, but the Lob. V bears anteriorly 2 long slender ribbon-shaped setae, and the Ri, which has the articular membranes rather indistinct bears six setae of the described structure.

Maxillipes: The proportions of Basp. I ∾ II, Basp. III and Ri = 55 : 50 : 30; they are in the main alike *Calanus*, but Ri II—IV have only a single seta each, and Ri V has 2 Si + 1 Se.

Legs are comparatively short and broad and have three segments in exopodites as well as in endopodites. In the first pair the Re I—II has no Se and the Re III has only a single one, placed a little nearer to base than tip. The Re I—III has 1 + 1 + 5 Si (cf. Wolfenden t. XI fig. 5, in which, however, the Se Re III is placed distinctly nearer tip than base). The second pair of legs has the Ri extending just beyond the end of Re II; the Re I—II is 1·1 shorter than Re III, but 1·6 as long as the distinctly serrated St.; the Re I—II have each a Se and the Re III has 3. The third and fourth pair of legs are in the main features alike the second pair. The fifth pair of legs is smaller than the others and differs in several respects. The inner margin of the basipodite II and III are almost straight, thus differing distinctly from pes. II, and in a less degree from pes. III—IV. The Ri extends beyond the base of Re III to the insertion of Se 2. The Re I—II have each one Se and the Re III has 2; the number of Si is 4 in Re III and 1 in Re II, but the Si is wanting in Re I.

Secretory pores are in pes II found on the the anterior surface at the base of Se Re II and the Se I—III of Re III, and, surrounded by a number of fine hairs, somewhat removed from tip, on the anterior surface of Ri III; in addition to these the pes III—V have a pore at the base of Se Re I, and so has pes V, in which, however, only 2 pores are observed in Re III.

The number as well as the arrangement of the "maculae cribrosae", of which none was observed in the mouth-appendages, is less regular than in *Megacalanus.* On the anterior surface of Re I, at base of Se, the organ was observed in pes II—III, but not in pes IV. On the posterior surface the maculae were sometimes found near the base of Se Re I pes II, and regularly in pes II as well as pes III near the base of Se Re II and Se I—II Re III; in pes IV only a single group was observed in Re II.

On the anterior surface of pes II—III, medially to insertion of the Re, a group of delicate filaments, projecting through minute pores (?) and perhaps corresponding to a macula cribrosa, was found.

The lateral outline shows, somewhat in front of the labrum, a low rather elongated elevation. In the middle, as well as on each side, well removed from the hinder margin, a group of fairly long and slender, delicate hairs are observed. The posterior margin has a median incision, and well removed from the middle on each side a transverse marginal row consisting of about 15 short lancet-shaped spines (fig. 2 a). On the oral surface the usual longitudinal series is dissolved into 5 more or less transversely placed groups, as shown in fig. 2 a pl. I; the bristles of the more posterior groups are more slender and longer than those of the anterior ones; between the group (Nr. 4) on each side and behind the fourth central spot a transverse row of granules is found.

The lamina labialis has 1 median and on each side 2 lateral teeth; in front of this we have an exterior and mostly anteriorly slightly convex series of rather long bristles and an interior short one of shorter bristles (pl. I fig. 2b). The serrula 6-dentata has the 4 posterior spines club-haped; between these and the labial lobes scarcely any setae were observed. The area labialis has behind the labial lobe a median somewhat convex group, and a lateral oblique group of numerous hairs on each side; the labial lobes bear about 8 groups of shorter and longer hairs, which seem to be arranged in 3 series.

Y (St. V). Size: $8{\cdot}4 + 2{\cdot}2 = 10{\cdot}6$ mm. The shape of body is scarcely different from that of the f♀ except for the urosome, which has four somites, hardly produced beneath, of which the second is almost twice as long as the first, which is the shortest. The antennulae extend only 4 segments beyond the end of the furca; the measurements differ in minor points only; the maxillulae have in one specimen only a single seta in the basp. III in another 2 as in f♀. The Re has only 10 setae. In other respects no difference was observed.

Y (St. III). Size $6{\cdot}1$—$6{\cdot}3$ mm. ($1{\cdot}10 + 0{\cdot}53$).

Of this stage I have examined 2 specimens; in spite of the different shape of the head and the short antennulae I do not doubt that the animals are rightly referred to this species, as they agree with it in several important features e. g. the curious structure of the maxillulae.

The body in much more slender, and the head shows no trace of a frontal keel; the first as well as the fifth thoracic tergite is well marked. The urosome consists of 2 somites, of which the second is almost twice as long as the rostrum as well as the furcal branch. The antennulae, which just reach beyond the end of the abdomen with the tip of the last segment, consist of 23 segments; the

25 is 2·1 as long as the 24 and 1·1 as long as the 23. The Le as well as the Re of the maxillulae have only 11 setae. The distal setae of the maxillae show indication of the curious structure found in the full-grown. The pes I—III have the Ri II∾III and the Re II∾III fused; the Re II∾III pes II has 3 Se and 5 Si; the Re II∾III pes III has only 2 Se; and its Ri has 8 setae. The pes IV has Ri I∾III fused with 7 setae and the Re I∾III has 3 Se and 3 Si. The fifth pair of legs is, as shown in *Cal. finmarchicus,* quite rudimentary. In contrast to the full-grown female a distinct pore was found at the base of Se basp. III of the pes II—III; in addition to this a pore was found at the base of Se Re I and Se 3 Re III.

Occurrence. This species has not been captured by the Ingolf Expedition, but the Thor Expedition has taken it from the following stations 1904 and 1905.

Thor 19/6 1904 St. 152 65°00 Lat. N. 28°01 Long. W. Yt. 1000 M. Wire 2 f♀.
10/7 1905 St. 180 61°34 Lat. N. 19°05 Long. W. Yt. 1800 M. Wire 3 f♀.
11/7 1904 St. 183 61°30 Lat. N. 17°08 Long. W. Yt. 1800 M. Wire 4 f♀; 2 y (V); 2 (III).
25/5 1904 St. 104 62°47 Lat. N. 15°03 Long. W. Yt. 1500 M. Wire 1 f♀.
22/5 1904 St. 99 61°15 Lat. N. 9°35 Long. W. Yt. 1700 M. Wire 1 f♀.
7/6 1905 St. 71 57°47 Lat. N. 11°33 Long. W. Yt. 1500 M. Wire 2 f♀.
8/6 1905 St. 72 57°52 Lat. N. 9°53 Long. W. Yt. 1500 M. Wire 2 f♀.
11/9 1905 St. 167 57°46 Lat. N. 9°55 Long. W. Yt. 1500 M. Wire 3 f♀.

Distribution. This species has previously only been recorded from the great depths in the Atlantic Ocean viz. from the west coast of Ireland as far north as 55° Lat. North, from the North Atlantic (c. 40° Lat. N. 70° Long. W.) and the Mid Atlantic (c. 10° Lat. N. and 20° Long. W.). As it has not been taken by the Siboga Exp., it is rather doubtful if it is found in the Indian Ocean.

Remarks. It seems to me scarcely doubtful, that the described species is identical with Brady's *Calanus princeps*; this author writes: The abdomen is short, stout and three-jointed. The latter character is certainly due to a mistake. His fig. 5 of the maxillula shows, probably wrongly, only 6 setae in Le I and 10 in Re. As I have examined specimens, identified by Sars, it is scarcely doubtful that the species is identical with Sars and Farran's *Megacalanus princeps* Brady. Farran has suggested, that Wolfenden's *Heterocalanus medius* is identical with *Cal. princeps* Brady, and I think he is right. My specimens differ from Wolfenden's fairly exhaustive description (1906 p. 27) in the following features: 1) Le I maxillulae has 9 instead of 7 bristles and the 2 setae of basp. II are not "very short and delicate". 2) the Se Re III pes I is placed nearer the base than the tip.

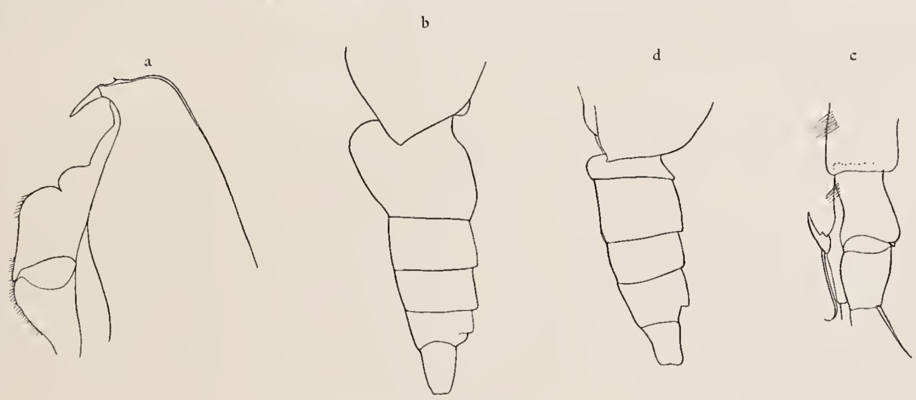
Megacalanus Wolfenden.

1904. Megacalanus, Wolfenden.
1905. Macrocalanus pars, G. O. Sars.
1905. Megacalanus pars, Wolfenden.
1906. Megacalanus pars, Pearson, p. 6.
1908. Megacalanus pars, Farran, p. 21.
1909. Megacalanus, Scott, pp. 10—12.
1911. Megacalanus, Wolfenden, pp. 195—196.

The type of this genus, which is probably more related to *Calanus* than *Macrocalanus* and *Bathycalanus,* is *M. princeps*; it is well characterized by its size and the curious hook on the anterior surface of the third basipodite of the first pair of legs. Scott has proposed to refer *Calanus gracilis* Dana and *Calanus robustior* Giesbrecht to the same genus, in spite of smaller size, on account of a similar hook. Possibly he is right; but as I have not had the opportunity of examining any specimens of the two said species, I do not feel competent to judge in the case.

3. **Megacalanus princeps** Wolfenden.
(Pl. I figs. 3 a—i; textfigs. 8 a—d).

1904. Megacalanus princeps n. sp. Wolfenden, pp. 112—113.
1905. Macrocalanus longicornis n. sp. G. O. Sars, p. 7.
1905. Megacalanus bradyi n. nom. Wolfenden, pp. 1—3, pl. I, figs. 1—6.
1905. Nec. Megacalanus princeps Brady. Wolfenden, pp. 3—4, pl. I, figs. 7—9.
1906. Megacalanus longicornis G. O. Sars. Pearson, p. 6.
1908. Megacalanus longicornis G. O. Sars. Farran, p. 21.
1909. Megacalanus princeps Wolfenden. Scott, pp. 13—14, pl. I, figs. 12—18.
1911. Megacalanus princeps Wolfenden. Wolfenden, pp. 196—198, taf. XXII, figs. 1—11.



Text-figure 8.
Megacalanus princeps Wolfenden.
a. Head of adult female × 16. b. Abdomen of adult female × 16. c. Pes I in situ × 67.
d. Abdomen of young female (stage V) × 16.

Description f♀. Size: 10·5 mm. (anterior division 8·5; urosome 2). The head is slightly produced between the base of the antennulae and is without any crest. The rostral filaments are short and placed on a low elevation just above the rostrum, composed of a short basal part and two slightly convergent rather obtuse, fairly long spines, directed backwards and downwards. The five thoracic somites are well distinguished; the fifth is laterally triangularly produced. Projecting from the hinder margin of the head a small process, similar to that of *Macrocalanus,* though less prominent, is observed.

The abdomen is only one fourth of the anterior division in length. The genital somite is as long as deep and wide, and in front ventrally produced.

The *antennulae*, which are at least 8 segments longer than the body, have all 25 segments well separated, except the VIII and IX, with the articular membranes wanting posteriorly. The segments increase in length from the 8 to the 17; beyond the 19 they are much shorter; the 23 is 1·4 as long as the 25, which is only 1·1 as long as the penultimate one. The 13 and 14 have in the distal part, ventrally and exteriorly, a row of delicate teeth (according to Wolfenden they are found in segment 12 and 13). The bristles of the antennulae are rather delicate; the posterior setae of segment 23—24 are rather weak, and scarcely 1·5 as long as two distal segments (in Scott's figure they are distinctly twice as long). The arrangement and number of setae are alike that of *Macrocalanus*, and agree with *Calanus* by the presence of a single seta instead of two in segment 21.

Antennae are in the main alike those of *Calanus* (cf. Wolfenden), but the Re II is by an incomplete articular line divided into a proximal division, bearing two setae, and a shorter terminal one with a single bristle.

Mandibulae (figs. 3 a and c) cf. Wolfenden (taf. XXII fig. 5) have a well developed manducatory portion with five distinct teeth and a few more or less fused.

Maxillulae are alike *Calanus finmarchicus* in most features, but differ by comparatively long Re, and by the presence of 3 setae instead of 4 in Ri I (as seen in Wolfenden's fig. 2).

The Maxillae (fig. 3 d) and Maxillipeds are as described by Wolfenden (taf. XXII figs. 4 and 6) in the main features alike those of *Calanus*, but the former organ has the fifth lobe comparatively long with a thin hook, and the latter has the hairs, which cover the anterior surface of the Basp. III proximally and medially bifurcate or divided into three branches, and the Se of Ri 4—5 are comparatively short and unarmed.

The five pair of natatory legs have three segments in exopodites and endopodites; in basipod III pes I a characteristic structure is found in the upwards directed hook, which dorsally in the concavity has a rather irregular process, and ventrally bears the slightly plumous Si; this hook is indicated in most species of *Calanus* and in *Macrocalanus* as a small process on which the Si is placed (cf. Giesbrecht p. 110). Pes II has the inner margin of second basipodite almost straight (cf. fig. 3 e). Thes pes III—IV is in main features alike pes II, but Ri II with distinct Se. The pes V (fig. 3 h) is in general structure like the preceding pairs, but is distinctly shorter; the inner margin of basp. has no hairs and no Si.

Glandular pores, surrounded by prominent rings are observed in the pes II—IV, as shown in fig. 3 e at the base of Se basp. III and Re I—III, and are observed surrounded by fine hairs distally on the anterior surface of Ri III; the last mentioned pore and the pore corresponding to the wanting Se 1 Re III are absent in pes V.

Maculae cribrosae: In the legs and in a less degree in the other appendages small spots, consisting of a more or less circular ring of minute pores, continued into a delicate threadlike glandular duct? (fig. 3 f—g), are observed.

As the arrangement of these, "maculae cribrosae" seems to be fairly regular, and as I have only observed them in *Megacalanus* and *Macrocalanus*, I think they are of some systematic importance and hope that the following account of their number is fairly exhaustive; they are often rather difficult to observe. The antennulae possess on the upper surface of the second segment a group of 9 pores; on the anterior surface of the Ri I of the antennae, at the base of the distal third, a group of about 15 pores is observed. The manducatory part of the mandibulae bears at the base of the serrations at least a single group, and the basp. III at least 2 rings of 7 pores anteriorly. The maxillulae bear on the anterior surface a group of 14 pores at the base of Le I and basally near the lateral margin of Re. In the maxillae a single group of 12 pores is observed on the anterior surface of the first basipodite and near the outer margin.

On the posterior surface of the first pair of legs no pores are found; anteriorly a group of 10 pores is observed in basip. III medially to the articular cavity of Re I, and another one is seen in the middle of Ri II. In the second pair of legs, on the anterior surface, pores are found near the lateral margin of basip. II (on the left side a single group of 10 pores and on the right side two groups of 6 pores), in the basip. III medially to the insertion of Re I and in Re I near base of the process bearing Se; on the posterior surface of basip. II, and at base of Se Re II and Se 1—2 Re III, a rather indistinct group of pores is found. In the third and fourth pair of legs, groups of pores are also found posteriorly at base of Se basp. II and Re I; in the fifth pair of legs only a single group was found in Re III posteriorly (at base of Se I).

As the number and arrangement of the maculae cribrosae in the mature male are scarcely different from those in the female, and as only the groups in the maxillulae, but not those in the natatory legs, were observed in the Copepodites (stage IV—V) it seems to be possible, that the main-purpose of the maculae cribrosae is connected with the sexual life (e. g. light organs).

In front of the labrum and well distinguished from it, a fairly prominent elevation is found. The *labrum* itself is rather elongated (Pl. I, figs. 3a—b and text-fig. 8a). Anteriorly a transverse row of delicate hairs is found, and posteriorly on each side of the median incision a transverse marginal row of about 25 rather short lancet-shaped spines in addition to two somewhat convex rows, and a small group of delicate hairs. The oral surface of the labrum has in front two well separated oblique groups. The three following groups are placed more longitudinally as seen in fig. 3b. Only corresponding to the fourth central spot a few hairs are seen in a transverse row. The *lamina labialis* is, as seen in fig. 3c, fairly distinct without serrations; in front of this an outer convex series consisting of fairly long hairs, in continuation of the serrula 6-dentata, and three inner series of very delicate hairs are observed. Behind the lamina labialis, between and upon the labial lobes and behind these a number of series and rows of delicate hairs are found; about their arrangement I refer to fig. 3a.

f♂. Size: 10·6 mm. (anterior division 8·5; urosome 2·1). The body is more slender and the process of the posterior margin of the head is better developed. The abdomen consists of 5 somites, of which the second is 2·5 as long as the first and 1·2 as long as the third.

The *antennulae* (Pl. I fig. 3i) have the articular membranes between the 7—9 segments less well developed than between the preceding and following ones. The number of the bristles shows a similar difference from that of the female as in *Calanus*. The "Æstetasken" are powerfully developed and the Sd of segment 9 is represented by a clavate structure (fig. 3i). The other appendages do not show any difference from those of the females except the fifth pair of legs. In these the basp. and Ri are scarcely different, but the Re have no Si except the Re II of the pes V sin, which has the Si (?) represented by a stumpy articulated process, prolonged into a somewhat twisted feathery spine, at the base of which long and stiff hairs are seen; marginally a dense seam of hairs, as figured by Wolfenden (fig. 9), is seen.

Y. (V). Size: 8·2 mm. (anterior division 6·5, urosome 1·7). The shape of body is in main as in f♀, but the lateral corner is more pointed and the urosome consists as seen in fig. 8d of four somites, of which the first one is prominent ventrally. The mouth appendages seem in the main features alike those of mature females; the Re of the maxillulae possess as usually 10 for 11 setae. The second pair of legs differs by comparatively short Ri, which does not extend to the end of Re II, and by the wanting glandular pore at the base of Se I Re III; the same pore is wanting in the fourth pair of legs and the corresponding Se is distinctly smaller than the following. The fifth pair of legs has the Ri II—III fused with the usual number of setae, as well as the Re II—III, bearing 3 Se (pore at base of Se I missing) and 5 Si.

Y. (IV). Size: 6·8 mm. (anterior portion 5·5; posterior 1·3). The body differs distinctly by a three-segmented abdomen; the first somite, which is slightly produced beneath, is the shortest, and 1·6 shorter than the third one. The *antennulae,* especially the distal segments, are comparatively longer; the number of setae differ in several details. The *maxillulae* differ by a smaller number of bristles in Ri (Ri I has f. inst. only 2 setae) and by 9 setae of Re. The first pair of legs have the Ri II—III fused with 8 setae, and the Re II—III with 3 rather slender Se, but only 4 Si. The second pair of legs has the Ri II—III fused with 9 setae, and the Re II—III fused with 3 Se and 5 Si; glandular pores as in preceding stage. The fourth pair of legs has 7 setae in Ri II ∾ III, and 5 Si and 3 Se, of which first one without glandular pore, in Re II ∾ III. The fifth pair of legs has the Ri I ∾ III with 6 setae and the Re I ∾ III with 3 Si, 3 Se and a St.; only a single pore at base of Se III is found.

Occurrence. This species has not been captured by the Ingolf Expedition, but has been taken at the following stations in deep hauls by the Thor 1904—1905 south and west of Iceland.

Thor 19/6 1904	St. 152	65°00 Lat. N.	28°00 Long. W.				1 y (IV).
13/7 1903	St. 164	62°10 Lat. N.	19°36 Long. W.				1 f♀.
10/7 1904	St. 180	61°34 Lat. N.	19°05 Long. W.	Yt.	1800	M. W.	2 f♀; 3 f♂; 1 y (V).
11/7 1904	St. 183	61°30 Lat. N.	17°08 Long. W.	Yt.	1800	M. W.	4 f♀; 4 f♂; 5 y (V); 1 y (IV).
24/5 1904	St. 104	62°47 Lat. N.	15°03 Long. W.	Yt.	1500	M. W.	1 y♀ (V).
12/5 1904	St. 78	61°08 Lat. N.	9°28 Long. W.				1 f♀.
29/8 1905	St. 167	60°00 Lat. N.	10°35 Long. W.	Yt.	1000	M. W.	1 f♀.
31/8 1905	St. 167	57°46 Lat. N.	9°55 Long. W.	Yt.	1500	M. W.	1 f♀; 1 y (V); 1 y (IV).
8/6 1905	St. 72	57°52 Lat. N.	9°53 Long. W.	Yt.	1500	M. W.	1 f♀; 1 y (IV).
23/7 1905	St. 124	61°04 Lat. N.	4°33 Long. W.	Yt.	1000	M. W.	1 f♀.

Distribution. This species seems to be fairly common in the Færoe-Shetland Channel, and on the west coast of Ireland between 600 and 1000 fathoms. It has been taken in the Atlantic by the Gauss Expedition as well as at a single station in the south polar region (c. 65° Lat. S. c. 85° Long. E). By the Siboga Expedition it has been taken at three stations at about 4° Lat. S. 129 Long. E.

Eucalanidae.

5. **Rhincalanus nasutus** Giesbr.

(Pl. I figs. 4a—e).

1877. Rhincalanus gigas Brady. Möbius.
1888. — nasutus n. sp. Giesbrecht, p. 334.
1888. — gigas Brady. J. C. Thompson, p. 148.
1892. — nasutus Giesbr. Giesbrecht, pp. 152—158, taf. 3, 12 and 35.
1898. Rhincalanus nasutus Giesbr. Giesbrecht & Schmeil pp. 22—23.
1901. — gigas Brady Th. Scott, p. 237; pl. XXVII figs. 1—4.

1902. Rhincalanus gigas Brady. Th. Scott, p. 450.
1902. — nasutus Giesbr. G. O. Sars, pp. 15—16 pls. VI—VII.
1903. — — — J. C. Thompson, p. 16.
1903. — — — Thompson & Scott, p. 242.
1903. — — — Norman p. 135.
1903. — — — Cleve, p. 368.
1904. — — — Wolfenden, p. 128.
1904. — — — Cleve, p. 196.
1905. — — — Farran, p. 30.
1905. Rhincalanus nasutus Giesbr. G. O. Sars, p. 2.
1905. — — — Th. Scott, p. 222.
1905. — — — Esterly, p. 137, fig. 1c.
1905. — — — Wolfenden, p. 996.
1906. — — — Pearson, p. 8.
1908. — — — Farran, p. 22.
1908. — — — v. Bremen, p. 18 fig. 14.
1909. — gigas Brady. Scott, pp. 24—25.
1910. — nasutus Giesbr. Farran pp. 18—19.

Description f♀. The females examined varied in size from 4·5 to 5 mm. When this characteristic species is examined in lateral view, a marked difference is observed between the different specimens in the outline of the head; in some animals a distinct pointed eminence is seen just in front of the insertion of the antennulae, in others the outline in more even as figured by Sars; the size of this eminence is probably dependent upon the preservation of the animal and the position of the antennulae in the moment of death. The structure of the limbs is scarcely different from Giesbrecht's description. In the exterior margin in the middle between Se I and II of the Re II∾III in the first pair of legs a small incision with a circular pore(?), through which a minute conical eminence projects, is seen (glandular pore?). In the three last pair of legs I have not been able to find secretory pores with certainty.

As seen in Sars' figure the *labrum,* which is widely removed from the insertion of the antennulae, is saddle-shaped and by a median line divided into an anterior and a posterior division (fig. 4a). On the oral surface of the labrum, on each side almost attaining the middle, a row of fairly long stiff hairs are found in addition to six short stout setae, more alike granules, in the middle partly fused with transverse groups, and two posterior groups of partly sickleshaped spines, between which large group of stout teeth are found (cf. Pl. I fig. 4e). The lamina labialis consists of a median and two lateral divisions (fig. 4c). In front of this we have laterally an inwards convex series of fairly long bristles; the inner longitudinal row is posteriorly represented by row of rather short spines or granules and anteriorly with irregular group of similar spines. Behind the lamina labialis and between the serrula 6-dentata the setae are arranged as figured. The lobus labialis possesses 4 longitudinal series or groups of hairs, which posteriorly and inwards are fused into a big irregular group of hairs, extending between the two lobi.

f♂. Size: 3·8 to 4·5 mm. The head is less produced in front of the rostral filaments. The abdomen, which is one fourth of the length of the anterior division consists of five somites; the first one is dorsally and posteriorly produced into a distinct spine, corresponding to that found in the genital somite of the female. The two first segments of the antennulae are well separated. The antennae (cf. Pl. I fig. 4f) are more clumsy than those of the female, and so are the mandibulae, which have a well developed manducatory lobe. The maxillulae, maxillae and maxillipeds, especially the latter, which have the second basal segment scarcely twice instead of three times as long as wide, are more clumsy than in the females, but scarcely less adapted for manducatory purposes. The mouth and its surroundings are scarcely different from those of the female; the single specimen which I examined had the spinulation of the labrum less coarse than in the female. The natatory legs are scarcely different from those of the female. The internal sexual organs are found on the left side.

Of this species Giesbrecht has only examined a single mutilated male from the Pacific Ocean. The figure, which is represented on his pl. 9 fig. 14 is not quite like the structure found in several males which I have examined, the main-differences being that the endopodite of the right leg in none of my specimens is terminated with a short clumsy hair; it is rather doubtful if this difference has any specific value, as the legs of the animals examined show marked variations in other respects. The left leg consists of 2 basal segments and a fairly elongate exopodite (fig. 4g) produced into a more or less curved terminal spine and a minute Se; only in a single one of my specimens, which had no Se, the St was so strongly curved as figured by Giesbrecht (fig. 4h). In the four specimens examined the exopodite of the right leg had a long St and a short slender Se; but the endopodite varied in a curious way. In a specimen (fig. 4g) with the Ri about 5 times as long as wide, the articular line between the last two segments was almost obsolete, and the posterior surface was more hairy than in the specimen with the segment about 3·6 as long as wide (fig. 4h). In a single specimen (fig. 4j) the Ri was represented by short segment, but this is probably due to a mutilation.

Y. ♀—♂ (St. V). Size: 3·5—4·1 mm. The "head" is about twice as long as the thorax, and the anterior division is 5·5 as long as the abdomen, which consists of four somites; the last one is partly fused with the furca; the first (genital) somite is produced beneath in the female, not in the male. The appendages are in most respects alike those of the mature females; the only difference of any interest is, that the exopodite of the maxillulae possesses 8 instead of 9 bristles. While the fifth pair of legs in the female is like that of the mature, this organ is in the male less developed than in the full-grown animal. The left leg (fig. 4k) is most similar to that of the female, but less slender; the Ri is represented by a conical protuberance, and a minute Se is found in Re. The right leg possesses an exopodite very similar to that of the left leg, and a fairly long and slender endopodite with a slender terminal bristle. Brady gives (Pl. VIII, fig. 10) in his description of *Rh. gigas*, without having understood its real nature, a figure of the fifth pair of legs in the young male; the Ri dext. has two bristles in stead of a single one, and the Se of Re is missing; in the former feature a valuable character between the y♂ of the two species is probably found; the latter character is probably due to a mistake (or an abnormity) as an exterior seta is present even in the mature female of Brady's species (Pl. VIII fig. 9) as well as in *Rh. grandis* Giesbr. in contrast to the female of *Rh. nasutus*.

Y. ♀—♂ (St. IV). Size: 3·9 mm. This stage is characterized by the three somites of the urosome. The pes V is better developed in the male; the right and the left legs are as shown in fig. 4l nearly symmetric. The Ri sin. is longer than in the preceding stage, but shorter than the Ri dext, which is however shorter than the Re dext.

Variation. A mature female (Thor St. 72; fig. 4b) had the lateral thoracic spine on right side of fourth thoracic somite distinctly bifurcate (in the same specimen a nematode was dwelling as parasite); a corresponding variation was found in a specimen from Thor St. 183, but in addition the right dorsal spine of the first abdominal somite was bifurcate. In a mature female from Thor St. 82 the latter abnormity was found on both sides and in a young female on the left side only. In a single specimen (Thor St. 88) the Re of the right fifth foot has a lateral pointed projection (fig. 4d); about the variations in the fifth pair of legs in the males I refer to the description of the male.

Parasitism. In several specimens the body cavity was partly filled with a nematod, which was very distinct through the skin on account of its white colour; this parasite was observed in a young female from Thor St. 153, in 5 f♀ from St. 183 and in one from St. 82, and mag. sci. Hj. Ditlevsen has kindly informed me that it is a larval stage, the exact determination of which is impossible on account of bad conservation.

Occurrence. The Ingolf Expedition has collected this species at the following stations south of Iceland.

$^{17}/_{6}$ 95	St. 18	61°44 L. N.	30°29 L. W.	V^{1}. 200—0 fm.	Temp. at the surface 10° C.	3 ♀.
$^{18}/_{5}$ 96	St. 54	63°08 L. N.	15°40 L. W.	V^{1}. 100—0 fm.	Temp. at the surface 9° C.	6 ♀.
$^{13}/_{5}$ 96	St. 49	62°07 L. N.	15°07 L. W.	V^{1}. 100—0 fm.	Temp. at the surface 9·3° C.	4 ♀.
$^{12}/_{5}$ 96	St. 47	61°32 L. N.	13°40 L. W.	V. 100—0 fm.	Temp. at the surface 10° C.	1 y♀ (V).
$^{15}/_{5}$ 96	St. 52	63°57 L. N.	13°32 L. W.	V^{1}. 200—0 fm.	Temp. at the surface 8·3° C.	2 f♀.
$^{20}/_{5}$ 96	St. 57	63°37 L. N.	13°02 L. W.	V. 100—0 fm.	Temp. at the surface 8·2° C.	9 f♀ 1 f♂.
$^{11}/_{5}$ 96	St. 45	61°32 L. N.	9°43 L. W.	V. 100—0 fm.	Temp. at the surface 9·5° C.	1 f♀.

The Thor Expedition has taken this species at about 12 stations in the Atlantic south and south-east of Iceland. Only at the following 6 stations more than single specimens (generally adult females) were found.

Thor $^{9}/_{7}$ 1904	St. 178	63°08 L. N.	21°30 L. W.	Yt.	750 M. Wire	16 f♀.
$^{11}/_{7}$ 1904	St. 183	61°30 L. N.	17°08 L. W.	Yt.	1800 M. Wire	150 f♀; 1 f♂; 2 y♀ (V) 2 y♂ (V).
$^{24}/_{5}$ 1904	St. 104	62°47 L. N.	15°03 L. W.	Yt.	1500 M. Wire	25 f♀; 8 y♀ (V); 1 y♂ (V).
$^{23}/_{5}$ 1904	St. 102	61°41 L. N.	13°31 L. W.	Yt.	15 M. Wire	20 f♀; 2 y♀ (IV).
$^{22}/_{5}$ 1904	St. 100	61°21 L. N.	10°39 L. W.	Yt.	15 M. Wire	20 f♀; 8 y (V).
$^{11}/_{7}$ 1904	St. 124	61°04 L. N.	4°33 L. W.	Yt.	1000 M. Wire	50 f♀; 10 y♀ (V) 3 y♂ (V).

In Denmark Strait the Ingolf did not take any specimens, but the Thor brought it home from the following stations.

Thor $^{20}/_{6}$ 1904	St. 153	65°20 L. N.	27°12·5 L. W.	Yt.	1000 M. Wire	36 f♀; 5 y♀ (V).
$^{21}/_{6}$ 1904	St. 154	65°27 L. N.	27°10 L. W.	Yt.	800 M. Wire	6 f♀.
					75 M. Wire	5 f♀; 1 y♀ (V); 1 y♂ (V).
					50 M. Wire	1 f♀; 1 y♀.
$^{18}/_{6}$ 1904	St. 150	65°50 L. N.	26°53 L. W.	Yt.	400 M. Wire	2 f♀.

The Thor has outside the Ingolf area south-west of the Færoes caught the species at the following stations.

Thor $^{15}/_{6}$ 1905	St. 82	51°00 L. N.	11°43 L. W.	Yt.	1200 M. Wire	8 f♀; 1 y♀ (V).
				Yt.	800 M. Wire	35 f♀; 6 f♂; 70 y♂; 25 y♂ (V).
$^{1}/_{9}$ 1905	St. 167	57°36 L. N.	9°55 L. W.	Yt.	1500 M. Wire	20 f♀.
					300 M. Wire	2 f♀.
					200 M. Wire	1 f♂.

$^{8}/_{6}$ 1905 St. 72 57°52 L. N. 9°53 L. W. Yt. 1500 M. Wire 50 f♀; 5 f♂; 20 y♀ (V); 20 y♂ (V); 1 y♂ (IV).
$^{20}/_{6}$ 1905 St. 88 48°09 L. N. 8°30 L. W. Yt. 300 M. Wire 75 f♀; 60 f♂; 15 y♀ (V); 5 y♂ (V).
$^{21}/_{6}$ 1905 St. 90 47°47 L. N. 8°00 L. W. Yt. 300 M. Wire 10 f♀; 10 f♂; 1 y♀ (V); 2 y♂ (V).
$^{17}/_{7}$ 1904 St. 119 59°54 L. N. 4°00 L. W. Yt. 500 M. Wire 1 y♀ (V).

From the material available it has been impossible to form any conclusive opinion about the season at which *Rhincalanus nasutus* attains its full development. By counting the specimens, collected by the Thor Expedition with the young fish trawl from May, June and July 1904 and 1905, I have attained the following figures. Even if we admit that the animals have been taken in two succeeding years in a limited and occasional quantity, I think that the following figures give some impression of the relation between the males and females etc. About 100 f♀, 20 y♀ and a few young males were taken in the month of May 1904 between 62°47 L. N. 15°05 L. W. and 61°15 L. N. 9°35 L. W. In June 1905 about 150 f♀, about 80 f♂, about 105 y♀ and 50 y♂ were taken between 57°52 L. N. and 47°47 L. N., 9°53 L. W. and 8°06 L. W. In July 1904 (61°30 L. N. 17°08 L. W.) a single sample containing 150 f♀, 1 f♂, 2 y♀ and 2 y♂ was taken. $^{1}/_{9}$ 1904 (62°49 L. N. 18°46 L. W. Yt. 500 M. W.) 5 females were captured. As the greatest number of males (60) against 75 females, of which three carried spermatophores attached to the genital somite, were taken $^{20}/_{6}$ 1905 St. 88 48°09 L. N. 8°30 L. W. Yt. 300—0, propagation probably took place in this locality.

Distribution. This species has been recorded from the Pacific between the Straits of Magellan and the Gulf of California, from the western part of the Mediterranean and from the Indian Ocean (one specimen only). Our knowledge about its distribution in the greater part of the Atlantic is very scarce: "As far as concerns its distribution in the N. E. Atlantic, it may be regarded as an inhabitant of the Atlantic current; its distribution to the north and east depending on the varying strength of that stream" (Farran p. 65). I think, that its occurrence on the west coast of Ireland, the Faeroe channel, the Faeroe-Iceland channel, the North Sea south and south-east of Shetland, the Norwegian Sea east of the Faeroes and east of Iceland (Sars), as well as at my own localities the south and west of Iceland is easily explained in this way.

The vertical range of the species seems to be uniform from the surface down to more than 1800 meters (Farran p. 66).

Esterly (1912 pp. 317—318) has on a somewhat scanty material drawn the conclusion that there is indication "of a movement of the greater proportion of the individuals from the neighbourhood of 200 fathoms upwards to above 100 fathoms at night".

6. Eucalanus elongatus Dana.

(Pl. I figs. 5 a—d; text-figs. 9 a—f).

1852. Calanus elongatus n. sp., Dana.
1877. Eucalanus elongatus Dana. Streets, p. 139.
1892. — — — Giesbrecht, pp. 131, 149.
1894. — spinifer n. sp. Scott, p. 29, pl. I, figs. 15—23.
1895. — elongatus Dana. Giesbrecht, p. 248.
1898. — — — Giesbrecht & Schmeil, p. 20.
1898. Eucalanus elongatus Dana. Aurivillius, p. 29.
1901. — — — Cleve, p. 6.
1903. — — — J. C. Thompson, p. 15.
1904. — — — Wolfenden, p. 127.
1904. — Atlanticus n. sp. Wolfenden, pp. 113—114, pl. IX, figs. 3—4.

1905. Eucalanus elongatus Dana. Esterly, p. 131—132, figs. 6 a—d.
1905. — — — Th. Scott, p. 222.
1905. — — — Farran, p. 30.
1906. — — — Pearson, pp. 6—7.
1906. — — — G. O. Sars, p. 2.
1908. Eucalanus elongatus Dana. v. Bremen, p. 15, fig. 10.
1908. — — — Farran, p. 21.
1908. — — — Wolfenden, p. 29.
1910. — — — Farran, pp. 93—94, pl. XIV.
1911. — — — Wolfenden, p. 204.

Description. f♀. Size: 6·5 mm. The females scarcely differ from Giesbrecht's description. No glandular pores were observed in the natatory limbs.

The *labrum* proper, which is suddenly raised from the region lying in front of it, is by a transverse groove divided into an anterior and a more raised posterior portion; the latter is divided into three hairy lobes, a median and two lateral ones (text-fig. 9 a). The oral surface (fig. 5 a) shows a structure similar to that found in *Rhincalanus,* but the two first groups of the longitudinal series consist of fairly long and slender bristles. In front of as well as behind the transverse bar the skin is beset with a dense group of strong granules. In front of the trebly divided *lamina labialis* (fig. 5 b) a median longitudinal row of long and a lateral one of very delicate setae are observed; in the middle a row of very short hairs is found on each side, single behind and double in front. Between the serrulae 6-dentatae a longitudinal lateral series, a median group and more posteriorly a transverse group of short setae are found; behind the serrula an oblique group was seen. The area labialis possesses a central group of hairs between the labial lobes, partly continued on the latter, which bear four fairly regular rows of hairs.

Text-fig. 9. *Eucalanus elongatus* Dana.
a. (to the left above) f♀. Labrum etc. × 18.
b. f♀. Abdomen × 18.
c. (to the right) f♂. Labrum etc. × 18.
d. f♂. Abdomen × 18.
e. Y♀ (St. V). Abdomen × 18.
f. (to the right beneath). Y♂ (St. V) × 18.

f♂. Size: 4·5—5 mm. The fifth thoracic somite is better marked out, and the lateral corner is less produced than in the female. The head is in front of the transverse groove more strongly convex (text-fig. 9 c) and the labrum is lower; its oral surface is smooth; the labial appendages are lower. The intestine is well developed with the usual convexity and coecal sacs.

The oral appendages are, as shown by Giesbrecht, greatly reduced. The legs of the fifth pair (fig. 5 c) are more slender than figured by Giesbrecht; the left leg was, except in two specimens, the longer. In a single male the terminal segments of the fifth pair possessed a small median hair in addition to the terminal one. The fifth pair of the young male has the left leg a little longer than the right; the Re is divided into two distinct segments, of which the latter bears two long bristles (fig. 5 f, cf. Wolfenden Pl. IX, fig. 3); in a single young? male the number of setae in the terminal segment was 3 instead of 2 (fig. 5 d) and in another young (?) male the structure was, as seen in fig. 5 e, more like that of the mature male.

J♀ (V). Size: 4·5 mm. The lateral corner of the last thoracic somite is like that of the f♂. The urosome consists of three somites, as the two basal ones (text-fig. 9 e) are fused in most specimens and slightly produced below. The anal somite is fused with the furcal rami, of which sometimes the left and sometimes the right is the longer. The structure of the legs and of the labrum is scarcely different from that of the female.

J♂ (V). The male of this stage is scarcely different from the female except for the four abdominal somites (text-fig. 9 f) and well developed fifth pair of legs, as previously described. Wolfenden (1904 p. 113) has, with some doubt established the young male of this species as a new one *Euc. atlanticus*, because "the larger furcal segment and longest tail seta are on the left side, instead of the right side", and on account of the not retrograded oral organs.

As, however, the former assumption is wrong, because not only males and females but also young specimens have the longest furcal branch now on the right and now on the left side, and as the latter is a general phenomenon in the young males, the species must vanish.

J♀ (IV). Size: 3·8 mm. In general structure this stage is like the preceding one, but the urosome consists of 3 somites, of which the two first are of almost equal length and distinctly shorter than the third one, which is fused with the furcal rami, on the left side being the longer in both specimens examined. The ovaries were well developed though less so than in the preceding stage.

Occurrence. The Ingolf has taken this species only at a single station in Denmark Strait.

27/6 1896 St. 95 65°14 Lat. N. 30°39 Long. W. V. 200—0 fm. Temp. at surface 7·8° C. 10 f♀.

By the Thor it has been taken at the following stations.

Thor 19/6 1904.	St. 152.	65°00 Lat. N.	28°10 Long. W.	Yt.	1000 M. Wire	35 f♀; 1 y♂ (V).
				Yt.	?	90 f♀.
20/6 1904.	St. 153.	65°20 Lat. N.	27°12·5 Long. W.	Yt.	800 M. Wire	1 f♀.
21/6 1904.	St. 154.	65°27 Lat. N.	27°10 Long. W.	Yt.	800 M. Wire	30 f♀.
				Yt.	75 M. Wire	10 f♀.
18/6 1904.	St. 150.	65°50 Lat. N.	26°53 Long. W.	Yt.	400 M. Wire	3 f♀.

The Ingolf, in the Atlantic south of Iceland, has caught the species at 6 stations, and the Thor at 7 stations.

Ingolf 17/6 1895.	St. 18.	61°44 L. N.	30°29 L. W.	V¹ 200—0 fm.	Temp. at surface.	10° C.	15 f♀.
16/6 1895.	St. 17.	62°49 L. N.	26°55 L. W.	V¹ 200—0 fm.	— - —	9·1° C.	1 f♀.
3/6 1896.	St. 68.	62°06 L. N.	22°30 L. W.	V¹ 100—0 fm.	— - —	8·7° C.	1 f♀.
18/5 1896.	St. 54.	63°08 L. N.	15°40 L. W.	V. 100—0 fm.	— - —	9·0° C.	10 f♀.
13/5 1896.	St. 49.	62°07 L. N.	15°07 L. W.	V. 100—0 fm.	— - —	9·3° C.	40 f♀.
12/5 1896.	St. 47.	61°32 L. N.	13°40 L. W.	V. 100—0 fm.	— - —	10·6° C.	35 f♀.

Thor 9/7 1904.	St. 178.	63°08 L. N.	21°30 L. W.	Yt. 700 M. Wire	85 f♀.
14/7 1903.	St. 167.	63°05 L. N.	20°07 L. W.		1 f♀.
10/7 1904.	St. 180.	61°34 L. N.	19°05 L. W.	Yt. 1800 M. Wire	8 f♀.
1/9 1904.	St. 285.	62°49 L. N.	18°46 L. W.	Yt. 500 M. Wire	8 f♀.
11/7 1904.	St. 183.	61°30 L. N.	17°08 L. W.	Yt. 1800 M. Wire about	350 f♀.
2/9 1904.	St. 286.	61°49 L. N.	14°11 L. W.	Yt. 1800 M. Wire	10 f♀.
				Yt. 15 M. Wire	1 f♀.

In the Iceland-Færoe channel, the Ingolf has taken it at 3 stations and the Thor at 6 stations, one from the month of July with a single female, and 5 from May.

Ingolf	15/5 1896.	St. 52.	63°57 L. N.	13°32 L. W.	V.[1]	200—0 fm.	8·3° C.	2 f♀.
	20/5 1896.	St. 57.	63°37 L. N.	13°02 L. W.	V.[1]	100—0 fm.	8·2° C.	9 f♀.
	11/5 1896.	St. 45.	61°32 L. N.	9°43 L. W.	V.[1]	100—0 fm.	9·1° C.	15 f♀.
Thor	23/5 1904.	St. 102.	61°41 L. N.	13°31 L. W.	Yt.	15 M. Wire		100 f♀.
	22/5 1904.	St. 100.	61°21 L. N.	10°39 L. W.	Yt.	180 M. Wire		15 f♀.
					Yt.	15 M. Wire		20 f♀.
	22/5 1904.	St. 99.	61°15 L. N.	9°35 L. W.	Yt.	1000 M. Wire		75 f♀; 1 y♀.

In the Atlantic outside the Ingolf area a big number of specimens, males as well as females, were found.

Thor	15/6 1905.	St. 82.	51°00 L. N.	11°43 L. W.	Yt.	1200 M. Wire	500 f♀; 28 y♀ (V); 100 y♂ (V); 2 y♀ (IV).
					Yt.	800 M. Wire	50 f♀; 10 y♀ (V); 10 y♂ (V); 2 y♀ (IV).
	1/9 1905.	St. 167.	57°36 L. N.	9°55 L. W.	Yt.	1500 M. Wire	25 f♀; 1 y♂ (V).
	8/6 1905.	St. 72.	57°52 L. N.	9°53 L. W.	Yt.	1500 M. Wire	2 f♀; 12 f♂; 15 y♀ (V); 16 y♂ (V); 1 y♀ (IV).
	20/6 1905.	St. 88.	48°00 L. N.	8°30 L. W.	Yt.	300 M. Wire	35 f♀; 3 f♂; 1 y♀(V); 1 y♂ (V); 2 y♂ (IV).
	21/6 1905.	St. 90?	47°47 L. N.	8°00 L. W.	Yt.	300 M. Wire	45 f♀; 17 f♂; 9 y♀ (V); 5 y♂ (V).

It is rather curious that a large number of adult females, but only three young animals, from three stations, were taken in the numerous samples brought home by the Ingolf and Thor from 31/7—8/9 north of 61° Lat. North. At four southern stations (8/6—21/6 1905) the Thor gathered mature males and young animals in addition to numerous adult females.

Distribution. This species has been recorded from the Mediterrenean, the Indian Ocean, the Pacific between 61° Lat. N. and 33° Lat. S., and the North and South Atlantic (as far south as 47° Lat. S. 40° Long W.).

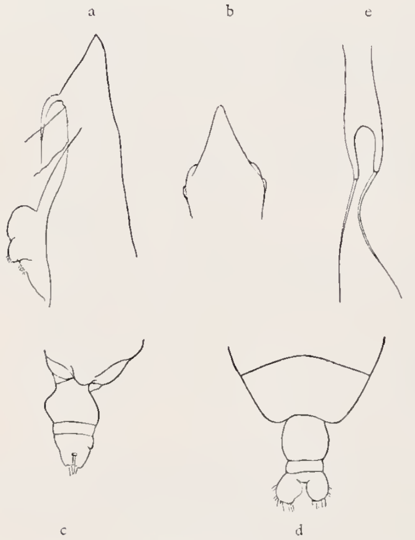
In the North Atlantic (cf. Farran Pl. XIV) it has been found on the south and west coast of Ireland, in the Færoe channel, north and east of Shetland and occasionally in the North Sea as far east as the coast of Norway. "In point of number it is generally scarce. Vertically it is recorded from the surface down to 4000 meters." Esterly (1912 pp. 295—300) has on an extensive material made it probable "that the species is more abundant and more frequent above 50 fathoms by night than by day."

7. **Eucalanus Attenuatus?** Dana.

(Pl. I figs. 6 a—c; text-figs. 10 a—e).

1849. Calanus attenuatus n. sp. Dana.
. Eucalanus attenuatus Dana. Dana.
1892. — — — Giesbrecht, pp. 131.
1894. — — — Th. Scott, pp. 28—29.
1895. — — — Giesbrecht, p. 248.
1898. — — — Giesbrecht & Schmeil, pp. 20—21.
1901. — — — Cleve, p. 6.
1903. — — — Norman, p. 135.
1903. — — — Cleve, p. 362.
1900. — — — Wheeler, p. 167.
1903. — — — J. C. Thompson & A. Scott, pp. 242.
1903. Eucalanus attenuatus Dana. J. C. Thompson, p. 15.
1905. — — — Wolfenden, p. 996.
1905. — — — G. O. Sars, p. 2.
1905. — — — Esterly, p. 133, figs. 7 a—c.
1906. — — — Pearson, p. 7.
1908. — — — Farran, p. 22.
1908. — — — v. Bremen, p. 16, fig. 12.
1909. — — — O. Pesta, p. 21.
1911. — — — O. Pesta, p. 20.
1910. — — — Steuer, p. 21.
1912. — — — Sewell, p. 357.

Description y♀. (Stage V). Length: anterior division 3·34 + 1·26 = 4·6; urosome 0·58; total length 5·18 mm. The head (text-figs. 10 a—b) is like that of *Rhincalanus nasutus* triangularly produced in lateral as well as in dorsal view. The *fifth thoracic* somite (text-fig. 10 c—d) is fairly well marked out, especially dorsally, and its lateral corners are slightly produced and rounded. The *rostral* filaments (text-fig. 10 e) are long and slender, and placed on a long bifurcate basal portion. The *urosome*, which is scarcely one sixth as long as the anterior portion, consists of three somites. The first (I ∾ II), which does not show any trace of receptacula seminis, is longer than the two following combined; the fourth somite is completely fused with the furca, which has the longer branch on the left side. The St. 2 sin. is distinctly longer and more powerful than the other setae.



Text-fig. 10.

Eucalanus attenuatus Dana. Y♀ (stage V).
a. Head in lateral view × 18.
b. Head in dorsal view × 18.
c.—d. Abdomen in lateral and dorsal view × 18.
e. Rostral filaments × 27.

The structure of the mouth appendages and natatory legs scarcely shows differences of any importance from Giesbrecht's description; the Ri 2 of the maxillipeds has only 3 instead of 4 Si. No glandular pores were observed in the four pair of legs.

The *labrum* is in lateral view like that of *Euc. elongatus* though less produced. The oral surface differs from that of the other species 1) by anterior group of minute spines laterally near free margin, and 2) by the different number and arrangement of three first groups of spines in longitudinal series, as seen by comparing figures 5 a and 6 a; the structure of the three posterior groups and of the transverse rows are scarcely different from that of *Euc. elongatus*. About the small differences existing in the structure of the labium etc. I refer to fig. 6 b.

Y♂ (Stage V). Length: 5 mm. The lateral corner of the fifth thoracic somite is less produced. The *urosome* consists of four somites, of which the first one is 1·2 as long as the second, which is again 1·3 as long as the third and fourth. In this species the fifth pair of legs (fig. 6 c) shows, as a whole, more similarity to that of the adult male of *E. attenuatus* than in *E. elongatus*. The right leg is the shorter, and the segments are more attenuated than in the mature male.

Remarks. Most probably the specimens examined ought to be referred to *Euc. attenuatus* Dana in spite of a more produced forehead than in original specimens, and of greater size (Giesbrecht f♀: 4·2—4·85 mm.). The Thor Expedition has taken the species at the following two stations

11/7 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 1 y♀; 1 y♂.
8/6 1905 St. 72 57°52 L. N. 9°53 L. W. Yt. 1500 M. Wire 1 y♂.

Eucalanus attenuatus has been recorded from the Pacific, the Mediterranean, the Indian Ocean and the Atlantic. In the North Atlantic on the west coast of Ireland it has been found as far north as 54°57 Lat. N. 10°51 L. W. at about 700 fathoms.

8. **Eucalanus crassus** Giesbrecht.

(Pl. I fig. 7; textfig. 11).

1888. Eucalanus crassus n. sp. Giesbrecht, p. 333.
1892. — — Giesbr. Giesbrecht, p. 132, pls 4. 11, 35.
1898. — — — Giesbrecht & Schmeil, p. 22.
1901. — — — Cleve, p. 6.
1902. — — — Wolfenden, p. 361.
1903. — — — J. C. Thompson and A. Scott, p. 242.
1903. — — — Cleve, p. 362.
1904. — — — Wolfenden, pp. 127—128.
1905. — — — Wolfenden, p. 996.
1905. Eucalanns crassus Giesbr. Th. Scott, p. 222.
1905. — — — G. O. Sars, p. 2.
1905. — — — Esterly, p. 134, fig. 8.
1905. — — — Farran, p. 30.
1906. — — — Pearson, p. 7.
1908. — — — v. Bremen, pp. 16—17; fig. 13.
1908. — — — Farran, p. 22.
1909. — — — A. Scott, p. 19—20.
1912. — — — Sewell, p. 357.

Description. f♀. Length: 3·7—4·0 mm. The basal fused portion of the rostral filaments is comparatively longer than figured by Giesbrecht (t. 35, fig. 26). The last thoracic somite, which is well marked out, is somewhat rounded (text-fig. 11). The *abdomen* consists of 3 somites only; the receptaculum seminis is large. The coecal sacs on each side are divided into smaller parts (fig. 7). In the structure of the appendages a feature of interest was observed in the structure of the external process of the basal segment of Ri, pes I, which is produced into a distinct point not seen in Giesbrechts fig. 29 taf. 11. No glandular pore was observed.

Text-fig. 11. *Eucalanus crassus* Giesbr. f♀. Abdomen in lateral view × 30.

The *labrum* is, in appearance, like that of *Eucal. elongatus*, but the distance to the insertion of the antennulae is comparatively shorter, and by a transverse groove divided into an anterior and a posterior better raised part. The oral surface of the labrum is most like that of *Euc. attenuatus*, but differs somewhat by sharp distinction between median and lateral groups of marginal bristles. The two first groups of the longitudinal series are partly fused and convex towards the middle. Around the first muscular spot a transverse group of granules is seen. The structures of the labium are in the main similar to those of the species mentioned.

Occurrence. The Ingolf Expedition has not taken this species, but it probably belongs to the area, as the Thor Expedition has taken it at

20/8 1905 48°05 Lat. North 8°29 Long. West Yt. 300 M. Wire 1 f♀.
31/8 1905 St. 167 57°46 Lat. North 9°55 Long. West Yt. 1500 M. Wire 3 f♀.

Distribution. This species has been recorded from the Mediterranean, the Indian Ocean, the Pacific and the Atlantic. It has been found several times in the Færoe channel and on the west coast of Ireland as far north as 56°11 L. N. 9°50 L. W.

Paracalanidae.

9. Paracalanus parvus Claus.

(Text-figures 12a—f).

1863. Calanus parvus n. sp. Claus, p. 173.
1864. Paracalanus parvus Claus. Boeck, p. 233.
1892. — — — Canu, p. 169, pl. I, figs. 1—12.
1892. — — — Giesbrecht, pp. 164—171, taf. 1, 6 and 9.
1894? — — — Th. Scott, pp. 26—27, pl. I figs. 9—14.
1898. — — — Aurivillius, pp. 29—30.
1898. — — — Giesbrecht & Schmeil, p. 24.
1899. — — — Th. Scott, p. 248.
1899. — — — Brady, p. 32.
1900. — — — Th. Scott, p. 383.
1900. — — — Wheeler, p. 168, figs 6a—c.
1901. — — — Th. Scott, p. 350.
1901. — — — Cleve, p. 8.
1901. — — — Brady, p. 32.
1902. — — — A. Scott, p. 402.
1902. — — — Wolfenden, p. 361.
1902. — — — G. O. Sars, pp. 17—18 pls VIII—IX.
1903. — — — Jensen, Johansen and Levinsen, p. 303, tabel I.
1903. Paracalanus parvus Claus. J.C.Thompson & A. Scott, p. 243.
1903. — — — Cleve, p. 367.
1904. — — — Cleve, p. 194.
1904. — — — Wolfenden, pp. 129—130.
1905. — — — var. borealis n. var. Wolfenden, pp. 997—998, pl. 96 figs 7—11 and 16.
1905. — parvus Claus. G. O. Sars, p. 2.
— — — Farran, p. 30.
— — — Esterly, pp. 140—41, figs 12a—e.
1906. — — — var. perplexus n. var. Norman & A. Scott, p. 127 pl. XII figs. 1—2.
1906. — parvus Claus. Pearson, p. 8.
1906. — — — T. Scott, p. 298.
1908. — — — v. Bremen, p. 20 fig. 17.
1908. — — — Farran, p. 22.
1909. — — — A. Scott, pp. 27—28.
1910. — — — Farran, pp. 61—63.
1910. — — — Kraeeft, p. 77, taf. 1 figs. 1—13.
1910. — — — Steuer, p. 22.
1912. — — — Sewell, p. 358.

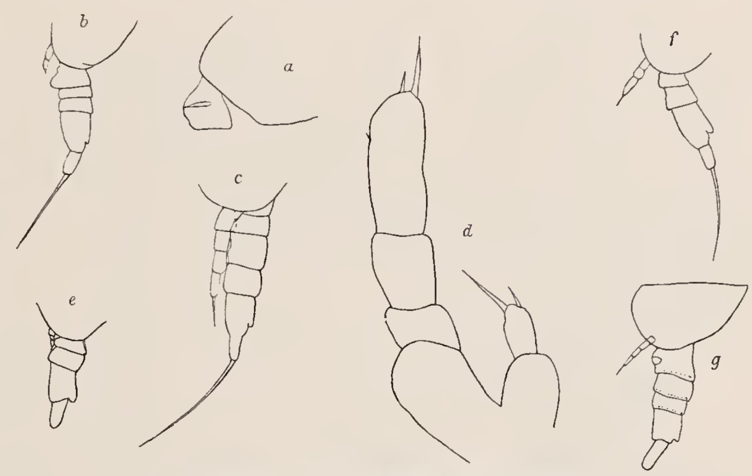
Description. f♀. Size: 0·84—1·0 mm.

In contrast to Giesbrecht the head and the first thoracic somite are completely fused. The mouthlimbs are scarcely different from Giesbrecht's description. In the structure of the natatory legs, however, fairly well marked differences are found, especially in the armatures of the basipodites and endopodites; in these respects they fairly well agree with Sars' description, but especially with that given by Wolfenden for his *P. parvus* variet. *borealis*. In Sars figure, Pl. IX, the first segment of the exopodite of the first pair of legs has a minute spine; in all my specimens this spine is substituted for by a bundle of fine hairs as seen in Giesbrecht's Taf. 9 fig. 31. Glandular pores are observed at the base of the exterior spines of the exopodites (at least in the second pair of legs).

Between the mouth and the rostral filaments the usual elevations are found; I was not able to see any setae along the hinder margin of the labrum. The arrangement of hairs on the oral surface of the labrum is similar to that of *Pseudocalanus*. The first group, which is convex outwards, and oblique, consists of about 10 short hairs in a single row; this group is followed by an almost straight row of about 25 very short hairs; most orally, and fairly well separated from this group, 20 hairs are placed in a S-shaped group. Laterally to the first group two partly transverse groups of fairly long setae, slightly convex inwards and posteriorly, are found. The median circular spots and transverse series of hairs were not observed. The *lamina labialis* shows three serrations, of which the median is the smallest. The *serrula 6-dentata* is found as usually; the arrangement of the setae was not examined in detail.

f♂. About the description of the mature males I refer to Sars and Giesbrecht. Size: 0·7—1·02 mm.

Y♀—♂ (St. V). Size: ♂ 0·80 mm. (Ø. Exp. 1900); ♀ (0·61 + 0·18) = 0·79 mm. (Ingolf 96 Cyl. 45). The shape of the body is in the main like that of the mature female, but the head and the first thoracic somite are fairly well separated, and there is an indication of limitation between fourth and fifth thoracic somite. The first abdominal somite is, at least in most specimens, distinctly produced below (text-fig. 12 b). The oral appendages are scarcely different from those of the mature females; the natatory legs, however, show a few differences; a very short Se Re II is present in the first pair of legs. The exterior margin of the last segment of exopodite is smooth in the fourth pair of legs, but, as usual, dentated in the third pair. The fifth pair of legs appears more clumsy with shorter terminal spine.



Text-fig. 12. *Paracalanus parvus* Claus.
a. f♀. Genital somite in lateral view × 90.
b. y♀ (Stage V). Abdomen × 90.
c. y♂ (Stage V). Abdomen × 90.
d. y♂ pes V in anterior view × c. 400.
e—f. y♀—♂ (Stage IV). Abdomen × 90.
g. f♀. Abnormal specimen with well developed pes V × 90.

The male differs from the female by the less prominent first abdominal somite, and by the better developed asymmetrical fourth pair of legs (cf. Canu) (textfigs. 12c—d).

Y♀—♂ (St. IV). Size: (0·48 + 0·14) = 0·62 mm. This stage is easily distinguished from the preceding one by the number of abdominal somites (3 only). As in the other stage, differences are found in the less prominent fifth pair of legs in the males (cf. text-figs. 12 e—f).

Of the copepodites (stages I—III) I am not sure of having observed any; according to Oberg these as well as the larval forms are rather difficult to distinguish from those of *Pseudocalanus elongatus*; they are, however, smaller and more clumsy, and have the exopodite and the endopodites of the antennae of almost equal length. From Ingolf St. 62 (Apst. 14) I have examined a young specimen (St. II) 0·6 mm. long and one (St. I) 0·48 mm. long, which on account of the long endopodite of the antenna perhaps ought to be referred to this species.

Variation. In a single mature female? (F. 389 Ø. Exp. 1900), the size of which was (0·68 + 0·2) = 0·88 mm. the left leg of the fifth pair consisted of four segments as in the immature male, while the right consisted of two segments only. A somewhat smaller female from the same locality had both pair of usual structure. Bay has taken 3 specimens with the left leg somewhat longer than the right, though consisting of the same number of segments. Normann & Scott have with reservation described a female with the right fifth foot three-segmented, and longer than the left as *P. p.* var. *perplexus*.

Remarks. The specimens, which have been examined all belong to the northern variety (var. *borealis* Wolfenden p. 997), and are fairly well distinguished from the Mediterranean form described by Giesbrecht. A. Scott (1909 pp. 27—28) thinks that the differences are rather unimportant, in that he is scarcely right. Detailed examination of a good many specimens from different localities especially from the Mid-Atlantic is necessary to decide the question whether the observed differences are specific or due other reasons.

Occurrence. The Ingolf Expedition has taken this species from 7 stations to the south and south-east of Iceland as well as in the Færoe channel. It has been taken as far west as at St. 84 Long. W. 25°24, Lat. N. 62°58; the only station farther north where is has been taken by the Ingolf Exp. is St. 101 (Apst. 47 $^{9}/_{7}$ 1896 4 p. m. 66°23 Lat. N. 12°05 L. W. 2 f♀) north-east of Iceland. From the East Greenland Exp. 1900 it was once taken in Denmarks Strait as far north as 65°36 L. N. 31°32 L. W. $^{9}/_{9}$ 2 a. m. F. 318. The comparatively few other localities, in which it has been taken by this Expedition lies between 62°06 Lat. N. and 59°20 L. N., and 21°11 L. W. and 0°52 L. W. At the following stations more than single specimens of this species were captured.

Ingolf	$^{17}/_{6}$ 96	St. 84	62°58 L. N.	25°24 L. W.	Cyl.	9 f♀; 3 y♀ (V); 2 y♂ (IV).
	$^{19}/_{8}$ 95		61°02 L. N.	0°40 L. W.	Pl.	11 f♀; 2 y♂ (V).
	$^{17}/_{8}$ 96		60°28 L. N.	0°20 L. E.	Cyl.	9 f♀; 1 f♂; 3 y♀ (V); 1 y♂ (V); 1 y♀ (IV); 1 y♂ (V).
Ø. Exp. 1900	$^{24}/_{9}$	6 p. m.	61°6 L. N.	16°26 L. W.	F. 389	2 f♀; 2 f♂; 6 y♀ (V); 2 y♂ (V).
	$^{25}/_{9}$	2 p. m.	60°29 L. N.	12°10 L. W.	F. 399	7 f♀; 3 y♂ (V).
		8 a. m.	—	—	F. 396	3 f♀; 2 y♀ (V); 2 y♂ (V).

It is an interesting fact that almost all the collections of this species are from the month of September (Ø. Exp. 1900 $^{9}/_{9}$—$^{30}/_{9}$ 16 Stations) or from the month of August (Ingolf Exp. 1895—96 $^{9}/_{8}$—$^{17}/_{8}$ 8 Stations). In the month of May a single young male ($^{4}/_{5}$ 96 Cyl. 2 57°54 Lat. N. 6°27 L. E.) was taken, and in the month of July (Cyl. St. 84 $^{17}/_{6}$ 1896 62°58 Lat. N. 25°24 Long. W.) 9 mature females, 3 young females (stage V) and 2 young males (stage IV) were taken. Young animals (St. IV—V) were also captured as late as $^{27}/_{8}$ 1896 and $^{25}/_{9}$ 1900. The fact that this species was rarely taken in several collections in the monthes of May and June 1895, 1896 and 1900 in the same regions in which it was found in August and September indicates a certain periodicity in its occurrence, as shown by Farran, in several of the localities explored by the International Investigations (1910 pp. 61—62). The average salinity for this species, which generally is swarming at the surface is rather low in the Kattegat (19·33 ‰, Temp. 10·33° C.), but a good deal higher in the English Channel (35·26 ‰, Temp. 13·28° C.). According to Cleve (1901) the salinity in the Arabian Gulf lies between 35·77 ‰ and 36·20 ‰ (Temp. 26·7 C.) and in 1904 between 35·40 and 40·70 ‰; the maximum temperature at which it was found in the Indian Ocean is 29°35 C. (Cleve 1901 p. 8).

Distribution. Assuming the specific identity of the northern and tropical forms we find records of its occurrence from the Mediterranean, the Black Sea, the Red Sea, the Arabian Sea, the Indian Ocean as far South as New Zealand (Brady 1911 p. 32), the Malay Archipelagos (A. Scott 1909) the

Pacific between 61° N. and 52° N., between 10° S. and 55° S. west of South-America, and 108° L. W. Equator (Giesbrecht 1892) and off California (Esterly 1905). In the North Atlantic it has been recorded on the west side off Woods Hole (Wheeler 1900) and on the east from the Faeroes to Gibraltar. According to Scott (1894) it is fairly common in the Gulf of Guinea as far south as the Congo; Wolfenden shares, probably rightly, the opinion that the species which the mentioned author describes as *P. parvus* really is *Paracalanus aculeatus* Giesbr., which represents this species in the South Atlantic (1911, p. 203). In addition to all these localities this species is found in the southern part of the Baltic, the Kattegat and the North Sea.

Pseudocalanidae.

10. Pseudocalanus minutus Krøyer.

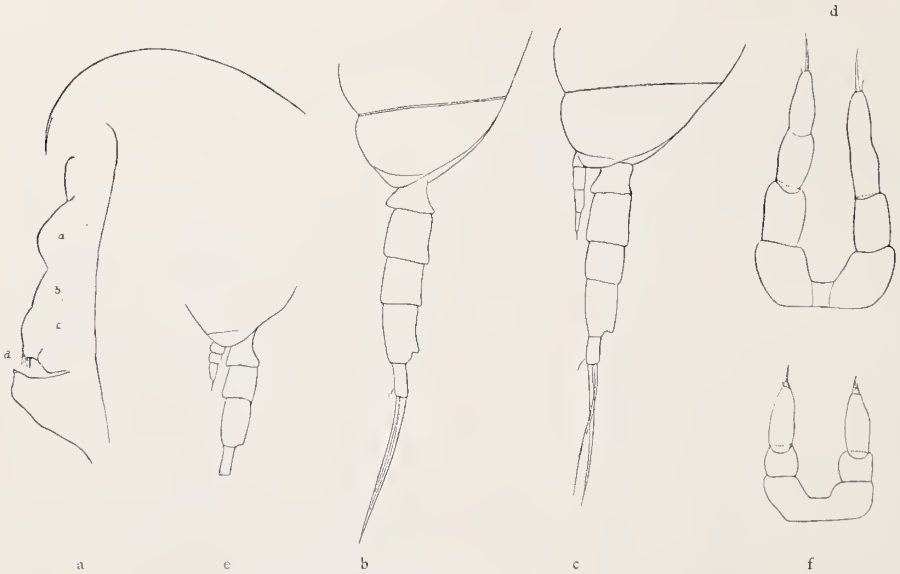
(Plate I fig. 8; text-figs. 13 a—f and 14 a—c).

1845—47. Calanus minutus n. sp. Krøyer, T. 41 fig. 4.
1849. Calanus minutus Kr. Krøyer, pp. 543—44, 552.
1864. Clausia elongata n. sp. Boeck, p. 234.
1872. Pseudocalanus elongatus Boeck. Boeck, p. 37.
1892. — — Boeck. Giesbrecht, pp. 197—200, taf. 10.
1892. Clausia elongata Boeck. Canu, pp. 170—171; pl. II, figs. 1—13.
1897. Pseudocalanus elongatus Boeck. Vanhöffen, p. 278, pl. I, fig. 6.
1898. — — — Giesbrecht & Schmeil, p. 28.
1898. — — — Aurivillius, pp. 69—70.
1900. — — — G. O. Sars, p. 69.
1900. — major n. sp. G. O. Sars, pp. 69—72, pl. XX.
1901. — elongatus Boeck. Th. & A. Scott, p. 339.
1902. — — — Mràzek, pp. 507—508, figs. 5—6.
1902. — — — Th. Scott, p. 450.
1902. — — — Wolfenden, p. 361.
1903. — — — Norman, p. 135.
1903. — — — I. C. Thompson, p. 16.
1903. — — — G. O. Sars, pp. 20—21, pls X—XI.
1903. — gracilis n. sp. G. O. Sars, pp. 154—155, pl. I (Suppl.).
1903. Pseudocalanus elongatus Boeck. Jensen, Johansen, Levinsen, p. 304, tabel II.
1903. — — — J. C. Thompson & A. Scott, p. 244.
1904. — — — Wolfenden, p. 111.
1905. — — — G. O. Sars, p. 3.
1905. — — — Farran, p. 30.
1906. — — — Pearson, p. 10.
1906. — — — Williams, p. 640.
1907. — major G. O. Sars. Koefoed & Damas, p. 407.
1907. — gracilis G. O. Sars. Koefoed & Damas, p. 406.
1908. — major G. O. Sars. v. Bremen, p. 25, fig. 22.
1908. — elongatus Boeck. v. Bremen, p. 25, fig. 23.
— — — Farran, p. 28.
1910. — — — Oberg, pp. 48-49, 56-57 taf. I and VI fig. 3.
— — — Kraeft, pp. 67, 77, 79, taf. I figs. 13—21.
1910. — — — Steuer, p. 22.
1911. — — — Farran pp. 63—65.
1913. — — — Stephensen, pp. 71—72, pls 4—5.
1913. — — — Stephensen pp. 312—13.

Synonymy. As Krøyer has described and figured a young male of his species, it is perhaps not so curious that the different authors have not realized that it is identical with *Pseudocalanus elongatus* Boeck. Krøyer's description and figure are however so good, that scarcely any other species from the Arctic Sea has a penultimate stage to be confounded with it. As I have had the opportunity of examining Krøyer's original specimens, it is quite evident to me, that the two species are identical; the three examined specimens belonged all to the penultimate stage (1 ♂ + 2 ♀); they were in the shape of the head most alike *Ps. gracilis,* and were of middle size. According to the general rules of nomenclature the name *Ps. elongatus* ought to be changed to *Ps. minutus* Kr., if the three forms are referred to a single species.

Introductory Remarks. The material which I have examined of this species has been very big, as it is one of the most abundant and widely distributed plancton-copepods of the northern seas; it was therefore quite necessary for me to try to solve the question, whether different or only a single species alike to *Pseudocalanus minutus* exist; unfortunately the result of my investigations is not quite satisfactory. Sars has been the first, who has pointed out that different types exist, and taking the scanty material into consideration he was quite right in establishing the three species *Ps. elongatus* Boeck, *Ps. major* G. O. S. and *Pseudocalanus gracilis* G. O. S. No naturalist has later on tried to solve the question, scarcely touched it[1]; most of them have examined specimens from southern regions and have scarcely been wrong in referring them to the *Ps. elongatus* Boeck (sensu strictu). According to Sars the 3 species are characterized in the following manner.

1) *Ps. major* G. O. S. Average length of ♀ 2·4 mm. The head is only slightly produced anteriorly; the abdomen is half as long as the cephalothorax. The antennulae extend almost to the middle of the abdomen.



Text-fig. 13. *Pseudocalanus minutus* Kr.
a. f♀. Head from the left × 110. b—c. Y♀—♂ (stage V) Abdomen × 59.
d. Y♂ (stage V) Pes V × 150. e. Y♂ (stage IV) Abdomen × 59.
f. Y♂ (stage IV) Pes V × 150.

2) *Ps. elongatus* Boeck (sens. strict.). The average length is 1·4 mm. The head is only slightly produced anteriorly; the urosome somewhat exceeding half the length of the anterior division. The antennulae scarcely reach beyond the second caudal somite.

3) *Ps. gracilis* G. O. S. Average length 1·65 mm. The body is more slender and the head anteriorly distinctly produced; the urosome scarcely exceeds half the length of the anterior division; the caudal rami are comparatively narrower and more divergent. The antennulae reach to the end of the third caudal somite. Legs considerably more slender than in the typical species, with both rami very narrow.

It will be noticed that in most characters, except in size, the *Ps. gracilis* differs almost equally from the two other forms. The character found in the size and the length of the urosome is at least of very relative value, as even from the same station (Ing. Nr. 31)[2] the following was observed: Spec. Nr. 1 2·3 mm. with ant. division 2·5 × urosome, Nr. 2 1·8 mm. ant. div. 2·5 × uros. (head of gracilis type); Nr. 3 1·8 mm. ant. div. 2 × uros. (head elong. type); Nr. 4 1·7 mm. ant. divis. 2·5 × uros., Nr. 5 1·5 mm. ant. divis. 2·4 × urosome; Nr. 6 1·4 mm. ant. divis. 2·1 × urosome; Nr. 7 1·2 mm. ant. divis. 2·3 × urosome. The relation between the length of the urosome and anterior portion has

[1] With the exception of Damas and Koefoed, who have often been in difficulty about the identification of the specimens and p. 406 write "Ces deux espèces, distinguées par Sars, ne sont peut-être que des variations d'une seule forme".
[2] N. B. from this station was found copepodite (St. V) 1·7 mm. and cop. (St. IV) 1·4 mm. long.

also been examined at several other stations (f. inst. Gunolfsvig Iceland), where I often found that the small specimens had the urosome comparatively longer (f. inst. ant. div. 1·9 × uros.), but with several exceptions. According to Sars the anterior division of *Ps. gracilis* is comparatively more slender; I found, certainly, that a specimen of typus *major* had the anterior division 2·3 as long as wide, one of typus *gracilis* 2·7 as long as wide, and one of typus *elongatus* 2·4 as long as wide, but as several exceptions were found, I was not able to use this character. I first got the impression that the characters found in the comparatively long antennulae and natatory legs in several specimens of the typus *gracilis* were useful, but a study of greater material made it evident to me that they were too variable to be of any value. The feature which marks out some specimens as *gracilis* is the curiously prominent forehead, which is in any case very seldom found in the biggest as well as in the smaller specimens. But as all transitions were found between the different shape of head, even in specimens which in other respects were most like *gracilis*, it was impossible for me to accept more than a single species.

Description. f♀. I was not able with certainty to find any secretory pores in the natatory legs.

The *labrum* proper, which is the most posterior of a row of more or less prominent elevations found behind the insertion of the rostral filaments (text-fig. 13a), has along its hinder margin, on each side, a group of fairly long hairs, and in the middle, somewhat in front, a hairy protuberance. The oral surface of the labrum possesses four groups of short hairs, as seen in fig. 8 (Pl. I). The *lamina labialis* has along its posterior margin three indistinct rounded eminences; orally the two usual longitudinal series of fairly short hairs are observed, of which the more lateral is longer and with longer hairs. Behind the lamina a transverse row of short hairs or teeth is observed and a similar but longitudinal one is found inside the serrula 6-dentata. Between the labial lobes, which are covered with hairs, the arrangement of which were not made out, about four groups of hairs are found, of which the hindmost, which has longer hairs, stands more laterally. Between this and the lateral margin behind the labial lobes 2 oblique groups of hairs are present.

Behind the *area labialis* proper is found on each side a large group of fairly long hairs in addition to a few hairs more laterally, and in the middle a triangular group, placed more posteriorly and with its hindmost, wider part fused with a rather irregular group of setae placed between the insertion of the maxillae.

f♂. As far as the full-grown males, of which comparatively few were examined, were concerned, I could not find other differences between the different specimens than that of size, varying from 1·1 to 1·4 mm. Canu and Sars have given descriptions and figures of the rudimentary mouth limbs. In most specimens an indication between the head and first thoracic somites was seen as figured by Canu as well for the male as for the immature specimens.

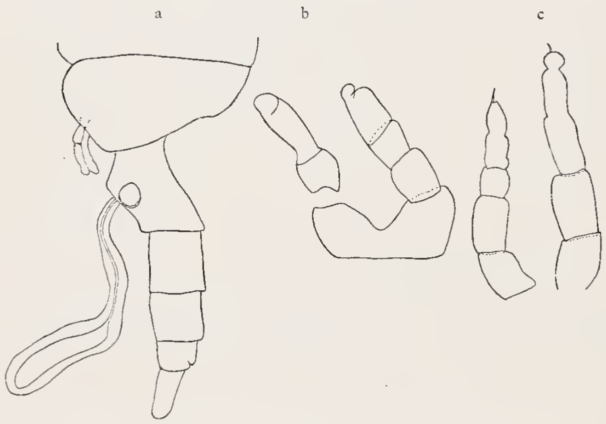
Y. (Stage IV). Size: 1·2—1·9 mm. The last thoracic somite is generally more produced than that of the mature females, and dorsally a more or less marked limitation between the two last somites is found (text-figs. 12b—c). The urosome is comparatively short and sometimes only one third of the anterior division; according to Kraefft (figs. 15—18) the two first somites are better separated in the males than in the females; generally no such differences were observed, but in some young females, especially of the smaller "variety", the two first somites were somewhat produced below, probably an indication of the final ecdysis. The mouth limbs are scarcely different from those of mature females. The males are always easily distinguished from the females by the presence of the well developed pes V (text-fig. 13 d) which consists of two basal segments and two terminal ones (Re), which especially on the right side, are not always so well distinguished as figured by Canu (Pl. II fig. 6). In this stage varieties similar to those of mature females but less marked were found.

Y. (Stage IV). Size: 0·9—1·4 mm. But for the presence of only 3 somites in the abdomen this stage is like the preceding one, and shows similar differences between the two sexes (text-figs. 13 e—f).

Y. (Stage III). Size: 0·7—1·0 mm. This stage, of which Stephensen has given figures of all the limbs, shows no sexual differences, and is characterized by four natatory legs and two abdominal somites.

Y. (Stage II). Size. 0·5—0·8 mm. This stage has three natatory legs and two abdominal somites. The last copepodite stage as well as the larval forms was not with security found out; I refer to Oberg's description.

Variation. From Iceland I have examined a female (taken 25/6 1902 by Ditlevsen in Hestereyrifjorde) with a spermatophor attached to the genital somite, in which a fairly well developed fifth pair of legs was observed (cf. text-fig. 14 a—b). The Ingolf Exp. (at St. 49 V.[I] 100—0 fm.) has taken a full-grown female? alike the preceding but with much longer pes V, of which the left is longer than the right (text-fig. 14 c). The Ø. Exp. 1900 (F. 451) has taken a female with a right and left pes V of almost equal length; the Re III of left pair is rounded and short, without terminal seta; the corresponding segment of the right side is more elongate. From Ingolf (St. 29 V[I] 50—0 fm.) I have examined a young animal (♀?) with a rudimentary pair of legs, consisting of two short basal segments, and a rounded small terminal segment. Boeck is the first who has mentioned females with a fifth pair of legs (1864 p. 234), and Mràzek has published an interesting study on this topic. He has found a small rudiment now and then, and sometimes a fairly well developed pair of legs; his figures of two specimens are somewhat different from each other, but in structure mainly like my specimen from Ø. Exp. Kraefft has examined a female with a rudimentary fifth pair of legs. It is interesting, though in no way surprising, that the organ in none of the 6 specimens in which its structure has been described was alike another.



Text-fig. 14. *Pseud. minutus* Kr., abnormal female.

a. Abdomen (female with spermatophor from Hestereyrifjord Iceland) × 67.
b. Pes V of same specimen × 160.
c. (to the right) Pes V of specimen from Ing. St. 49.

Occurrence. This species has been taken almost all over the area explored by the Ingolf Expedition, as far north as Jan Mayen and the Diskoisland; in the Atlantic it has not been taken farther south than at the latitude of 63° North. By the East-Greenland Expedition it was only taken at comparatively few stations, south east of the Færoes 61°06 Lat. N. 10°26 Long. W., in the Norwegian Sea as far east as 1°04 Long. East (lat. 62°16 North) and at 6°12 Long. West (at 69°06 Lat.

North), in the Polar Sea as far north as 72°30 Lat. North (6°41 Long. West), along the east coast of Greenland as far north as c. 70° Lat. N. In Denmark Strait, in the Atlantic (west of the Færoes) and in the fjords of Iceland as well as on the west coast of Greenland it has been taken by several collectors.

In the following I am going to give an account of the number of stations at which the different stages and partly the types of the species were taken at the different seasons.

West Greenland. In Davis Strait, on the west coast of Greenland, the Ingolf Expedition 1895, has taken mature females of *Ps. major*, at four stations from $^{1}/_{7}$—$^{11}/_{7}$ 1895, *Ps. gracilis* at five stations from $^{25}/_{6}$—$^{28}/_{7}$, and *Ps. elongatus* from a single stat. $^{11}/_{7}$. Of the copepodites (St. V) specimens of *Ps. major* have been taken at 2 stat. ($^{26}/_{6}$—$^{1}/_{7}$), of *Ps. gracilis* at 3 st. ($^{1}/_{7}$—$^{28}/_{7}$) and of *Ps. elongatus* at 2 stat. ($^{1}/_{7}$—$^{11}/_{7}$); of the copepodites (St. IV) *Ps. major* was taken at 3 stat. ($^{26}/_{6}$—$^{1}/_{7}$), of *Ps. gracilis* at 2 stat. ($^{6}/_{7}$—$^{28}/_{7}$) and *Ps. elongatus* at 2 stat. ($^{1}/_{7}$—$^{11}/_{7}$). At a single station ($^{1}/_{7}$ St. 29, 65°17 Lat. North 55°42 Long. West) a single mature male was found, but at no station copepod. of younger stages than the fourth were taken. In contrast to the Ingolf Expedition, by which most specimens were taken in the open sea in vertical hauls in a depth of from 200--0 fathoms, Bergendal and Lundbeck have in 1890 taken a good many specimens at the surface and near the coast. On that account, perhaps, almost all the specimens are most naturally referred to the *Ps. elongatus* type. From "Jakobshavn" 2 mature males [from the same sample 50 f♀; 5 y♀ (V); 4 y♂ (V); 3 y♂ (IV); 1 y (III)] were taken $^{28}/_{8}$, mature females were taken at 3 stations ($^{21}/_{8}$—$^{28}/_{8}$), young specimens (V) at same 3 stations and Cop. (III—IV) at a single stat. ($^{28}/_{8}$) only. From Egedesminde 2 mature males were taken $^{23}/_{7}$ [from same stat. 6 f♀; 2 y♀ (V); 2 y♂ (V)], $^{4}/_{8}$ 2 f♂ [9 f♀; 60 y♀ (V); 35 y♂ (V) from same station] and 3 f♂ $^{10}/_{8}$ [from the same stat. 12 f♀; 9 y♀ (V); 2 y♀ (V); 5 y♂ (V); 1 y♂ (IV); 1 y (III); 1 y (II)]; from the same locality mature females were found eight times between $^{21}/_{7}$ and $^{10}/_{8}$ and a single time $^{9}/_{10}$ night [at this catch were taken 6 f♀; 12 y♀ (V); 4 y♂ (V); 6 y♀ (IV); 4 y♂ (IV); 4 y (III); 1 y (II)], young animals (V) seven times between $^{3}/_{7}$ and $^{10}/_{8}$ and $^{9}/_{10}$, young animals (IV) $^{3}/_{7}$, $^{10}/_{8}$ and $^{9}/_{10}$ and Copep. (II—III) only $^{9}/_{10}$.

At Disco Bay Lundbeck has $^{6}/_{9}$ taken 160 mature females, 3 mature males, 3 young females (V) and 5 males (V), 3 young females IV and 13 copepodites (III) and Bergendal at the same date 100 ♀ (VI), 1 ♂ (VI) and 3 y♀ (V).

West of Iceland. In Denmark Strait and on the west coast of Iceland no specimens, which were naturally referred to *Ps. major,* were observed; mature females of *Ps. gracilis* were only taken at 3 stations (V.[1] $^{19-20}/_{5}$ 1895) in the open sea and young ones (III—V) only $^{19}/_{5}$, while specimens in different stages, including mature males, of the *Ps. elongatus* s. s. were only found in "Dyrefjord" [$^{30}/_{5}$ 1895. 6 f♀ (partly with egg-balls attached to genital somite), 9 y♀ (V), 2 y♀ (IV), 1 f♂, 7 y♂ (V), 1 y♂ (IV), 2 y (III) and $^{3}/_{6}$ 1896 1 f♀]. The sample from $^{19}/_{5}$ 1895 V.[1] 100—0. St. 8, 63°56 Lat. N. 24°40 L. W. contained 100 f♀, 2 y♀ (IV), 7 f♂, 2 y♂ (V), 1 y♀ (IV) and 2 y (IV), and that from $^{20}/_{5}$ 1895 V.[1] 100—0 fm. St. 9 17 f♀ and 15 f♂.

North of Iceland. In the fjords north-west and north of Iceland A. Ditlevsen has $^{25}/_{8}$ 1902, at Hjalteneyri Øfjord gathered specimens of the *elongatus* type [1 f♀, 2 y♀ (V), 1 y♀ (IV); 2 y♂ (IV); 1 y (III)] and $^{28}/_{8}$ at Svavadilvig [2 f♀, 1 y♀ (V); 1 y♂ (IV), 3 y♂ (V)]. Lundbeck has $^{25}/_{5}$ 1892 taken 14 f♀ (two with egg-ball and one with spermatophor), 3 y♀ (V), 2 y♂ (V) at Skutulsfjord and $^{23}/_{8}$? in Gunolfsvig (N. East Iceland) 50 f♀, 5 y♀ (V), 10 y♂ (V) and 1 y♂ (IV).

South-West of Iceland. To the south-west of Iceland 10 mature females, 5 y♀ (V), 3 mature males and 5 young males (V) were found $^{13}/_{6}$ 1896, St. 80, P. 100—0 fm. 61°02 Lat. N. 29°32 Long. W.

South of Iceland. To the south of Iceland a single male was taken by the Ingolf Exp. ($^{7}/_{8}$ 1896, Cyl. 32, 63°45 Lat. N. 22°37 Long. W. 2 ♀; 2♂); $^{8}/_{8}$ 1896 a mature female of *Ps. gracilis*, and from $^{13}/_{5}$—$^{19}/_{5}$ 1896 at three stations females of *Ps. elongatus* were taken; of the latter young animals (V) were taken at 3 stations ($^{6}/_{5}$—$^{31}/_{5}$), y♀ (IV) at a single station ($^{31}/_{5}$ 1896) and young animals (III) $^{30}/_{5}$ 1895 and $^{31}/_{5}$ 1896. The East Greenland Exp. 1900 has taken a few mature and young females south of Iceland $^{25}/_{9}$.

In the Icelandish fjords adult males have been taken several times by different collectors. On the north coast it was only taken once [Ingolf $^{1}/_{8}$ 1896 Selvik in Skagafjord 65°58 L. N. 19°50 L. W. Pl. 4 y♀ (V), 1 f♂, 5 y♂ (V), 7 y♂ (IV), 10 y (III) and 2 y (II)]. On the east to west coast males were taken 3 times ($^{13}/_{5}$—$^{26}/_{5}$ 1902), and females as well as juniores (stage II—V) were in several samples found common from $^{13}/_{5}$—$^{26}/_{5}$.

South-East of Iceland. In the Iceland-Færoe channel south east of Iceland *Ps. gracilis* (f♀) were taken in four samples between $^{11}/_{5}$—$^{16}/_{5}$ 1895 and $^{20}/_{5}$ 1896, and *Ps. elongatus* (f♀—♂) in four samples ($^{11}/_{5}$—$^{16}/_{5}$ 1895 and $^{20}/_{5}$ 1896); young animals (IV—V) were taken three times ($^{11}/_{5}$—$^{13}/_{5}$ 1895 and $^{20}/_{5}$ 1896). Several males were found in a single sample from $^{11}/_{5}$ St. 1, V.^{1} 50—0 fm. 62°30 Lat. N. 8°21 L. W., including 140 f♀, 23 y♀ (V), 8 y♀ (IV), 30 f♂, 20 y♂ (V) and 5 y♂ (IV). From St. 3, $^{12}/_{5}$, V.^{1} 100—0 fm. 11 f♀ and 1 f♂ were found and from St. 4, $^{13}/_{5}$ 1895, V.^{1} 100—0 fm. 64°07 L. N. 11°12 L. W. 37 f♀, 3 y♀ (V), 1 y♀ (IV), 2 f♂ and 4 y♂ (V). From St. 57, $^{20}/_{5}$ 1896, V.^{1} 100—0 fm. 63°37 Lat. North 13°02 Long. West, 1 f♀, 1 y♀ (V) and 2 f♂ were secured.

North-East of Iceland. To the east and north-east of Iceland as far north as Jan Mayen specimens (f♀) of *Ps. gracilis* were found in four samples, taken between $^{10}/_{7}$ and $^{25}/_{7}$ 1896, and *Ps. elongatus* in six samples ($^{10}/_{7}$—$^{25}/_{7}$); young animals (IV—V) of the former type from 3 Stat. ($^{10}/_{7}$—$^{25}/_{7}$) and of the latter from 9 Stat. ($^{10}/_{7}$—$^{25}/_{7}$ 1895); the following stage (III) was taken at 6 Stat. ($^{1}/_{7}$—$^{28}/_{8}$).

The East Greenland Expedition 1900 has from $^{21}/_{6}$ to $^{2}/_{7}$ in the Norwegian Sea between 63°16 Lat. North 1°14 Long. East and 72°30 Lat. N. 6°41 Long. W. collected a few samples containing this species (type: *gracilis* or *elongatus*) all taken at the surface (F. or G.).

The mature female was only taken once ($^{21}/_{6}$ 12 p. m. F. 33, 64°17 Lat. North 0°51 Long West); young animals (V) were taken in 7 samples, including that from the most northern station, young animals (III—IV) were found in four samples. As the species was only taken in few specimens, in altogether 7 samples, though one sample was taken each hour day and night from $^{21}/_{6}$ to $^{10}/_{7}$ as far north as 74°28 Lat. North (15°36 Long. West), there is good reason to regard it as extremely scarce at the surface at the season and in the region mentioned.

The expedition has taken the *Ps. elongatus* a few times in Nansen's closing net.

Viz:	$^{21}/_6$ 1 p. m. 64°17 L. N. 0°51 L. E.	75—50 fm.	1 f♀; 3 y♀ (V); 1 y♀ (IV); 1 f♂; 3 y♂ (V); 3 y♂ (IV); 1 y (III); 1 y (II).
		40—10 fm.	1 f♀; 6 y♀ (V); 5 y♀ (IV); 9 y♂ (V); 9 y♂ (IV); 7 y (III).
	$^{25}/_6$ Jan Mayen	50—60 fm.	5 f♀.
	$^{1}/_7$	100—50 fm.	1 f♀.

Johannes Petersen has $^{11}/_7$ 1901 at 73° Lat. North and 8° Long. East taken 60 f♀, 99 y♀ (V), 9 y♀ (IV), 72 y♂ (V) and 5 y♂ (IV) of *Ps. gracilis*.

East and South-East of the Færoes. To the east and south-east of the Færoes mature females of *Ps. gracilis* were only taken $^{7}/_5$ 1895 and $^{6}/_5$ 1896, while those of *Ps. elongatus* were taken in 3 samples ($^{5}/_5$ and $^{19}/_8$ 1895) and in 9 samples by Ingolf 1896 ($^{4}/_5$—$^{6}/_5$ and $^{16}/_8$). Mature males were taken $^{6}/_5$ 1895 Cyl. 2 [59°17 Lat. N. 3°26 Long. E. 3 f♀; 1 f♂], $^{4}/_5$ 1896 Cyl. 4 [58°29 Lat. N. 5°0 Long. E. 16 f♀, 3 y♀ (V), 2 y♀ (IV), 2 f♂, 6 y♂ (V), 2 y♂ (IV), 1 y (III)], $^{5}/_5$ 1896 Cyl. 6 [59°18 Lat. N. 3°08 Long. E. 5 f♀, 1 y♀ (IV), 1 f♂, 1 y (III)], $^{5}/_5$ 1896 Cyl. 8 [61°00 Lat. N. 0°10 L. E. 9° C. 33 f♀, of which one with spermatophor, 1 y♀ (V), 1 y♀ (IV); 8 f♂, 6 y♂ (V)], $^{10}/_8$ 1896 Apstein 81 [63°45 Lat. N. 7°10 Long. W. 1 f♂; 1 y♂ (IV); 1 y (III)], $^{13}/_8$ 1896 Klakvig Ankerplads the Færoes 1 f♂, $^{17}/_8$ 96 Cyl. 44 [60°50 Lat. N. 0°25 L. W. 6 f♀, 8 y♀ (V), 10 y♀ (IV); 1 f♂, 14 y♂ (V), 8 y♂ (IV); 4 y (III); 1 y (II)] and $^{17}/_8$ 1896 Cyl. 47 [59°40 Lat. N. 2°12 Long. E. 11 f♀, 1 y♀ (IV); 1 f♂; 1 y (III)]. Young animals (V) were taken $^{5}/_5$ 1895 and in 9 samples 1896 ($^{4}/_5$—$^{6}/_5$; $^{16}/_8$—$^{17}/_8$), young animals (IV) only in 5 samples ($^{4}/_5$—$^{6}/_5$ and $^{17}/_8$ 1896), jun. (III) in 3 samples ($^{4}/_5$, $^{6}/_5$, $^{17}/_8$ 1896) and juniores (II) $^{4}/_5$ and $^{12}/_8$ 1896.

E. Bay has $^{11}/_6$ 1891 58°03 Lat. N. 2°08 L. W. taken 50 f♀, 31 y♀ (V), 16 y♀ (IV), 3 f♂, 16 y♂ (V), 19 y♂ (IV), 9 y (III) and 2 y (II). Mortensen has $^{3}/_6$ 1899 at Kalbarsfjord, the Færoes, 40—10 fm. taken 3 females with spermatophores and Rink has $^{18}/_3$ 1848 at the Ørkney Islands taken 6 f♀, 4 y♀, 3 f♂ and 3 y♂.

If any conclusions with regard to the occurrence of the three mentioned types can be drawn from the above, it must be that *Ps. major* is only found in the open sea in Davis Strait, probably not at the surface, that *Ps. elongatus* is often found at the very surface, most common in samples taken comparatively near the coast, though in no wise scarce in those from the open sea, and that *Ps. gracilis* seems to be a more northern and more oceanic form.

Propagation. As it is generally recognised that the mature males of the pelagic copepodes, especially in species in which the manducatory limbs are rudimentary, only live a comparatively short time, we are right in concluding that the seasons in which we find mature males are those of the propagation of the species; specimens with spermatophores attached to the genital somite and with egg-balls indicate the same.

Mature males have been found south-east of the Færoes $^{6}/_5$ 1895 and in 4 samples $^{4}/_5$—$^{6}/_5$ 1896, in the Iceland-Færoe Channel at 3 stations $^{11}/_5$—$^{13}/_5$ 1895 and $^{20}/_5$ 1896, south-west of Iceland $^{13}/_6$ and $^{7}/_8$ 1896, in Denmark Strait at 2 stations $^{19}/_5$—$^{20}/_5$ 1895, in various Icelandish fjords, in 5 samples $^{3}/_5$—$^{30}/_5$ 1895—1902, at the Ørkney Islands $^{18}/_3$ 1848; $^{3}/_6$ 1899 a female with spermatophor was taken at the Færoe Islands; $^{11}/_6$ 1891 mature males were taken south-east of the Færoes; north-east of Iceland (as far north as 66° Lat. North) mature males were taken $^{25}/_7$ 1895 (+ females with spermatophores) and $^{21}/_{6}$ 1900. In Davis Strait mature males were taken $^{1}/_{7}$ 1895 and at Egedesminde etc. in 6 samples from $^{23}/_{7}$—$^{6}/_{9}$ 1890.

From the north of Iceland males were taken $^{1}/_{8}$ 1896; from the Færoes and the Norwegian Sea, south-east of these Islands, they were taken in 5 samples from $^{7}/_{8}$—$^{17}/_{8}$.

As only very few samples were taken from the explored regions at other seasons (from Norwegian Seas none June—July 1895—96), we do not know if propagating took place at other seasons.

Mature females were taken in Denmark Strait $^{19}/_{5}$—$^{30}/_{5}$ 1895, in Davis Strait $^{25}/_{6}$—$^{28}/_{7}$ 1895 and $^{23}/_{7}$—$^{6}/_{9}$ 1892, south-west of Iceland $^{13}/_{6}$ 1896, south of Iceland $^{13}/_{5}$—$^{19}/_{5}$ 1896, $^{7}/_{8}$ 1896 and $^{25}/_{9}$ 1900, south-east of Iceland $^{11}/_{5}$—$^{16}/_{5}$ 1895, $^{20}/_{5}$ 1896, north-east of Iceland $^{10}/_{7}$—$^{25}/_{7}$ 1896, $^{21}/_{6}$—$^{25}/_{6}$ 1900 and $^{11}/_{7}$ 1901, south-east of the Færoes $^{4}/_{5}$ and $^{19}/_{8}$ 1895, $^{4}/_{5}$—$^{6}/_{5}$ and $^{16}/_{8}$ 1896. The copepodites (V—IV) were practically found in samples from the same dates, the only interesting exception being their occurrence at Disco Bay $^{9}/_{10}$ 1892; the copepodites (III, II) were only found at very few stations, probably on account of their small size.

Distribution. The *Pseudocalanus minutus* Kr. has its main distribution over the northern part of the Atlantic Ocean, on the west side as far south as the Gulf of St. Laurence, and on the east as far south as 35° Lat. North; it has been mentioned from the Black Sea, the Gulf of Suez and the Mediterranean. In the Arctic Ocean it is known from Baffins Bay to the New Siberian Islands, and has once been recorded from the west coast of North America (Puget Sound).

Farran, mainly on material collected by the International Investigations, has given a fairly exhaustive account of its distribution and the points of its biology. It is most often abundant in the Baltic, except in the Gulf of Bothnia, in the Belts, Kattegat, Skagerak, along the coast of Norway, in the English Channel, the Irish Sea and in coastal waters on the south and west coasts of Ireland. "In the North Sea south of 55° it is always present but usually scarce, sometimes abundant". In the north-west of Scotland, there is an indication of periodicity in its occurrence as well as of curious variation from year to year; it was common in August 1903, moderate in August 1904 and 1906, scarce in August 1907, and absent or almost absent in August 1905. In the Færoe and the Færoe-Iceland channel the recorded distribution is somewhat irregular; during several years it has been found fairly common in May and August (in 1906 almost absent). "On the south and west coast of Iceland it is generally distributed in the open sea ten miles or more from shore, but it is usually rare, and often absent from the tow-nettings. In the coastal waters it may be found frequently, and often forms large shoals". On the north coast of Iceland it has been recorded by Paulsen.

In the Norwegian Sea and southern Arctic Ocean between Jan Mayen and Iceland on the west and Norway on the east it is in any case sometimes common or abundant.

On the west coast of Greenland it has been recorded by Vanhöffen from Umanak Fjord (1897) and rather abundantly from the surface down to 240 m. adults as well as copepodites by Stephensen from Northern Strömfjord about 67°40 Lat. North (range of temperature 0° to 3·2° C.).

From the east coast of Greenland it has been recorded by Cleve 74°15 Lat. N. 18°15 Long. W. and by Koefoed, who has found specimens (1·42 to 1·7 mm. long) at 4 Stations between 78°09 and 77°35 Lat. North, and 14°01 and 18°02 Long. West from the surface down to 65 met. (Temperat. ÷1·0—÷1·7° C.), which he thinks ought to be referred to *Ps. elongatus* rather than to *Ps. gracilis*.

As the Duc d'Orléans is the expedition which has made the most systematic plancton-investigations from different depths with measurements of salinity and temperature, and as Koefoed and Damas are the only ones, who have separated the three types, I think a more detailed survey of their material, should pay.

Ps. major, which was first recorded by G. O. Sars north of the New Siberean Islands, was only taken a single time 78°05 Lat. N. 5°21 Long. W. $^{16}/_{7}$ 1905 between 800 and 1350 met. (salinity 34·95 ‰; temp. 0·08° — ÷ 0·37° Cels.).

Ps. elongatus was only taken near the coast of Spitzbergen (c. 80° Lat. North 14°33 Long. East) at 4 stations near the surface (Temp. 0·50—2·50° C.) and at the mentioned stations near East Greenland.

Ps. gracilis, which has previously been recorded by Sars at the coast of Finmarken and between Finmarken and Bären Island "a été capturé entre 600 mètres et la surface; il est particulièrement abondant au-dessus de 200 mètres; d'après les estimations faites par Koefoed, il paraît moins fréquent le long de la côte grönlandaise qu' au large, mais il est très fréquent tant dans le Gulfstream que dans le courant polaire". The species is generally missing in hauls from 0—20 meters, but it has been found common here at a few station (c) independent of the time of the day and of the temperature (lying between ÷ 1·70 and + 1·50). It has been found common at a depth between 480 and 600 metres, juniores between 800—1000 metres (p. 270), and abundant at temperatures from ÷ 1·70 to + 3° C. The salinity, at which it is found common, varies from 30·60 ‰ to 34·90 ‰.

As set forth by Farran the conditions at which this species can flourish are very varied. The salinity varies from 7·25 ‰ to 35·30 ‰, the temperature from ÷ 1·70° C. to 12·47° C., it is found from the surface near the coast, where it is often left in tidal pools, as deep as 600 metres in the open ocean. About the details of its biology I refer to Farran, several interesting studies of Herdmann from the Irish Channel but especially to Kraeeft, who in the Baltic and the North Sea has studied the growths and the occurrence at different depths of the various stages (juniores). He writes (1910 p. 79) "es zeigt sich deutlich dasz das III Stadium von Schicht zu Schicht, von Boden nach der Oberfläche gerechnet in immer gröszer werdenden Menge vorhanden ist"; he found that mature females (April 1906 in the Baltic) were present in 59·1 % between 75 and 30 metres, but only in 3·1 % between 5 and 0 metres.

About the time of propagating I have in the literature only found that the Duc d'Orléans has collected mature females and males ($^{8}/_{7}$ 1905 80°13 Lat. N. 7°42 Long. East 400—500 metres, 0·23—0·80° C., and $^{15}/_{8}$ 1905 71°22 Lat. N. 18°58 Long. East, 200—400 metres, 0·67—1·53° C.).

Remarks. It has previously been mentioned that no characters are found by which all specimens could be referred to one of the three types of *Pseudocalanus minutus*; in the same sample intermediary links are found not only between the extremities of the mature females but also between the copepodites of stage IV—V, in which however the difference between the types is less marked. The question how to explain marked differences in size and other characters found in the same sample under the same biological conditions, if they all belong to the same species, is too vexed to be answered now. Specificness of the different types may perhaps be excluded by the examination of several hundreds of specimens at least, from samples with marked variation between the specimens, after Galton's statistical methods.

Some of the differences are certainly congenital, but others are probably due to the fact that specimens, which later on are found under identical biological conditions, are born at different localities and have got a different start in life, before being carried by currents or other agencies to their present abode.

11. Microcalanus pygmæus G. O. Sars.

1900. Pseudocalanus pygmæus n. sp. (♀) G. O. Sars, pp. 73—75 pl. XXI.
Spinocalanus longicornis n. sp. (♂) G. O. Sars, pp. 77—78, pl. XXII figs. 13—14.
1901. Pseudocalanus pygmæus G. O. Sars. Th. & A. Scott, p. 339.
1902. — — — Mràzek, pp. 508—509, taf. V figs 3—11.
1902? — — G. O. Sars. Giesbrecht, p. 20, taf. 2.
1903. Microcalanus pygmæus G. O. Sars. G. O. Sars, p. 157.
? Microcalanus pusillus n. sp. G. O. Sars p. 156—157; supplement pl. II, pl. III fig. 1.
1907. Pseudocalanus pygmæus G. O. Sars. Damas and Koefoed, pp. 396 and 407.
1908? Microcalanus sp. Farran, p. 28.
1908. — pygmæus G.O. Sars. v. Bremen, p. 26 fig. 24.
— pusillus G. O Sars. v. Bremen, p. 27 fig. 25.
1908? — — — Wolfenden, pp. 41—42, pl. II fig. 5.
1908? — — — Hj. Brock.
1910? — — — Kraeeft, pp. 98—99.
1911? — — — Farran, pp. 98—99.
1911? — — — Wolfenden, p. 286.
1913. — pygmæus G. O. Sars. Stephensen, pp. 311—312.

Description. f♀. Most of the examined full-grown females agreed fairly well with Sars' description of *M. pygmæus*. The size of the specimens varied from 0·65 to 0·9 mm. In a single specimen (St. 8) the antennulae scarcely reached the end of the first abdominal somite, and the terminal spine of the second pair of legs of this, as well as of other specimens, had indication of the serration which according to Sars forms the chief characteristic between *M. pygmæus* and *pusillus*; as the natatory limbs were broken in most of my specimens, I was unfortunately unable to examine this character in most specimens (cf. pag. 68). According to Sars the rostrum is represented by two "extremely small tentacular filaments"; in my specimens, as in those examined by Mràzek and Kraeeft, these organs are rather thick and more like teeth.

f♂. Size: 1·1 mm. The structure of the fifth pair of legs is very much like that figured by Sars (Pl. I pes V ♂), but in my specimen the division of the left leg into 3 basal segments is more indistinct.

Y (St. V). The juniores (♂—♀ Copep. V) are practically like the preceding stage, but for the number of abdominal somites. The male differs from the females by less prominent first abdominal somite and a fairly well developed fifth pair of legs (cf. Mràzek fig. 13).

Y (St. IV): Size: (♀) 0·65—0·75; (♂) 0·65—0·9 mm. In this stage with only 3 abdominal somites are the same differences between males and females observed.

Occurrence. Considering its minuteness one can not wonder that this species has only been taken from the following few stations by the Ingolf Exp.

Davis Strait: St. 29. 65°34 L. N. 54°31 L. W. 5/7 3.30 p. m. 1895. V¹. 50—0 fm. Temp. at surface 3·5° C. 1 ♀, 1 ♂, 4 y♀ (V), 8 y♂ (V).

West of Iceland: St. 95. 65°14 L. N. 30°29 L. W. 27/6 5·25 p. m. 1896. P. 100—0 fm. Temp. at surface 7·8° C. 16♀, 5 y♀ (V), 26 y♂ (V).

St. 8. 63°56 L. N. 24°40 L. W. 19/5 5 p. m. 1895. V. 100—0 fm. Temp. at surface 8·6° C. 1 ♀.

South-east of Iceland: St. 133. 63°14 L. N. 11°24 L. W. 9/8 96 1·30 p. m. P. 100—0 fm. Temp. at surface 10·8° C. 2 ♀, 2 y♂ (V).

St. 58. 64°25 L. N. 12°09 L. W. 20/5 96 3 p. m. P. 100—0 fm. Temp. at surface 1·2° C. 7 ♀, 2 y♀ (V), 2 y♀ (IV), 2 y♂ (V), 2 y♂ (IV), 1 y (III).

North-east of Iceland: St. 105. 65°34 L. N. 7°20 L. W. 11/7 6·30 p. m. 96. Closing net. 700 fm. 11 ♀, 2 y♂ (V).

St. 104. 66°23 L. N. 7°25 L. W. 11/7 5·30 a. m. Closing net. 850 fm. 1 ♀.

East of the Færoes: 60°05 L. N. 1°18 L. E. 17/8 11·45—3·45 p. m. 96. Cyl. 46. 1 y♂.

West of the Færoes: 60°28 L. N. 12°10 L. W. the East-Greenland Exp. has 25/9 1900 F. 397 taken 1 y♂ (V).

The mentioned expedition has besides taken the species from the polar seas east of Greenland.

74°28 L. N. 15°30 L. W. 10/7 1900 Closing net 110—40 fm. 2 y♀ (V), 2 y♀ (IV), 2 y♂ (V), 2 y♂ (IV).

72°02 L. N. 21°20 L. W. 16/7 1900 6 a. m. Closing net 35—10 fm. 1 ♀, 1 y♀ (V), 1 y♀ (IV), 2 y♂ (V), 2 y♂ (IV).

Distribution. The *M. pygmæus* G. O. S. was originally captured by Nansen (78° N. 13·6° E.) in considerable numbers north of the New Siberian Islands in October 1893; by Bruce it was taken at Novaya Zemlyá 12/6 1900 and by Schaudin at Spitsbergen 81°32 L. N. The most important contribution to its distribution in the polar seas and to its biology has been published by Damas and Koefoed in the "Duc d'Orléans". It has been taken at almost all the stations in the polar seas between Spitsbergen and Greenland as far east as 10°42 Long. East and as far west as 18°22 Long. West, as far north as 80°17 Lat. North and as far south as 75°35 Lat. North between 26/6 and 16/8 1905. The authors write (p. 396) "*Microcalanus pygmæus* possède une grande amplitude verticale: il s'observe encore en abondance entre 1·800 et 1·200 mètres (St. 17) et ne manque dans aucun des échantillons profondes. Il remont fréquemment à la surface. Nos pêches prouvent que son niveau habituel est au dessous de 100 mètres". As all the information about each species, which is found under the gatherings for each station, has not been collected for each species, I have tried to do it for *Microcalanus pygmæus*. Near the surface it has only been found: at St. 13 (0—20 metres, T. 0·30° C., Salin. 33·30 ‰, 8/7 4·45 p. m.), at St. 30 (0—5 metres, T. 1·20° C., Sal. 31·32 ‰ 22/7 8 p. m.) and at St. 43 (0—20 met. T. 0·98° — ÷ 1·64° C. Sal. 32 ‰ 1/8 3 p. m.). As the salinity at which this species has been found lies between 31·10 ‰ and 35 ‰ the said authors may be right (p. 406) in referring it to the intermediary group of species, which in the Norwegian Sea exceptionally are observed "à la surface surtout pendant la nuit et dans les endroits, où la salinité est elevée"; but their final statement, indicating a difference in the vertical distribution in the different seas, about *M. pygmæus* (p. 407) "a) Dans la Bassin polaire: constaté à de faibles profundeurs. b) Dans la Mer du Grönland: principalement vers 100 mètres; existe depuis la surface jusque à 1850 mètres. c) Dans la Mer de Norvège: sourtout abondant entre 200 et 600 mètres", is neither born out by their own material (tab. II) nor by the information available in the literature. The species has not yet been recorded from the Norwegian Sea. The temperature, at which this species has been found even in great numbers (cc) at different depths, varies from ÷ 1·75 to + 2·15° C.; it has been found fairly common (+) at 3·81° C., but its optimums temperature seems to be a little below and a little above Zero. Adult males have been found at 11 stations in the Greenland Sea between 15/7 and 15/8, in vertical hauls from 60 to 20 and from 1000 to 800 metres and at a temperature between + 0·49° C. and ÷ 1·75° C. In the literature I was unable to find any further information about this species, but about *M. pusillus* G. O. Sars, which possibly is identical with it, a good deal of information is found. According to Farran (1910 pp. 98—99) it has been recorded from several of the Norwegian fjords at considerable depths, and from the sea between Jan Mayen and Finmarken. According to Paulsen a species, which Sars has determined as *M. pusillus*, but which really is *M. pygmæus* (cf. later on), occurred plentifully in a depth between 230 and 350 metres on the north coast of Iceland (14/8 1904 66°20 L. N. 12°10 L. W.). In addition it has been recorded from the Irish Sea, the west coast of Ireland, the whole Norwegian Sea, the Skager Rak, the Kattegat and in the extreme S. W. Baltic off Bornholm.

At Spitsbergen (80°02 L. N. 17°02 L. E.) it was found by the "Duc d'Orléans" in a depth of from 60—30 m. (Temp. 0·40—0·27° C.) and by Hofsten and Bock (150—40 m. D.).

The Belgian Antarctic as well as the National Antarctic Expedition has in the Antarctic Seas collected a good number of a minute species by nets let down through holes in the ice to a depth of 200—500 met.; they have been mentioned by Giesbrecht and Wolfenden respectively as *M. pygmæus* and *pusillus*. The latter has pointed out that Giesbrecht's description refers to *M. pusillus* (viz. comparatively short antennulae). Giesbrecht's localities lie between 71°18 and 69°48 Lat. South and 92°22 and 81°19 Long. W. If this identification is right, the species should certainly be found in the deep sea all over the world.

Remarks. I am fairly convinced, that the characters, which Sars has set forth to distinguish *Microcalanus pygmæus* and *pusillus* viz: shape of St. pes IV and length of the antennulae are not sufficient. In this point of view I have been even more convinced by examing some specimens from the North of Iceland, placed at my disposal by the kindness of Dr. Paulsen and determined by Professor Sars as *M. pusillus*. Most of the specimens were young males with the antennulae reaching about to the middle of the abdomen; the spinulation of the St. of the natatory legs was not very coarse. In a single specimen (lengt 0·84 mm.) the St. pes III has 16 dentations in proximal half in contrast to Sars figure of *M. pusillus* with 10 teeth, and to an adult female from Ingolf St. 8 with about 20. It seems evident to me that Paulsen's specimens ought to be referred to *M. pygmæus*, and the fact that even such an authority as Sars has difficulty in distinguishing the two species from each other, makes reservation necessary with regard to several identifications found in literature, and bears out my doubts with regard to the validity of the two species.

The partial value of the two main characters have been mentioned. According to Sars the size of the adult specimens of *M. pusillus* scarcely exceeds 0·7 mm.; several of my specimens are smaller. Mràzek, who has examined ♂ and ♀, varying in size from 0·60 to 0·75 suggests the possibility of referring them to two species, and Kraeeft points out minor differences between his specimens of *M. pusillus* and Sars' decription. It may be admitted that a careful re-examination of a good material from the different localities is necessary before settling the qustion of the identification of the species.

12. Clausocalanus arcuiformis Dana.

(Pl. I figs. 9 a—d).

1849. Clausocalanus arcuiformis n. sp. Dana.
1892. — — Dana. Giesbrecht, pp. 185—190, taf. 1, 2, 10 and 36.
1894. Clausocalanus arcuiformis Dana. Th. Scott, p. 73, pl. 8.
1895. — — — Giesbrecht p. 248.

1898. Clausocalanus arcuiformis Dana Giesbrecht & Schmeil, p. 27.
1899. — — — Brady, p. 32.
1900. — — — Wheeler, p. 171, fig. 9.
1901. — — — Cleve, p. 5.
1903. — — — J. C. Thompson & A. Scott, p. 243.
1903. — — — Cleve, p. 359.
1904. — — — Cleve, p. 188.
1905. — — — Wolfenden, p. 999.
1905. — — — Esterly, p. 142, fig. 13.
1905. Clausocalanus arcuiformis Dana G. O. Sars, p. 3.
1906. — — — Pearson, p. 9.
1908. — — — v. Bremen, p. 23, fig. 20.
1908. — — — Farran, p. 28.
1909. — — — Pesta, p. 22.
1909. — — — A. Scott, p. 32.
1910. — — — Steuer, p. 22.
1910. — — — Farran, pp. 91–92.
1911. — — — Wolfenden, p. 203.
1912. — — — Pesta, pp. 20–21.
1912. — — — Sewell, p. 360.

Description. Between the specimens described by Giesbrecht and my specimens scarcely any differences were found. As far as the oral surroundings are concerned they scarcely show features of greater interest. Just behind the rostrum a low epistoma bearing a few rather short and strong bristles (fig. 9a) is found. In the middle of the *labrum* proper a rather prominent, narrow and hairy process is found, on each side of which a group of rather short setae is seen. Posteriorly the labrum is on each side produced into a hairy wing-like rounded expansion. The oral surface of the labrum (Pl. I fig. 9c) possesses on each side 3—4 longitudinal rows of short setae, and between these 3 transverse groups, of which the posterior is the most developed.

The *lamina labialis* has three subdivisions. Orally and anteriorly two interiorly convex series of hairs are observed on each side. The arrangement of the hairs behind the lamina labialis did not show features of greater interest (Pl. I, fig. 9d).

Occurrence. This species seems to be extremely rare within the area explored by the Ingolf Expedition; I have only examined 11 full-grown females and a single young one, which were taken $^{24}/_{4}$ 1889 59° Lat. North and 17° Long. West.

Distribution. The species has previously been found on the west coast of Ireland[1]. In the Mediterranean it has been recorded by several authors. In the northern as well as in the southern parts of the Atlantic Seas it has been captured by the Monaco and the German Antarctic Expeditions. On the west coast of South America it has been found as far south as 53° S. By Wolfenden it is recorded from the Maladive Islands and from the Antarctic Seas as far south as Lat. 84°01, and by Brady from New Zealand (at the surface). In the Pacific Ocean it has been found between 20° Lat. North and 26° Lat. South. Vertical range from the surface to 4000 met. Cleve has found the species in the Arabian Sea (Temperat. between 24·8° and 26·7° C. and salinity between 36·20 and 35·77 ‰), the Indian Ocean (7—4° Lat. North T. 27·7°—29·35° C., Sal. 30·84—34·38 ‰) and in the Malay Archipelago (T. 25·3°—28·30° C. Sal. 32·22—33·80 ‰). According to Scott (1909 p. 32) it is moderately common over the whole area investigated by the Siboga Expedition.

13. **Spinocalanus abyssalis** Giesbrecht.

(Plate I figs. 10a—b; textfigs. 15a—e).

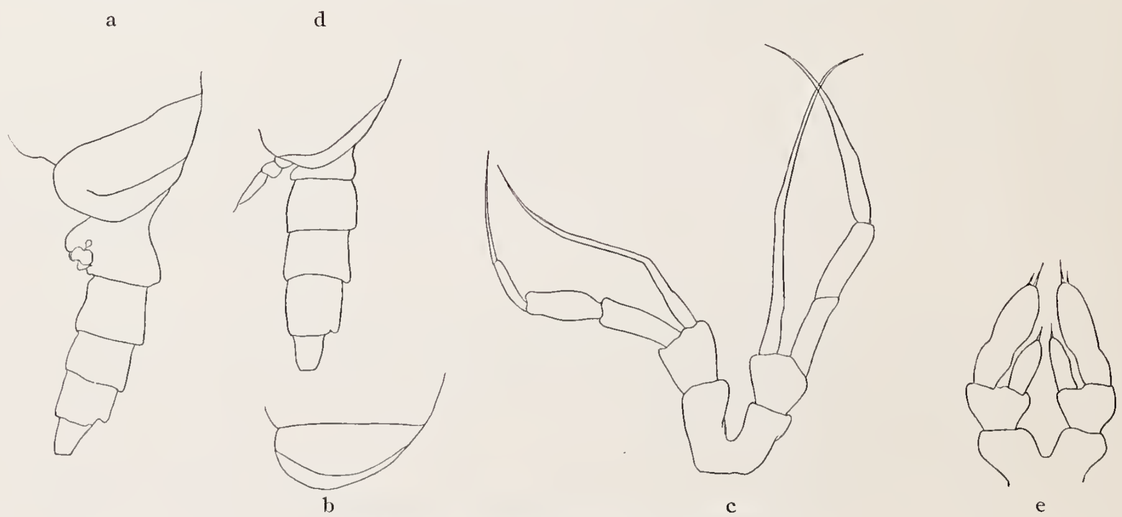
1888. Spinocalanus abyssalis n. sp. Giesbrecht.
1892. — — Giesbr. Giesbrecht, 1892 pp. 209–213, taf. 13 and 36.
1900. Spinocalanus longicornis n. sp. (♀) G. O. Sars, pp. 75–78, pl. XXII.

[1] According to Farran (1910 p. 92) "it is occasionally carried by currents into the mouths of the English Channel and the British Channel, but has not yet been recorded from the west or north coast of Scotland". (Salinity 35·4 ‰).

1902? Spinocalanus Schaudinni n. sp. Mràzek, pp. 509—512, taf. IV, taf. V fig. 1.
1903. — longicornis G. O. Sars. G. O. Sars, pp. 22—23, pl. XII.
1903. Spinocalanus abyssalis Giesbr. G. O. Sars, pp. 157—158; supplement pl. III fig. 2.
1908. — — — v. Bremen, pp. 28—29, fig. 27.
1908. — — — Farran, p. 27.

Description. f♀. Size: varied from 1·73 to 1·86 mm. Sars' specimens measured 1·1—1·6 and Giesbrecht's 1·1—1·25 mm.

The specimens which I have examined are certainly to be referred to Gbt.'s species in spite of minor differences, in which I most often agree with Sars' description. The head and the first thoracic segment are completely fused except in a single specimen, in which there was indication of a subdivision. The fifth thoracic somite is, as seen in text-fig. 15 a, only indistinctly marked out in front. The ventral protuberance of the genital somite is less prominent than figured by Giesbrecht, and more prominent than drawn by Sars, and the shape is somewhat different.



Text-fig. 15. *Spinocalanus abyssalis* Giesbr.
a. f♀. Abdomen × 170.
b. f♂. Lateral thoracic corner × 170.
c. f♂. Pes V in anterior view × 225.
d. y♂ (stage V). Abdomen × 170.
e. y♂ (stage V). Pes V × c. 225.

The oral appendages are scarcely different from Giesbrecht's description. In the structure of the natatory legs a few differences are observed. The number of bristles which are present on the anterior surface of the second basipodite are fewer in number than figured by Giesbrecht. The exterior seta of the first outer segment of the first pair of legs is distinctly more slender than that of the following segments. The number and the arrangement of the spines or setae which adorn the surface of the exopodites and endopodites in the last three pair of legs show variations from specimen to specimen, and are not quite like Giesbrecht's description; in most specimens f. inst. short spines are observed, as figured by Sars (Pl. XII), not only on the posterior, but also on the anterior surface of the two last segments of the endopodites. In the second pair of legs the usual glandular pores were observed at the base of the exterior seta in the two last segments; none was observed in the basal segment.

The *labrum* proper is less prominent than figured by Sars (Pl. III 2c). In front of the hinder margin in the middle a transverse row of long bristles is observed, but here none along the margin proper; laterally a series of short setae is observed (Pl. I fig. 10a), and in front of these, partly on the oral surface, a group of short spines or granules is observed. Orally we find on each side an inner and an outer series of delicate bristles, arranged in a short posterior and a long anterior division. As far as the structure of the labium etc. is concerned I refer to the fig. 10b.

f♂. Size of male 1·63 mm.

The thoracic somite IV and V are as seen in the text-fig. 15b well separated. The *antennulae* have the articular-membranes between the segments 8∾9 and 10, 10 and 11, 11 and 12 rather indistinct; the antennulae become rather suddenly narrower beyond segment 14, which is wider than 15. The first to ninth segments possess two bristles in addition to one or two "Aesthetasken"; in the following segments, except in the 12th, no distinct proximal seta (Spr.) is observed, but small incisions, corresponding to their insertions; "Aesthetasken" are observed in several of the segments. The oral appendages are as shown and partly figured by Sars rather rudimentary. The *maxillulae* show the following features. The Le possesses 7 short bristles; the Li I has only a few rudimentary setae, and the rather prominent Li II—III have 3 short delicate bristles each. The Basp. has 5 and the Ri I—III 4 + 4 + 6 bristles, of which those of Ri III are fairly long and slender. The Re bears 11 partly powerful hairs. The *mandibles* are figured by Sars; the *antennae*, the *maxillae* and the *maxillipeds* are less powerful, but in the main features alike those of the female. The *labrum* and labial appendages show exteriorly a structure scarcely different from that of the female.

The Se of Re I pes I is even less developed than in the female. The structure of the fifth pair of legs (cf. text-fig. 15c) is in some points different from Sars' description; between the Re I and II on the right side an indistinct limitation is seen.

Y (St. V). Size: 1·45 mm.; anterior division 1·00 and the abdomen 0·45 mm.

The shape of the body is scarcely different from that of the female; there is indication of articulation between the head and first thoracic somite; the two last thoracic somites are, as seen in text-fig. 15d, well developed. The oral and natatory appendages are scarcely different from those of the females. The structure of pes V is shown in text-fig. 14e.

Occurrence. The Ingolf Expedition has taken 2 mature females, a single mature male and two young ones (St. V) $^{26}/_{6}$ 1895 2 p. m. V^{I}. 200—0 fathoms St. 25 63°30 Lat. N. 54°25 Long. W.

Distribution. This species has been taken at 2 different stations in the polar seas in about the 80th degree of latitude and the 134th degree of longitude east as well as at 81°32 L. N. by Rømer and Schaudinn, on the coast of Norway (Osterfjord Norway in the depth from 400—600 metres), and in moderate numbers on the west coast of Ireland "at all depths from 200 to 1000 fathoms". According to Giesbrecht it is found "99°—132° W. 3° S.—14° N. In 1000—4000 Meter Tiefe".

Remarks. The female described by Mràzek as *Spinocalanus Schaudinni* is certainly identical with the mentioned Species. His male, however, seems in rather important features to differ; in his specimen the segments VIII to XIV of the antennulae are completely fused (Taf. V fig. 1), and the pes V differs distinctly, especially by the Ri, the terminal seta of which just reaches beyond the end of Re I.

14. Spinocalanus magnus Wolf.

1904. Spinocalanus magnus n. sp. Wolfenden, p. 118.
1905. — — Wolf. Farran, pp. 30—31, pl. IV figs. 1—12.
1906. — — — Pearson, pp. 10—11.
1907. — — — Damas & Koefoed, p. 409.
1908. Spinocalanus magnus Wolf. Farran, p. 27.
1908. — — — v. Bremen, p. 29, fig. 29.
1911? — — — Wolfenden, pp. 216—217, text-f. 8, pl. XXV figs. 3—5.

Description. f ♀. Size of female from Thor St. 82 2·8 mm.; anterior division measured 2·2; urosome 0·6 mm. Wolfenden's specimens measured 2·75 and Farran's 2·9 mm.

As far as could be made out by the examination of the two very mutilated specimens, they do not seem to differ in any feature of interest from Farran's description.

In the second pair of legs no glandular pores were observed in the first outer segment, but a distinct one in the second segment, and three near the base of Se in the third outer segment.

In front of the labrum proper, which is very prominent, a smoothly rounded elevation was found; the structure of the labrum etc. was not examined in detail.

Occurrence. Of this species I have only examined two mutilated females, gathered by the Thor 14/6 1905 St. 82 51°00 L. N. 11°43 L. W. Yt. 1200 M. Wire.

Distribution. This species is according to Farran of frequent occurrence on the west coast of Ireland "from the surface to 1·000 fathoms, though never very plentiful". According to Koefoed & Damas it is found "dans la mer du Grönland: de 800 à aû moins 1·800 mètres". According to the tables prepared by Koefoed, it has been found at four stations, but according to the records from each single station it has only been found at St. 22 79° L. N. 1°52 L. E. 800—1350 metres and at St. 48 71° L. N. 18°58 L. W. 800—1000 metres. The species is by Wolfenden recorded from the Antarctic, but he is probably not right in referring the Antarctic animals to the northern species, as his figure shows the genital somite less distinctly produced.

Aetideidae G. O. Sars.

Little by little a good many genera of the *Aetideidae* have been established; these genera are not at all of equal value, and in their definition not the same principles have been followed. My material has not been sufficiently exhaustive for a final solution of the question, but nevertheless a few remarks upon the value and the position of the genera, which I have examined, may be useful.

As a whole I think that undue stress has been placed on the presence or absence of the lamelli-formed setae or spines along the inner margin of second basipodite in the fourth pair of legs. *Chiridius* and *Aetidiopsis* are the only genera in which marginal setae of usual structure without spines are found; in *Aetidius* (Pl. II fig. 1 c) terminally and posteriorly a few teeth were found in addition to the usual slender setae. In most species of *Gaidius*, *Gaetanus* and *Euchirella* the setae are transformed into more or less well developed spines. In *Undeuchæta minor* and nearly related species the margin is either completely smooth or possessses a few terminal teeth (cf. text-figure) and in *Chirundina*, the margin is either completely smooth as in *Ch. Streetsi,* or possesses well developed spines

(*Ch. abyssalis* and *pustulifera*). Corresponding to the difference between the mature females and males a difference is sometimes found between the two sexes in the penultimate stage; in *Gaidius tenuispinus* and *Euchirella rostrata* f. inst. the young female has along the inner margin of the second basipodite in the fourth pair of legs a few lamellous setae, while the young male has a few of usual structure; in most species of *Euchirella* and *Chirudina* the margin is smooth in both sexes in the penultimate stage.

The *Actidius* is a well characterized genus which, as far as can be concluded from the wanting glandular pore in Re I pes II and the well developed marginal setae in the fourth pair of legs, is a rather primitive form. The *Chiridius*, to which genus I refer not only *Ch. obtusifrons* without distinct rostrum, but also *Ch. armatus* in similarity to Sars and in contrast to Vanhöffen and Wolfenden, is among other features characterized by the wanting plate-shaped process of the second basipodite of the maxillipeds, the well developed exopodite of the first pair of legs with 3 setae, and the slender marginal setae of the fourth pair of legs; as Giesbrecht had originally established the genus for a species without rostrum, Wolfenden and Vanhöffen have accepted the name *Pseudoaetidius* for *Ch. armatus*; Sars has judged this single character as being of minor importance, and he is certainly right, especially when it is taken into consideration that a rudimentary slightly bifurcate rostrum is really found. On account of the great number of glandular pores in the three last pair of legs (Pl. II figs. 3—5a) I once thought that Wolfenden was right; but as *Ch. modestus* n. sp., which in other respects was like *Ch. armatus*, has 3 glandular pores (including one in Re I), I definitively accepted Sars' definition. Sars has established a new genus *Ætidiopsis* synonymous with Wolfendens *Faeroella*, especially characterized by well developed fifth thoracic tergite; as a fairly well marked fifth somite is found in most specimens of *Ch. armatus*, I do not think this genus is a good one. A. Scott's new genus *Gaidiopsis* (1909 p. 52), characterized by a very robust rostrum, is probably nearly related to *Chiridius*.

The genera *Bradyetes* Farr. and *Undinopsis* G. O. Sars (synonymous with *Bradyidius* Giesbr.) are nearly related; *Pseudoeuchæte* Sars is according to Farran related to these genera as well as to *Bryaxis* Boeck, the position of which seems to be a little doubtful on account of the poorly developed outer ramus of the antennae. The position of Sars' genus *Chiridiella* is very doubtful. I have not had the opportunity of examining any specimens of the last mentioned five genera.

According to Giesbrecht (1892 p. 249) the genus *Gaidius* has "rostrum kurz einspitzig" and "Aussenast des ersten Fusses zwei ... und Innenast des 1. und 2. Fusses eingliedrig" and the only difference from *Gaetanus* is found in the frontal spine and the two-segmented endopodite of the second pair of legs of the latter genus. The character found in the segmentation of the endopodite of the second pair of legs is not of much value, as this articulation is well developed in most species of *Gaetanus* as well as in *Gardius brevispinus*, slightly developed in *Gaetanus miles* and *Gardius tenuispinus,* and completely wanting in *Gaetanus minor.* The presence or absence of the frontal spine seems to me to furnish a good specific, but scarcely a generic, character; Sars seems to share this opinion, as he has established a *Gaetanus inermis* without any spine. Wolfenden has established a new genus *Mesogaidius* (1911 p. 223) for his *M. intermedius*, perhaps identical with *G. brevispinus*, and his *M. maximus*, because they combine the wanting frontal spine with "das Vorhandensein eines Zipfel am Aussenaste der hinteren Antennen und einer eigentümlichen Chitinlamelle am Rande der hinteren Maxillipeden". The former character is found in *G. tenuispinus* as well (Pl. III fig. 2 b), and the latter is scarcely sufficient; the exopodite of the first pair of legs of *M. maximus* has 3 distinct segments, each with a well developed outer seta, a character not found in any *Gaidius* or *Gaetanus* known to me. If we regard the following species of *Gaidius* and *Gaetanus* as forming one group, the natural division will probably be the following: 1) the *Gardius tenuispinus* which has no frontal spine and no lamina in the second basipodite of the maxillipeds; the second segment of the exopodite of the antennae possesses a distinct process for the second seta, the first segment of the exopodite in the second pair of legs has no glandular pore, and the inner margin of the second basipodite in the fourth pair of legs in the young females has a few stiff setae, while in the young males it has a few of usual structure, 2) the *Gaidius brevispinus* which has a well developed lamina in the maxillipeds of the female, and the male of which has not a minute outer seta in the second segment of the exopodite in the second pair of legs, 3) the *Gaetanus Kruppi* and *latifrons*, which differ from the two preceding species by the frontal spine, and the presence of ten instead of eleven setae in the exopodite of the maxillulae, but in other respects, except the lamina of the maxillipeds, agree with *G. tenuispinus* 4) *Gaetanus minor* which, except for the wanting glandular pore in the first outer segment in the second foot, completely agrees with the preceeding group; and 5) *Gaetanus pileatus* and *miles*, which in addition to the wanting glandular pore of the second foot do not possess any process in the second outer segment of the antennae, and have the inner margin of the second basipodite in the fourth foot smooth in both sexes in the penultimate stage. For settling definitively the question of the relative position of the species, the structure of the fifth foot in the male of *G. miles* must be known. At present I am inclined to regard *Gaidius tenuispinus* and *Gaetanus Kruppi* as being more nearly related to each other than the latter species is to *Gaetanus miles*. In addition to the mentioned characters all the enumerated species have the lamina labialis rather simple, without the division in three portions as in *Euchirella*, in contrast to *Chiridius* and *Aetidius*. The position of *Chirudina*, to which not only *Ch. Streetsi* but also *pustulifera*, *abyssalis*, *notacantha*, *parvispina* and *spectabilis* are referred, is a little doubtful. These species are in several respects rather different, but show their affinity by the structure of the oral surface of the labrum, and the structure of the fifth pair of legs in the male; the second outer segment of the antennae have distinct setigerous processes, the outer surface of the maxillae (Pl. V figs. 5 c) is not very produced, the maxillipeds have a rather characteristic structure, the exopodite of the first foot is more or less distinctly three-divided, with three outer setae, and the glandular pore of the first outer segment is wanting in the second foot; the inner margin of the second basipodite in the fourth pair of legs is either more or less smooth, or has a distinct corona of spines in the mature female, but is completely smooth in both legs in the penultimate stages. Some of these characters suggest affinity to *Chiridius*, others to *Gaidius*; if Wolfenden's *Mesogaidius maximus* with a lamina in the maxillipeds, and the outer edged spines in the second pair of legs, really belongs to this genus, a connecting link with *Gaidius* is found. The three last species ought perhaps, on account of the structure of the fifth pair of legs, to form an independent genus, and others, f. inst. *Ch. pustulifera*, ought perhaps, as suggested by Sars, to be referred to *Undenchœte*, the most nearly related genus. As, however, the three or five species which I have referred to this genus form a well defined group, I have preferred to exclude other species of somewhat doubtful position, as well as to let Wolfenden's genus *Mesundeuchæta* go out. Though the different species of *Euchirella* differ from each other in several important features, I think the genus is a quite natural one, as it is not only characterized by the structure of the antennae and maxillulae, but also by the presence of a glandular pore at the base of Se I Re II pes II—IV (cf. *Chiridius*), which is wanting in the penultimate stage. In *Euch. rostrata, messinensis, maxima* and *betumida* a glandular pore is wanting in the first outer segment in the second pair of legs, but in *E. curticauda* and *intermedia* it is wanting in the third and fourth pairs of legs as well. In addition to the generally accepted specific characters, good ones are found in the structure of the oral surface of the labrum, in the number of bristles of the exopodite of the maxillulae in the males, and in the marginal hairs of the second basipodite of the fourth pair of legs.

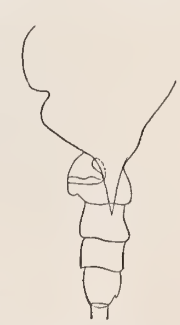
15. **Aetidius armatus** Boeck.

(Pl. II fig. 1 a—d; text-fig. 16).

1872. Pseudocalanus armatus n. sp. Boeck, p. 38.
1883? Aetidius armatus n. sp. Brady, p. 75.
1892. nec. — — Brady. Giesbrecht, p. 213, taf. 2, 14 and 36.
1893. pars. — — — Th. Scott, p. 70.
1898. pars. — — — Giesbrecht & Schmeil, p. 31.
1901. — — Boeck. Th. Scott, p. 238.
1902. — — — Th. Scott, p. 451.
1902. — — — G. O. Sars, pp. 25—26, pls XIII—XIV.
1903. — — — Norman, p. 136.
1903. — — — Jensen, Johansen, Levinsen, p. 304.
1903? — — Brady. J. C. Thompson, p. 16.
1904. Aetidius tenuirostris n. sp. Wolfenden, pp. 116—117.
1905. — armatus Boeck. Farran, p. 31.
1905. — — — Esterly, p. 145, figs. 14 a—b.
1905. — — — Th. Scott, p. 222.
1906. — — — Pearson, p. 11.
1908. — — — v. Bremen, p. 30 fig. 30.
1908. — — — Farran, p. 28.
1909? — — — Pesta, p. 23.
1909. — — — A. Scott, pp. 37—38, pl. IV, figs 14—25.
1910. — — — Steuer, pp. 23—24.
1910. — — — Wolfenden, p. 209, text-fig. 4.
1911. — — — Farran, pp. 81—82.

Description. ♀. Size of specimen from Ingolf St. 47, 1·93 mm.: anterior division (head + som. thor. I 0·920; somite II—V 0·575) 1·495; urosome 0·437 mm.

The head is as figured by Sars etc. vaulted in a characteristic way without frontal keel, and the rostrum has two pointed branches without basal tubercle. The genital somite, which is both wider and deeper than long, has a receptaculum seminis (text-fig. 16) which is distinctly different from that of *A. Giesbrechtii* Cleve 1904 (synonymous with *A. mediterraneus* Steuer 1910), as seen by comparing figs 1 a—b with Giesbrechts fig. 9 Taf. 36; the vulva (fig. 1 b) is also somewhat different from Giesbrecht's fig. 8.



Text-fig. 16. *Aetidius armatus* Boeck. Abdomen in left view × 57.

The measurements of the antennulae are distinctly different from those given by Giesbrecht, as the segment 23 is shorter than 22, and as segment 24 ∾ 25 is respectively 1·4 and 1·5 as long as segment 8 ∾ 9 and 2 (not 2 and 2·5). The antennae differ from Sars' as well as from Giesbrecht's figures by the small process on which the proximal seta of Re II is placed. The other mouth appandages show some differences from Sars' figures, but not in any feature worth to be mentioned from Giesbrecht's description.

The pes I differs from Giesbrecht's description (fig. 10) by the second basipodite, which has no setae exteriorly and distally, and by the third one, which has no spinous area laterally and anteriorly.

The pes II has the articular membrane between Re I and II distinct anteriorly, but missing posteriorly; the basp. II pes IV has, in addition to marginal row of setae, posteriorly and just proximally to the Si a transverse row of 4 short spines (Pl. II fig. 1 c), which corresponds to the two spines mentioned by Giesbrecht but not by Sars and Scott. Glandular pores were found at the base of Se Re II and Se 3 Re III in the three posterior pair of legs, and in addition to these a pore was found at the base of Se Re I in pes III—IV.

The *labrum* is in lateral view like Sars' figure, with a short anterior elevation, which by a low incision is separated from the labrum proper; this is, anteriorly, evenly convex and, posteriorly towards the free margin, slightly concave. In front of the marginal row of setae along the free posterior margin no setae were found. The oral surface of the labrum is most like that of *Gaidius*; the longitudinal group 1 consists of a single series of fairly long hairs; the groups 2—5 are only indistinctly separated, and only the groups 4—5 are 2—3 setae deep. The lamina labialis and the setae in front of it have a structure as shown in figure 1 d.

Y♀ (V). Size of specimen from St. 45 1·58 mm., anterior division 1·23 mm.; urosome 0·35 mm.

This stage differs distinctly from that of the adult female by the structure of the abdomen. The head is well separated from the first thoracic tergite, and the fifth from the fourth; the appendages do not show any difference of importance, except the even less developed articulation between Ri I—II pes II, and the wanting spines in besipodite II pes IV, which has however the usual marginal setae.

Occurrence. The Ingolf Expedition has gathered this species at the following stations viz:

1/7 1895	St. 27	64°54 L. N.	55°10 L. W.	V[1]. 200—0 fm.	Temp. at surface	3·9° C.	1 f♀.
26/6 1895	St. 25	63°30 L. N.	54°25 L. W.	V[1]. 200—0 fm.		2·9° C.	1 f♀.
30/7 1895	St. 38	59°12 L. N.	51°06 L. W.	V[1]. 100—0 fm.		10° C.	1 f♀.
18/6 1895	St. 19	60°29 L. N.	34°14 L. W.	V[1]. 300—0 fm.		9° C.	6 f♀.
20/5 1895	St. 11	64°34 L. N.	31°12 L. W.	V[1]. 200—0 fm.		8·2° C.	1 f♀.
12/5 1896	St. 47	61°32 L. N.	13°40 L. W.	V[1]. 100—0 fm.		10° C.	15 f♀.
15/5 1896	St. 52	63°57 L. N.	13°32 L. W.	V[1]. 200—0 fm.		8·3° C.	1 f♀.
20/5 1896	St. 57	63°37 L. N.	13°03 L. W.	V[1]. 100—0 fm.		8·2° C.	11 f♀.
20/5 1896	St. 59	65° L. N.	11°16 L. W.	Apst. 12		1·5° C.	1 f♀.
11/5 1896	St. 45	61°32 L. N.	9°43 L. W.	V[1]. 100—0 fm.		9·1° C.	2 f♀, 1 y♀ (V).

In addition to these Captain Wandel has 1891 at 67°07 L. N. 11°41 L. W. taken 1 f♀, and the Danish East Greenland Expedit. 1900 10 p. m. F. 403 has gathered a single female 60°29 L. N. 12°10 L. W.

Distribution. This species is according to Farran "a characteristic inhabitant of the lower layers of the North-East Atlantic off the coast of Ireland and Scotland": It has been found in the cold as well as in the warm area of the Faeroe channel, the northern part of the North Sea, and several of the Norwegian fjords. It has been taken off the Finmark coast N. W. of Nordkyn and north of Iceland. The records of the Ingolf. Exp. show that it is also found in deep waters, probably as a member of the Atlantic fauna, in the Iceland-Færoe channel, Denmark and Davis Straits. This species seems to have a very wide distribution; according to Scott and Wolfenden the specimens which they have referred to *A. armatus* are not to be distinguished from specimens from the northern seas. The gulf of Guinea, the South Atlantic, the Indian and Malayan Seas ought accordingly to be regarded as lying within the range of this species. Even if Sars is right, that some of Brady's specimens are identical with Boeck's species, we are not right in concluding that the species has the distribution stated by Brady (cf. A. Scott's remark p. 37).

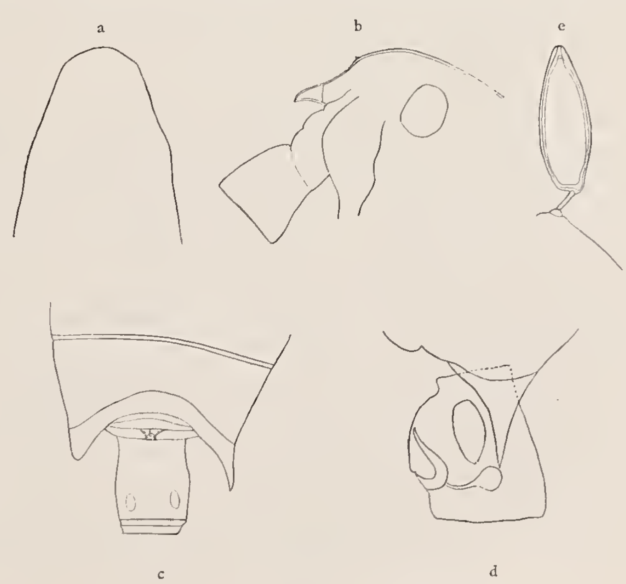
16. Chiridius armatus Boeck.

(Pl. II figs. 3a—e; text-figs. 17 a—d).

1872. Euchæte armata n. sp. Boeck, p. 39.
1897. nec. Pseudocalanus armatus Boeck. Vanhöffen, p. 279, fig. 16.
1900. nec. Chiridius armatus Boeck. G. O. Sars, pp. 29—30.
1903. — — — G. O. Sars, pp. 27—29, pls. XV—XVI.
1903. — — — Jensen, Johansen & Levinsen, p. 304.
1904. Pseudoaetidius armatus Boeck. Wolfenden, pp. 115 and 131, pl. IV figs. 29—31.
1905. Chiridius armatus Boeck. Farran, p. 34.
1905. — — — G. O. Sars, p. 2.
1905. — — — Th. Scott, p. 222.
1906. Pseudoaetidius armatus Boeck. Pearson, p. 11.
1907. Chiridius armatus Boeck. Koefoed & Damas, p. 408.
1908. — — — Farran, p. 30.
1908. Pseudoaetidius armatus Boeck. v. Bremen, p. 33, fig. 34.
1911. Chiridius armatus Boeck. Farran, pp. 90—91.
1913. nec — — — Stephensen, p. 316.

Description. f♀. Size of specimens from Thor St. 172 measured 4·43 mm., anterior division 3·3 mm., urosome 1·10 mm. The smallest specimen (Thor St. 72) measured 3·6 mm.

The body differred in the following features from Sars' description; laterally and beneath, the limitation between the head and first thoracic tergite is indicated; the fifth thoracic tergite, which is produced into well developed triangular points, is short, but well distinguished (text-fig. 17 c). The genital somite is only slightly produced beneath, and the receptaculum has, as seen in fig. 17 d, a characteristic structure. The furcal rami, which are a little longer than the anal somite, are scarcely 1·3 as long as wide.



Text-fig. 17. *Chiridius armatus* Boeck.
a. Head in dorsal view × 16. b. Head in lateral view × 60. c. First abdominal somite in dorsal view × 50. d. Lateral corner etc. × 60. e. Parasite attached to the right maxilla × 74.

The *antennulae,* which have the segment 25 well marked out with rather indistinct articular membrane, have the segment 2 a little longer than 8∾9, which is as long as the segment 20; the segment 21 is a little longer than 18, and the segment 23 is distinctly 1·1 as long as 24. The arrangement of the appendages is scarcely different from that of *Ch. obtusifrons;* the posterior seta of the segment 23 just reaches the tip of the segment 25. The exopodite of the *antennae* is scarcely 1·4 as long as the endopodite. The Le 1 of the *maxillulae* has as usual 9 setae and the Li 2 possess 5 spinelike setae, the Li 3, which terminally on the anterior surface has a curved row of short spines, has 4 setae, and the basipodite III has a similar row of short spines and

5 setae. The Ri has 13 setae as the Ri I has 3 Sa + 1 Sp, and the Re has only 10 setae. The posterior seta of the first lobe of the *maxilla* is at least 3 times as long as the lobe itself. In the maxillipeds the third basipodite is about 1·3 as long as the second, and three times as long as the endopodite. The fourth lobe possesses in addition to the usual 3 hairs a short hairy sensory process. In contrast to Sars' figure the distance between the Si 2 and Si 3 is 2·5 as long as the distance between the Si 1 and 2.

The *first pair* of legs has the Se Re I just extending beyond the tip of Re II. On the anterior surface of Re II, near the lateral margin, 1—2 minute pores are often observed, and at the outer margin of Re III, somewhat posteriorly, just in the middle, a pore, placed on a minute process surrounded by delicate hairs, is found. The pes II has a fairly distinct articular surface between Re I—II anteriorly, but posteriorly it is partly wanting in contrast to pes III—IV, in which it is well developed. The *terminal spine* has 40—50 well separated teeth (fig. 3 a). On the anterior surface of the Ri III the usual glandular pore surrounded by delicate hairs is found in the last three pair of legs; the usual *glandular pores* at the base of Se Re I—III in the three last pair of legs are not seen, but they are certainly represented by a number of pores which, as shown in fig. 3 a, in the arrangement provides an important character for this species; the "pore" is formed by a chitinous ring, in the middle of which a generally longitudinal split is seen. In the Re I a single pore and in Re III three are found in pes II—IV, but in Re II a single is found in pes IV, but 2 in pes II—III.

The lateral outline of the *labrum* is like Sars' figure Pl. XV, and scarcely different from *Aetidius*. The anterior surface of the labrum has, in addition to the usual marginal row of setae which are fairly slender in the middle and more like granules laterally, in the middle a transverse row of laterally shorter setae, and in front on each side a group of short setae.

The oral surface of the *labrum* is rather characteristic (fig. 3 b). In front of the chitinous transverse bar behind the median central spot Nr. 3, a transverse row of short setae is found; around and behind the median spot 4 (S4) short setae are placed in transverse rows. The skin is everywhere, especially posteriorly, minutely granular. The lateral longitudinal series consists as usual of 5 groups; the two first groups are placed somewhat longitudinally, are distinctly longer than wide, and consist of short spinules, most like granules; the groups 3—5 are, in contrast to the two first, less well separated, and consist of an inner row of longer and an irregular, outer group of scattered shorter hairs.

The lamina labialis (fig. 3 c) is in the shape of the dentations somewhat different from that of *Ch. obtusifrons* (fig. 2 a), and it is almost smooth. The arrangement of the groups of hairs in front of and behind the lamina labialis I refer to *Ch. obtusifrons*. About the arrangement of the series of bristles on the labial lobes, the fig. 3 d will give an impression.

f♂. Size: Specimen from Thor St. 99 1904 measured 3·66 mm., anterior division 2·65 mm. urosome 1·01 mm.

The body seems to be more slender than figured by Sars; the anterior division is 2·6 as long as the urosome; the fifth thoracic tergite is well distinguished. The first abdominal somite is somewhat assymmetric, and the genital pore is found on the left side; the second somite is three times as long as the first; the furcal branches, which are almost twice as long as the anal somite, are 1·6 as long as wide.

The *Antennulae* are in the main like Sars' figure; the segments 24 ∾ 25 are almost completely fused; the segments 8 ∾ 9 and 10 as well as the 20—21 are almost completely fused on the right side, but fairly well distinguished on the left side. The segments 8 ∾ 9 are a little longer than 2, which is about 1·2 as long as segment 20; the posterior seta of segment 23 is very short. The *antennae* are scarcely different from those of the female, in contrast to the *mandibulae* which, except for the presence of 2 instead of a single seta in Ri, are completely like Sars' figure without distinct manducatory plate. The manducatory part of the *maxillulae* is scarcely developed, and the rudimentary Li I bears a few short sensory appendages instead of spines; the Li 2 is not developed; the Li 3 bears 2 feathery bristles, the basipodite 3, and the endopodite 9 setae; the exopodite possesses 9 strong plumous setae. The *maxillae* are comparatively more slender than figured by Sars, with a number of very short spinnles and three proximal knobs. The *maxillipeds* differ from those of the females by the comparatively long Basp. III, which is 1·7 as long as the second. The first four pair of legs is scarcely different from those of the females. Pes V is scarcely different from Sars' description; the Ri sin (fig. 3 e) is rather elongate; about the structure of the right and the left exopodite I refer to figs 3 g—f.

Y (Stage V). Size: Specimen from Thor St. 72 measured 3·05; anterior division 2·4 mm., urosome 0·65 mm. Another specimen was 3·65 mm.

The abdomen consists as usual of four somites, of which the second is the longest; the antennulae are comparatively longer than in the females, and reach to about the end of the second abdominal somite; the articular membrane between the Ri I—II pes II is only indicated by a faint line. The pes V of the male is, as shown in Pl. II fig. 3 h, like that of *Gaidius*.

Y♂ (Stage IV). Size: Specimen from Thor St. 82 measured 2·16 mm.; anterior division 1·7 mm.; urosome 0·46.

The shape of the body is like that of the adult specimens, but the abdomen has only three somites; the number of segments is somewhat reduced in pes IV, as Re II ∾ III and Ri II ∾ III are mor a less completely fused. Two glandular pores were observed in Re III and one in Re I. The pes V is rather rudimentary, as seen in fig. 3 i.

Variation. In a few specimens from Thor St. 172 $^6/_9$ 1905, which, except for the less prominent sexual area, were in all other respects like the adult females, a fifth pair of legs, as shown in fig. 3 j, with the right leg the longer, was found. In a specimen from St. 72 (Thor 1905) the left leg was longer and more slender (fig. 3 l), and in one from St. 173 (Thor $^7/_9$ 1905) fig. 3 k the right leg was again the longer. In two specimens from St. 104 (Thor $^{24}/_5$ 1904), and in one from St. 99 (Thor $^{22}/_5$ 1904), the pes V was like fig. 3 e; the last mentioned specimens as well as one from St. 153 ($^7/_9$ 1905) with pes V dext. > sin. and well developed eggs had the genital somite of female type, but without distinct receptaculum seminis.

As most of the mentioned specimens were in all respects but the presence of pes V like the typical ones, and as the mentioned stucture was variable to a degree, it must be regarded as a kind of abnormity (cf. similar structures in *Pseudocalanus*).

Parasites. In a single adult female from Thor $^1/_9$ St. 285 a stalked parasite was found, attached to the first basipodite laterally on the anterior surface of the right maxilla; the body consisted of a chitinous wall and a granular content, and was as a whole not quite unlike a spermatophor. (text-fig. 17 e).

Occurrence. Of this species the Ingolf Expedition has taken a single adult female $^{26}/_6$ 1896 St. 92 64°44 L. N. 32°52 L. W.

The Thor Expedition has gathered the species, fairly common, at several stations, most often in deep hauls.

Thor $^{11}/_7$	1904.	St. 153.	65°20 L. N.	27°12·5 L. W.	Yt. 800 M. Wire	1 f♀; 1 f♂; 1 y♂ (V).
$^{9}/_7$	1904.	St. 178.	63°08 L. N.	21°30 L. W.	Yt. 750 M. Wire	1 f♀.
$^{1}/_9$	1904.	St. 285.	62°49 L. N.	18°46 L. W.	Yt. 500 M. Wire	17 f♀.
$^{11}/_7$	1904.	St. 183.	61°30 L. N.	17°08 L. W.	Yt. 1800 M. Wire	15 f♀; 2 f♂; 2 y♂ (V).
$^{24}/_5$	1904.	St. 104.	62°47 L. N.	15°03 L. W.	Yt. 1500 M. Wire	8 f♀; 1 y♂ (V).
$^{29}/_8$	1905.	St. 164.	61°20 L. N.	11°00 L. W.	Yt. 300 M. Wire	2 f♀.
$^{22}/_5$	1904.	St. 99.	61°15 L. N.	9°35 L. W.	Yt. 1700 M. Wire	2 f♀; 2 f♂.
					Yt. 900 M. Wire	3 f♀.
$^{12}/_5$	1904.	St. 78.	61°08 L. N.	9°28 L. W.		5 f♀.
$^{23}/_7$	1905.	St. 124.	61°04 L. N.	4°33 L. W.	Yt. 100 M. Wire	1 f♀.

Outside the Ingolf area the S/S. Thor has gathered the species at the following stations.

Thor $^{15}/_6$	1905.	St. 82.	51°00 L. N.	11°43 L. W.	Yt. 1200 M. Wire	1 f♀; 1 y♀ (V).
					800 M. Wire	2 f♀; 1 y♂ (V); 1 y♂ (IV).
$^{20}/_6$	1905.	St. 88.	48°00 L. N.	8°30 L. W.	Yt. 300 M. Wire	4 f♀; 1 y♀ (V); 2 y♂ (V).
$^{8}/_6$	1905.	St. 72.	57°52 L. N.	9°53 L. W.	Yt. 1500 M. Wire	75 f♀ (one with spermatophor) 1 f♂; 4 y♂ (V); 1 y♀ (V).
$^{9}/_9$	1904.	St. 294.	57°54 L. N.	7°38 L. W.		9 f♀.
$^{1}/_9$	1905.	St. 167.	58°42 L. N.	6°13 L. W.	Yt. 1500 M. Wire	17 f♀; 1 y♂ (V); 2 y♀ (V).
$^{6}/_9$	1905.	St. 172.	57°33 L. N.	4°26 L. E.	Yt. 300 M. Wire	121 f♀; 4 f♂; 5 y♂ (V).
$^{7}/_9$	1905.	St. 173.	57°52 L. N.	8°01 L. E.	Yt. 600 M. Wire	3 f♀.
					Yt. 300 M. Wire	4 f♂.

Distribution. The above mentioned localities affirm the conclusion arrived at by Farran at the base of the records in the literature "that *Chiridius armatus* is a permanent inhabitant of the North-East Atlantic, the Norwegian Sea south of 65° N., the Norwegian Channel and the Skagerak, at depths of from 300 to 2000 metres, and is also indigenous to all the deeper Norwegian fjords." It has been taken by the Monaco Expedition; the records of this species from the west coast of Greenland and from the North Polar Basin refer, as shown by Sars, really to *Ch. obtusifrons.*

According to Damas and Koefoed it has been taken at the following two stations by the Duc d'Orléans. Viz: St. 14 $^{9}/_7$ 1905 80°17 L. N. 5°40 L. E. between 340 and 600 meters (f♀ with ovisacs) and St. 23, $^{17}/_7$ 77°25 L. N. 4°03 L. W. between 480—640 meters; as, however, nearly related species exist, which have probably been confounded with *Ch. armatus* now and then, these localities ought to be accepted with due reservation.

Remarks. In spite of the small differences enumerated in the description, I do not doubt that this species is identical with that described by Sars from Norway, and with that which Wolfenden has described under the name of *Pseudaetidius* from the Færoe channel. According to my investigations the size of the specimens varied from 3·6 to 4·4 mm., the biggest being those from northern regions; Farran's (1905) specimens measured 3·3—3·5 mm., and even 2·65; these small specimens possibly belong to another species.

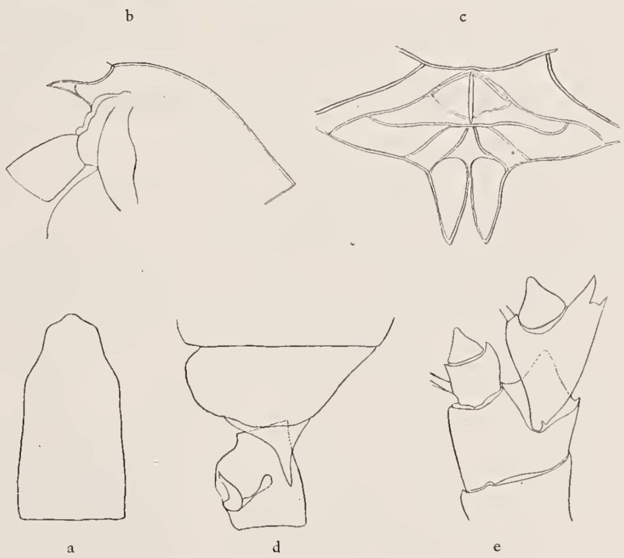
17. Chiridius nasutus n. sp.

(Pl. II fig. 4 a; text-figs 18 a—e).

1905. pars? Chiridius armatus Boeck. Farran.

Description. f♀. Size: Specimen from St. 167 2·88 mm.; anterior division 2·19 mm.; urosome 0·69.

The shape of the body is in the main like that of the preceding species, but somewhat more slender (text-fig. 18 a). The insertion of the antennulae is apparently better removed from the tip and the rostral spines, which are somewhat longer and basally swollen, and directed more forwards (text-figs 18 b—c). The anterior division is just three times as long as the abdomen. The genital somite (text-fig. 18 d), which has a receptaculum seminis like that of *Ch. armatus*, is about 1·5 as long as the third and 1·7 as long as the fourth somite; the furcal rami are 1·7 as long as wide and 1·7 as long as the anal somite; the last segment is about half as long as the third one. The *antennulae*, which extend somewhat beyond the end of cephalothorax, but scarcely to the end of the abdominal somite, have the segments 24 and 25 well defined; the measurements differ only in minor details, as the segment 20 is a little longer than $8 \backsim 9$, as the segment 18 is a little longer than 21, and as the segment 23 is scarcely 1·1 as long as 24. The appendages are like those of *Chiridius armatus*, but the Sp. of the segment 23 extends somewhat beyond the end of the segment 25. The *antennae* are like those of the preceding species, but the exopodite is 1·5 as long as the endopodite. The *mandibulae* and *maxillae* are scarcely different, and the *maxillulae* only by the smooth anterior surface of the third basipodite. In the *maxillipeds* the third basipodite is 1·5 as long as the second, and 2·2 as long as the endopodite. The legs are only in minor points different from those of *Ch. armatus;* the Se of Re I in the first pair of legs extends a little beyond the end of the second segment, the articulation between the Re I and II of the second pair of legs is well developed anteriorly as well as posteriorly, and its *terminal spine* has 30—40 spinules (fig. 4 a). A curious difference is found between this species and *Chiridius modestus* as well as *armatus* in the arrangement of the *glandular pores*; in the number of the pores it is, as shown in fig. 4 a, like *Ch. modestus*, as a single pore



Text-fig. 18. *Ch. nasutus* n. sp.
a. Head in dorsal view × 16. b. Rostrum from below × 150. c. Head in lateral view × 60. d. Genital somite etc. × 60. e. Pes IV dext. in anterior view with abnormal rami × 150.

was found in the three segments of the exopodites in the three last pair of legs, but in the position of the pores, especially in Re I—II, it is most like *Ch. armatus*, as these are placed on the anterior surface, well removed from the lateral margin.

Occurrence. This species was taken by the S/S Thor at the following 3 stations viz:

$^{11}/_{7}$ 1904. St. 183. 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 1 f♀.
$^{8}/_{6}$ 1905. St. 72. 57°52 L. N. 9°53 L. W. Yt. 1500 M. Wire 2 f♀.
$^{1}/_{9}$ 1905. St. 167. 57°46 L. N. 9°55 L. W. Yt. 1500 M. Wire 2 f♀.

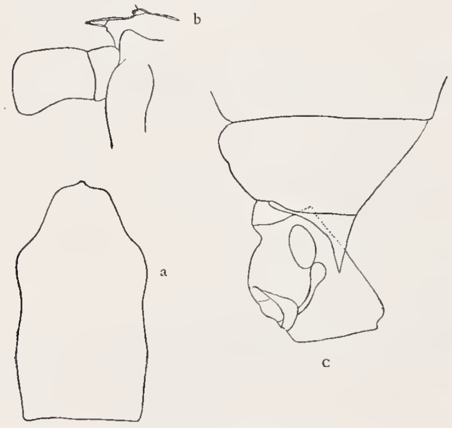
Remarks. This species, which on account of its small size, the prominent rostrum, and the curious arrangement of the secretory pores is well distinguished from *Ch. armatus,* is certainly new to science, as in the literature I have only found a single reference to a species of the *Ch. armatus* type of a size of 2·65 mm. (viz. Farran 1905 p. 34).

18. Chiridius modestus n. sp.

(Pl. II fig. 5; text-figs 19 a—c).

Description. f♀. Size: Specimen from St. 183 measured 3·69 mm.; anterior division 2·70 mm., urosome 0·99.

The rostral spines are longer and more prominent than in *Ch. armatus,* but less so than in *nasutus* (text-fig. 19 b). The outline of the head is anteriorly not fairly rounded as in *Ch. armatus,* but distinctly produced (text-fig. 19 a). The frontal organ is prominent, and the distance between it and the base of the rostrum is short and straight, not slightly concave as in the two other species. The cephalothorax, which is 2·5 times as long as wide, is scarcely 3 times as long as the urosome. The genital somite, which has a receptaculum seminis of the usual structure, is about 1·3 times as long as the third somite, and 1·7 as long as the fourth (text-fig. 19 c); the furcal rami are 1·6 as long as wide, and 1·4 as long as the anal somite, which is a little longer than the furca; the latter somite is scarcely half as long as the third one.



Text-fig. 19. *Chiridius modestus* n. sp.
a. Head in dorsal view × 16.
b. Head in lateral view × 60.
c. Genital somite etc. × 60.

The *antennulae,* which extend somewhat beyond the end of the thorax, have the 24—25 segments almost fused. The appendages and the measurements are scarcely different from those of *Ch. nasutus.* The *antennae* have the exopodite 1·4 as long as the endopodite; the Re I has, inwards, a conical process, but no seta, and the Re II has a medial and a terminal seta placed on a small protuberance, in addition to a basal protuberance without seta. The *mandibulae* and *maxillae* do not show any features of interest, and the *maxillulae* only differ from those of *Ch nasutus* by slightly developed spinulation of the anterior surface of the Li 3. The third basipodite of the *maxillipeds* is 1·4 as long as the second, and 2·4 as long as the endopodite; its 2 proximal setae are placed near to each other with the articular membranes confluent. The Se Re I in the first pair of legs extends distinctly beyond the end of the segment. In the second pair of legs (fig. 5 a) the terminal spine has about 80 densely placed, partly fused, spinules; in other respects, except the arrangement of pores, which, except for the more medial position is like that of *Ch. obtusifrons* etc., the legs are like those of preceding species.

Occurrence. The S/S. Thor has gathered a few specimens of this species at the following two stations.

$^{21}/_{6}$ 1904. St. 154. 65°27 L. N. 27°10 L. W. Yt. ? Wire 3 f♀.
$^{11}/_{7}$ 1904. St. 183. 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 2 f♀.

Remarks. This species, which seems to stand between the species of *Chiridius* without rostrum and *Ch. nasutus,* is well characterized by the shape of the rostrum and the position of the glandular pores.

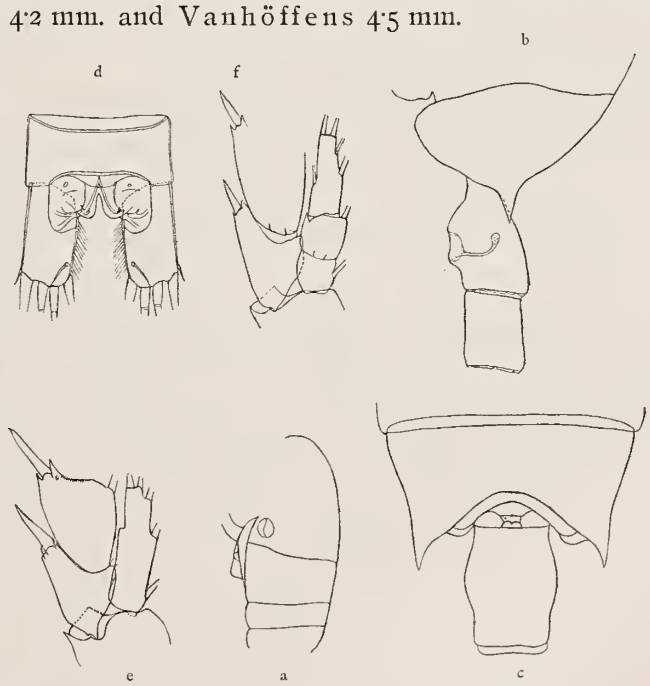
19. **Chiridius obtusifrons** G. O. Sars.

(Plate II figs. 2 a—b; text-figs 20 a—e).

1897. Pseudocalanus armatus Boeck. Vanhöffen, p. 279, fig. 6.
1900. Chiridius armatus Boeck. G. O. Sars, pp. 29—30, pl. XVII.
1902. — — — Mràzek, pp. 521—22.
1903. Chiridius obtusifrons n. sp. G. O. Sars, pp. 29—30, pl. 17.
1904. — — G. O. Sars. Wolfenden, p. 131.
1904? — Vanhöffeni n. sp. Wolfenden, p. 117, pl. IV fig. 23.
1907. — obtusifrons G. O. Sars. Koefoed & Damas, p. 408.
1907. Chiridius armatus Boeck. Vanhöffen, pp. 519—521.
1908. — obtusifrons G. O. Sars. v. Bremen, pp. 34—35, fig. 37.
1909. nec. Chiridius? obtusifrons G. O. Sars. A. Scott, p. 43, pl. XLIV figs 1—3.
1913. pars. — armatus Boeck. Stephensen, pp. 316—317.

Description. f♀. Size: Specimen from Thor St. 214 measured 4·39 mm.; anterior division 3·12 mm., urosome 1·27 mm. Sars' specimens measured 4·2 mm. and Vanhöffens 4·5 mm.

The shape of the body is as figured by Sars (cf. text-fig. 20 a). The articular membrane between the head and first thoracic tergite and between the fourth and fifth thoracic tergite (except in the middle) is often wanting; in the articular membrane between the last thoracic and the first abdominal somite chitinous lists of a rather curious structure are found (text-fig. 20 c). According to most authors no rostrum is observed; in several specimens, however, the rostrum was represented by a very short spine, sometimes showing trace of bifurcation as a median line, when observed from beneath. The anterior division is 2·4 as long as wide, and 2·4 as long as the abdomen. The genital somite, which has a receptaculum seminis of a similar structure as in *Ch. armatus*, but more slender, is 1·2 as long as the fourth somite; the furcal rami are almost twice as long as wide (text-fig. 20 d).



Text-fig. 20. *Chiridius obtusifrons* G. O. Sars. a. Cephalosome × 9. b. Genital somite in lateral view × 31. c. Genital somite in dorsal view × 33. d. Anal somite etc. in dorsal view × 60. e. (Downwards to the left) pes II in anterior view × 60. f. (In the middle above) pes III in anterior view × 60.

The *antennulae,* which almost extend to the posterior end of the genital somite, have the 24 and 25 segments fairly well separated; the segments 2 and 8 ∾ 9 are of equal length, and a little longer than the segment 20; the segment 18 is distinctly 1·1 as long as 21, and the segment 24 is a little longer than 23. The posterior seta of the segment 23 scarcely extends to the tip of the segment 24. The *antennae* have the exopodite almost twice as long as the endopodite, and the third basipodite of the *mandibulae* has the Si 1 shorter than figured by Giesbrecht (Taf. 14 fig. 17). The *maxillulae*, *maxillae* and the *maxillipeds* are scarcely different from those described by Giesbrecht; a small pointed process, placed behind the articular cavity of the maxillipeds, is better developed than in preceding species (text-fig. 20 a). The first pair of legs is like Sars' fig., but the Se Re I extends a little beyond the end of the Re II. In the second pair of legs (text-fig. 20 e) no trace of articulation was found between Ri I—II, neither anteriorly nor posteriorly; the articular membrane between Re I—II is anteriorly indicated by a faint line. Glandular pores are found at the base of the respective Se of Re I—III in the last three pair of legs; the articular membranes between the Re I—II in pes III—IV are scarcely better developed than in the second pair of legs, but the articulation between Ri I—II is marked not only by a lateral incision as drawn by Sars, but also by a faint line anteriorly (text-fig. 20 f).

The structure of the *labrum* is in most respects like that of *Ch. armatus*; the most interesting differences are found at the oral surface viz: the wanting transverse row of spinules behind the median circular spot Nr. 3, and the lateral group of spinules anteriorly which is divided into a smaller anterior and a bigger posterior portion. The *lamina labialis* (fig. 2 a) consists posteriorly of a chitinous apparatus which is subdivided into a median and two lateral clumsy teeth, the posterior margin of which is somewhat striated; the lamina is gradually sloping anteriorly, and overlapped by the slightly concave posterior margin of an almost semicircular chitinous plate. In front of the lamina labialis we observe on the posterior wall of the pharyngeal cavity in the middle a smooth longitudinal area, and on each side of this a minutely granular area, as seen in fig. 2 a. Laterally a series of fairly slender setae, which are situated on a chitinous lists, apparently a continuation of that supporting the serrula 6-dentata, is found. Behind and medially, a longitudinal series of about 20 more slender setae; this series reaches only a little beyond the anterior limitation of the lamina labialis. The number of the serrulae behind the lamina is three, arranged as seen in fig. 2 a.

The number of series of hairs behind the labial lobes etc. is in the main like that of *Gaidius* (cf. fig. 7 f). The series lateral 1 seems to be wanting, series lat. 2 consists of about 30 short delicate hairs which are anteriorly placed in a single longitudinal row, and posteriorly in an irregular group; the series lat. 3 has posteriorly an oblique row of short hairs, on the medial side of which we find an area consisting of about 20 short bristles, and anteriorly one or two short rows, one of which is continued as a long row to the end of the labial lobe. The series lat. 4 is medially placed transversely with backwards directed convexity, as seen in fig. 2 a; laterally to this, and probably belonging to it, a triangular group of densely placed hairs is found. The series lat. 5 is represented by a group of densely placed short hairs, which are placed in a triangular area, pointed in front. The connection between the two last series and the hairs on the lateral lobes was not made out.

Y (Stage V). Size: Female from St. 154 measured 3·08 mm.; anterior division 2·3 mm.; urosome 0·78 mm.

The shape of the body is in the main like that of the adult, but the articulation between the head and the first thoracic tergite was complete at least in a single specimen; a well marked fifth somite bearing the lateral spines was found. The abdominal somites are as usual four. The male differs from the females by the presence of a fifth pair of legs without any endopodite, corresponding to the structure in the adult males (Pl. II fig. 2 b).

Occurrence. The Ingolf Expedition has curiously enough not gathered any specimen of this species, but the Thor has taken it at the following stations.

21/6 04	St. 154	65°27 L. N.	27°10 L. W.	Yt. 800 M. Wire	85 f♀, 1 y♀ (V).
22/7 04	St. 214	67°19 L. N.	17°55 L. W.	Yt. 800 M. Wire	67 f♀ (one with spermatophor), 1 y♀.
23/7 04	St. 216	66°15 L. N.	12°13 L. W.	Yt. 600 M. Wire	1 f♀.
9/5 04	St. 70	63°35 L. N.	6°20 L. W.	Yt. 100 M. Wire	12 f♀.
23/7 05	St. 124	61°04 L. N.	4°33 L. W.	Yt. 100 M. Wire	1 f♀.

The Danish East Greenland Expedition 1900 has gathered the species three times.

4/7 1900	3 p. m.	79°09 L. N.	4°36 L. W.	Vertical net	300—0	1 f♀.
8/7	2 p. m.	74°09 L. N.	11°31 L. W.	—	400—0	2 f♀.
24/9	12 p. m.	61°06 L. N.	16°26 L. W.	F. 392		2 f♀.

Distribution. Nansen's North Polar Expedition found this species rather abundantly from the surface down to a depth of 300 meters. By the S/S Michael Sars it has been taken twice in the open sea about midway between Iceland and Norway. According to Wolfenden this species occurs sparingly in the cold underwater of the Færoe channel. By the Duc d'Orléans this species was found at eleven stations, most often between 300 and 600 meters, as far north as 78° N., as far east as 5° L. E. and as far west as 16° L. W. In Lille Karajakfjord it was taken by Vanhöffen on the west coast of Greenland.

Taking into consideration the new localities enumerated above, it seems right to regard the species as characteristic of the deeper layers of the Arctic seas.

Remarks. The male which Wolfenden has described as *Ch. Vanhöffeni* is certainly identical with that discribed by G. O. Sars as *Ch. obtusifrons*. The species, which A. Scott with doubt refers to this species, does certainly not belong to it, on account of its smaller size and more robust body, not taking into consideration the distribution.

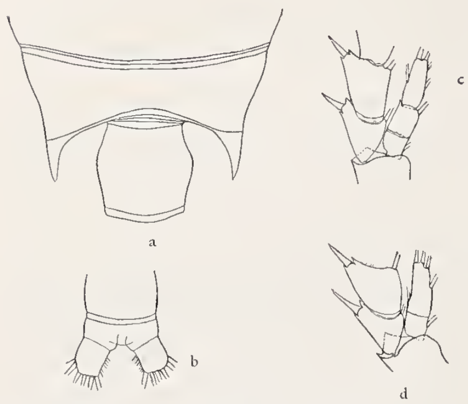
20. Chiridius gracilis Farran.

(Text-figs 21 a—d).

1905. Chiridius Poppei Giesbrecht. Farran, p. 35.
1908. — gracilis n. sp. Farran, pp. 30—31, pl. II figs 1—3.
1909? Chiridius? gracilis Farran. A. Scott, p. 42, pl. XI figs 1—3.
1911? — polaris n. sp. Wolfenden, pp. 211—212, taf. XXIV figs 9—12, text-f. 6 a—b.

Description. Size: 2·69 mm.; anterior division 2·00; abdomen 0·69 mm. Farran's specimens measured 2·4—2.8 mm.

The shape of the body is like Farran's description; the anterior division is 2·9 as long as the abdomen; the furcal rami are 1·4 as long as wide (text-figs 21 a—b). The *antennulae* differ from those of *Ch. obtusifrons* by the 20 segment, which is a little longer than the second, which is again longer than segments 8 ∾ 9. The Si 1 of the third basipodite of the *mandibulae* is longer and thicker than that of *Ch. obtusifrons,* but shorter than that of *Ch. Poppei.* In the other mouth appendages scarcely any difference was observed. In the first pair of legs the Se Re I does not extend to the end of the segment. The segmentation of the legs is better developed than in *Ch. obtusifrons*, as shown by Farran (text-figs 21 c—d).



Text-fig. 21. *Chiridius gracilis* Farran.
a. Genital somite in dorsal view × 60.
b. Furca × 60.
c. Pes II sin in anterior view × 60.
d. Pes III sin in anterior view × 60.

Occurrence. Though the Thor has only taken 3 f♀ (of which one with spermatophor) 8/6 1905 St. 72 57°57 L. N. 9°53 L. W. Yt. 1500 M. Wire, I think that this species belongs to the fauna of the region explored by the Ingolf Expedition.

Remarks. This species is according to Farran fairly common on the west coast of Ireland; its range was from 280 to 1000 fathoms. I think it is extremely doubtful whether the species which A. Scott refers to this species, from the Malayan Sea, really is identical with the Irish species. I think that Farran is right in regarding it as a species which forms a connecting link between the much smaller *Ch. Poppei* and the much bigger *Ch. obtusifrons*, of which the former is a distinct Arctic and the latter a Mediterranean form.

As the females belonging to the *Chiridius*, as Giesbrecht defined it are very much alike, a thorough investigation of the differences between the existing species viz. those from the Siboga expedition, the three mentioned above and *Ch. polaris* Wolf. (p. 212), which is very nearly related to if not identical with *Ch. gracilis,* is needed.

21. **Aetidiopsis rostrata** G. O. Sars.

(Pl. II figs 6 a—b; text-figs 22 a—d).

1903. Aetidiopsis rostrata n. sp. G. O. Sars, p. 160, supplement pls. IV—V.
1904? Faeroella multiserrata n. sp. Wolfenden, p. 117, pl. IX figs 26—28.
1906? — — Wolf. Pearson, p. 13.
1907. Aetidiopsis rostrata G. O. Sars. Koefoed & Damas, p. 409.
1908? Faeroella multiserrata Wolf. Farran, p 29.
1908. Aetidiopsis rostrata G. O. Sars. v. Bremen, p. 33, fig. 35.
1909. Nec. — — — A. Scott, pp. 40—41, pl. V figs 13—24.

Description. f♀. Size: Specimens from Thor St. 214 measured 3·8 mm.; anterior division 2·76 mm.; urosome 1·04. Other specimens measured 3·4 and 3·9. Sars' specimens measured 4·4 and Wolfenden's 3·54 mm.

The shape of the body is like Sars' figure. The rostral spines (text-fig. 22 a) are comparatively shorter, and in shape somewhat different from Sars' figure; the frontal organ is very prominent. The articular membrane is distinct not only dorsally, but also laterally between the head and the first thoracic somite. The lateral spines of the thorax (text-figs 22 b) scarcely reach the middle of the genital somite. The abdomen is in most specimens at least one third of the length of the cephalothorax, but in others it is scarcely one third. The comparative length of the abdominal somites and the furcal rami are 32 — 24 — 18 — 11 — 16; the furcal rami are 1·6 as long as wide. The receptacula seminis are in most specimens well developed, and of similar shape as in *Ch. obtusifrons* (text-figs 22 b—c).

The *antennulae,* which have the segment 24 and 25 well separated, reach about to the end of the third abdominal somite; the segment 2 is 1·2 as long as $8 \backsim 9$, which is a little shorter than the segment 20; the segment 21 is about as long as 18, and the segment 23 is 1·1 as long as the 24. The appendages are like those of *Ch. obtusifrons*, but a distinct "Aestetask" is found in segment 7; the posterior seta of segment 23 reaches distinctly beyond the end of segment 25. The *antennae* are like Sars' figure, with the Re 1·4 as long as the Ri; the setae of Re I—II are arranged as described in *Ch. modestus.* The *mandibulae* are like Sars' figure. The *maxillulae* are in main features, especially in the number of setae, like *Ch. armatus*; the *maxillae* are scarcely different from Sars' figure, but differ from those of mentioned species by a small depression in the middle of the exterior margin of the first basipodite, which seems to be connected with a wide chitinous sac. The third basipodite of the *maxillipeds,* is 1·5 as long as the first and second segments and almost twice as long as the endopodite.

In the first pair of legs the Se Re I extends distinctly beyond the end of Re II. The second pair of legs has the first basipodite greatly enlarged inwards; the articulation between Ri I—II is wanting anteriorly; glandular pores are present at the base of the Se in Re I—III; the St has 58 spinules (in Sar's figure 35 only). The fourth pair of legs differs from that of the three first pairs by wanting marginal row exteriorly of the second basipodite; its structure is in most features like Sars' figure, and the St has about 60 spinules (text-fig. 22 d).

Text-fig. 22. *Aetidiopsis rostrata* G. O. Sars. a. Head in lateral view × 60. b. Genital somite in lateral view × 60. c. Genital area from below × 115. d. Pes IV dest. in post. view × 60.

The anterior surface of the *labrum* was like that of *Ch. armatus*, but differed by the wanting lateral irregular group of hairs in front of the transverse series. The oral surface has the hairs in the three first groups, especially the third, somewhat differently arranged, as seen in fig. 6 a; the groups 4—5 are more irregular than in this species. The *lamina labialis* is, as seen in fig. 6 b, in most respects similar to that of *Ch. armatus*; the inner longitudinal series in front of the lamina was not observed. The longitudinal series of hairs upon and behind the labial lobes are in most features, especially in series lateral IV—V, like those fully described in *Ch. obtusifrons.*

Occurrence. The Ingolf Expedition 11/7 96 6·30 p. m. St. 105 65°34 L. N. 7°31 L. W. closing net 700 fathoms has taken a single adult female, and the S/S Thor has gathered it at the following three stations.

20/6 04	St. 153	65°20 L. N.	27°12·5 L. W.	Yt. 800 M.	Wire	1 f♀.
21/6 04	St. 154	65°27 L. N.	27°10 L. W.	Yt. 800 M.	Wire	3 f♀.
22/7 04	St. 214	67°19 L. N.	17°55 L. W.	Yt. 800 M.	Wire	6 f♀.

Distribution. This species was taken twice by S/S Michael Sars between Jan Mayen and Finmarken at a depth of from 500 to 1000 metres. According to Koefoed and Damas the species is found "a) dans la mer du Grönland: de 60 jusqu' à 1800 mètres au moins, b) dans la mer de Norvège: jamais observè à moins de 400 mètres" (p. 409). By the Duc d'Orléans it was gathered at 10 stations as far east as 2°40 L. E. at 79° L. N., and as far west as 15° L. W. at 78° L. N. near the east coast of Greenland. The expedition has at the most northern station $^{12}/_{7}$ 1905 taken adult males as well as females and young ones. According to Wolfenden his *Faeroella multiserrata* "is not uncommon in the deep water of the Færoe channel, and has been traced by the writer as far south as Valentia in Ireland" (p. 117). This species is, according to Farran, "occurring not uncommonly from 400 to 1000 fathoms" off the west coast of Ireland.

Remarks. I do not doubt that the specimens which I have examined ought to be referred to Sars' species, in spite of the smaller size, the shorter rostral spines, the lateral spines which scarcely reach the middle of the genital somite, and the comparatively longer abdomen; from Wolfenden's very imperfect description it differs by the well marked segmentation between the head and first thoracic tergite, by imperfect segmentation of Ri pes II, and by more coarsely spinulated terminal spines of the legs.

Though Sars (cf. Farran p. 20) has accepted Wolfendens species as distinct from his own, and in spite of the different distribution, I am fairly convinced that they belong to the same species; the southern variety has sometimes comparatively few dentations in the St pes II (Farran has found 32 only). Further examination and comparison of the different forms are needed before the question can be solved. It is to be regretted that neither Wolfenden nor Damas & Koefoed, who have examined the males as well, have given any description of them.

If Scott's figure of the antennulae of his *A. rostrata* Sars is correct, the Sp. of the segment 23 does not reach the end of the segment 24, and a new species ought to be established.

Wolfenden has later on established 2 new species *Faeroella minor* and *antarctica* (1911 p. 214); it is remarkable that this author does not accept Sars' name, which without doubt has the priority. That the species are cogeneric does not seem to be doubtful; whether the genus is quite natural is very doubtful. To solve this rather vexed question I have not sufficient material of the different genera.

22. **Udinopsis armatus** Vanhöffen.

1895. Bradyanus armatus n. sp. Vanhöffen, p. 322.
1897. — — Vanh. Vanhöffen, p. 280, fig. 17.
1902. pars. Bradyidius armatus Vanh. Mràzek, p. 521.
1903. Udinopsis similis n. sp. G. O. Sars, p. 34, pl. XXI.
1907. Udinopsis armatus Vanh. Vanhöffen, pp. 517—519, taf. 21 fig. 24.
1908. Bradyidius similis G. O. Sars. v. Bremen, p. 32, fig. 32.
1913. Udinopsis armatus Vanh. Stephensen, p. 317.

This species, which has not been secured by any of the expeditions, has been mentioned from "Lille Karajak Fjord" on the west coast of Greenland, and Sars has found it in the inner part of the Stavanger Fjord, where "it only occurred close to the ground", "the depth ranging from 50 to 100 fathoms".

This species is not identical with *Bradyidius armatus* Giesbr. of Scott, Giesbrecht-Schmeil and Wolfenden. Stephensen has wrongly given *Bradyidius armatus* v. Bremen as partly synonymous with it.

23. **Gaidius tenuispinus** G. O. Sars.

(Pl. II fig. 8 a; pl. III figs 2 a—n; text-figs 23 a—j).

1900. Chiridius tenuispinus n. sp. G. O. Sars, p. 67, pl. XVIII.
1902. Gaidius tenuispinus G. O. Sars. Mràzek, p. 512.
1902. — borealis n. sp. Wolfenden, p. 365.
1903. — tenuispinus G. O. Sars. Norman, p. 136.
1903. Chiridius tenuispinus G. O. Sars. G. O. Sars, pp. 30—31, pl. XVIII.
1903. Gaidius tenuispinus G. O. Sars. G. O. Sars, p. 162, pl. VI, suppl.
1904. ?Gaidius pungens Giesbr. Wolfenden, p. 131, pl. IX fig. 43.
1905. Chiridius tenuispinus G. O. Sars. Th. Scott, p. 223.
1905. Gaidius tenuispinus G. O. Sars. Farran, p. 33.
1906. — — — Pearson, p. 13.
1907. Gaidius tenuispinus G. O. Sars. Vanhöffen, pp. 521—522, taf. 21 fig. 27, taf. 22 fig. 33.
1907. — — G. O. Sars. Koefoed & Damas, p. 408.
1908. — — — Farran, p. 32.
1908. — — — v. Bremen, p. 36, fig. 39.
1909. Nec. — similis Th. Scott. A. Scott, pp. 51—52, pl. VII figs 1—11.
1911. — tenuispinus G. O. Sars, Farran, p. 97.
1911? — — — Wolfenden, p. 223, figs 11 a—b.
1913. — — — Stephensen, pp. 315—316.

Description. f♀. Size: Specimen from Thor St. 70 measured 3·84 mm.; anterior division 2·94 mm.; urosome 0·90 mm. Two specimens from Thor St. 285 measured 2·6 + 0·62 = 3·22 mm. and 2·9 + 0·8 = 3·7 mm.; specimens from Thor St. 183 measured 2·7 + 0·7 = 3·4 mm. Sars' specimens measured 3·8 and Wolfenden's 3·8 (1904) and 3·25 (1911) mm. Vanhöffen's specimens 3·9 and Farran's (1905) 3·2 mm.

The shape of the body is scarcely different from Sars' figure, and no trace of segmentation between the fourth and fifth thoracic somite was observed; the lateral spines of the thorax are distinctly set off, and extend almost to the end of the genital somite (text-fig. 23 a). The rostrum is not, as set forth by most authors, undivided, but shows as seen in fig. 2 a (Pl. III) trace of bifurcation.

The length of the abdomen, compared to that of the anterior division, varies from about $^1/_3$ to $^1/_4$. The genital somite, which as seen in fig. has a short and well marked receptaculum seminis, well distinguished from the stalked one in *Chiridius*, is somewhat deeper and wider than long, and 1·6 as long as the third somite. The furcal rami are 1·6 as long as wide and a little wider than the anal somite is long.

The *antennulae* reach to about the end of the third abdominal somite and have the measurements distinctly different from those of *G. brevispinus* on account of the shorter distal segments; the segment 2 is 1·2 as long as 8 ∾ 9, which is almost 1·3 as long as segment 13 and only a little shorter than segment 20; the segments 19 and 22 are almost of equal length, and almost 1·1 shorter than segment 2. The appendages are like those described by Giesbrecht in *Gaetanus armiger* with "Aesthetasken" in segments 3, 4 and 6 and Spr. in segment 13; the posterior seta of the segment 23 is ringed, and about three times as long as the segments 24 and 25, which are well separated.

The *antennae* have the Re 1·3 as long as Ri; the Ri I is distinctly twice as long as Re II; this is about twice as long as Re I, and about twice as long as Re III—VI, and about $^2/_3$ as long as Re VII. The Re II has the short Se 2 placed on a rather prominent process, (Pl. III fig. 2 e), like that found in Giesbrecht's fig. 19 Taf. 14 of *Gaetanus armiger*, and the Se 3 is somewhat longer. The *mandibulae* differ from Sars' figure by two slender Si of the third basipodite, and are in main features like those in Giesbrecht's *G. armiger*. The *maxillulae* are rather elongated, like Giesbrecht's figure of *Gaetanns miles* (Taf. 14 fig. 21); the Li I possesses on the anterior surface about 10 fairly strong teeth, and on the posterior surface near the base of S 11 about 10 similar ones; the Li II has 4 setae, and the Li III 5 + a sensory lobe and anteriorly a fairly strong spinulation, the Basp. III has 4 Sp and 1 Sa but no spinulation anteriorly; the Ri I has 3 Sa + 1 Sp, the Ri II has 3 Sa + 1 Sp and the Ri III 5 S. The exopodite has 11 setae, and the Le has 7 long + 2 shorter ones. The *maxillae* are very characteristic by the strongly and suddenly convex outer margin of the basipodite, with a short concavity in the middle (text-fig. 22 b); the lobe I possesses a quite rudimentary spinelike Sp. 1 and a Sp. 2, which it about twice as long as the lobe itself; the strong spine of lobe IV is somewhat longer but scarcely stronger than that of lobe V. The third basipodite of the *maxillipeds* is 1·2 as long as Basp. I—II and three times as long as Ri; the exterior margin of the second basipodite has no trace of lamina, and its fourth lobe bears 3 hairs and a sensory process (fig. 2 c Pl. III).

The *first pair* of legs has the articulation between Re I and II indicatad by a faint line anteriorly, and sometimes a small incision laterally; the Se Re I is wanting; the St has the usual

Text-fig. 23. *Gaidius tenuispinus* G. O. Sars.
a. ♀. Abdomen in lateral view × 33. b. Maxilla sin. in posterior view. c. Pes IV sin. in posterior view × 82. d. ♂. Pes V sin. × 140. e. Maxilla dext. in anterior view to show position of parasites × 60. f and g: the same parasites × 150. h—j. Contorted bodies attached to the body-wall × 400.

characteristic structure (Pl. III fig. 2 d). The articulation between Re I and II in pes II and Ri I and II is as shown in Sars' figure well developed; the St has 25 teeth. The *fourth pair* of legs has the Re III three times as long as wide and the St. has 25 teeth, partly armed with accessory ones; the first basipodite has the usual marginal hairs substituted for by 30—40 stiff thin lamellous bristles, which are placed in about 5 rows along the inner margin, and in 2—3 parallel ones on posterior surface, the more posteriorly the more distally placed. The arrangement and number of the glandular pores in pes I—IV are as in *Ch. obtusifrons.*

The lateral view of the *labrum* is like that of *Chiridius*, but the different parts are less prominent. The oral surface of the labrum (Pl. III fig. 2 e) is, as seen by comparing figures, distinctly different from *Gaidius brevispinus*; the five groups, as well as the sixth more transversely placed one (not seen in fig.), are well separated; the setae around the median circular spot Nr. 4 are well developed.

The *lamina labialis* is almost smooth, but in other respects scarcely different from fig. 7 f (Pl. II), and the area in front of it is most like fig. 5 e Pl. III. The longitudinal lateral series of hairs placed behind the lamina labialis are in details somewhat different from those of *G. brevispinus*; the 3 posterior groups of the third series are better separated, and without direct connection with the anterior part; the proximal and distal groups of the series V seem to be fused.

f♂. Size of specimen from Thor St. 183 was 3·01 mm.; anterior division 2·3 mm., urosome 0·71.

The shape of the body is scarcely different from Sars' fig. Pl. VI (supplement). The rostrum is fairly long and shows, terminally, trace of bifurcation (Pl. III figs. 2 f—g).

The *antennulae* have the segments 8 ∾ 9 partly fused with 10, and the segments 12 and 13 with 14; the segments 20 and 21 and 24 and 25 are completely fused; the appendages are scarcely different from those of *Aetidius armatus* (cf. Giesbrecht Taf. 14 fig. 15). The measurements differ from those of the female by the segment 22, which is 1·1 as long as segment 17 and 1·2 as long as segment 2. The structure of the *antennae* is in most respects like that of the female, but the Si 2 of Re II is not placed on a small process. The manducatory portion of the *mandibulae* (cf. fig. 1 d) is even more thin-skinned than in *G. brevispinus*, but has rudimentary teeth; the third basipodite has no setae, and those of the exopodites and endopodites are better developed. The *maxillulae* differ from those of *G. brevispinus* (fig. 1 e) by a fairly long Li 2 with a number of rounded sensory organs. The *maxillae* (Pl. III fig. 2 h) are small, thin-skinned organs, which in the main preserve their original shape; the exterior margin of the basipodite has no convexity; the inner surface possesses an indistinct number of short partly fused lobes, the setae of which are more or less transformed into thin-skinned more or less setiformed appendages with a swollen base; the Ri has a few setae of usual form. The two first segments of the maxillipeds possess only the fourth lobe.

The *first pair of legs* has, as shown in fig. 1 g, the Se Re II represented by a minute seta, and the St. is as usual in the male almost straight (Pl. III fig. 2 i); the second to the fourth pairs of legs are scarcely different from those of the females, except by the smooth inner margin of the second basipodite of the fourth pair of legs. The *fifth pair of legs* is on the right side in the main like Sars' figure; the Ri (Pl. III fig. 2 l) is distally swollen and contains clear alveolar structures; the Re I (I ∾ II ?) has in most specimens a lateral protuberance, and shows trace of segmentation (fig. 2 m); the Re II has inwards a lamelli-form process which surrounds a shallow cup facing backwards and outwards (fig. 2 n, cf. fig. 1 j); the Re III is elongate and curved with a terminal hooked hairy process. The left leg (text-fig. 22 d) appears more slender than in Sars' figure; the Ri which shows a trace of segmentation is long and slender, distally somewhat enlarged and bearing a short hair; the Re 2 has inwards a hairy protuberance (fig. 2 j), and the Re 3 is very elongate with a distal fairly long Se and a St. (fig. 2 k).

Y (St. V). Size of female from St. 70 3·15 mm.; anterior division 2·51 mm., urosome 0·64.

The shape of the body, except for the usual segmentation of the abdomen, is as in the female, the *antennulae* extend almost to the end of the abdomen. The mouth appendages are scarcely in any features of interest different from those of the female. The articulation between Ri I and II of pes II is less developed than in the female; the glandular pores were scarcely different. Along the inner margin of the second basipodite of pes IV a few lamellous setae like those of the adult females were found in the young females, but in the males a few marginal hairs of usual structure were found. The fifth pair of legs in the males is as seen in fig. 8 a (Pl. II) rather slender.

Y♀ (St. IV). Size: A single female from Thor St. 165 1905 measured 2·06 mm.; anterior division 1·67; urosome 0·39 mm. The antennulae reached to base of furca; the shape of the body is in the main like that of the adult females, but the abdomen has as usual only three somites. The structure of the appendages was not examined in details.

Parasites. In several adult females of this species curiously twisted bodies (text-figs 22 h—j) to the number of one or two were found, now on the right and now on the left side; they are by a delicate stalk fastened to the skin of the body wall between the insertion of the maxillae and maxillulae; their content is finely granular. About their nature I do not at present wish to express any opinion. They were found in the following number of adult females from 5 stations viz. 1 from Ingolf St. 20, 25 from Thor St. 152 $^{19}/_{6}$ 1904, 20 from Thor $^{21}/_{6}$ St. 153 and 4 from $^{10}/_{7}$ 1904 St. 78. At St. 152 and 153 they was generally found together with the "parasites" to be described.

In a great number of adult females of this as well as of the following species elongate obovate bodies (text-figs 22 e—f) were observed; they are by a stalk and a terminal disc fastened to the chitin of the maxillulae (in a specimen from Ingolf St. 19 f. inst. to a seta of Le), but especially of the maxillae. These structures are of somewhat different shape in the various animals, with the tip more or less pointed; they consist of a transversely striated wall, which, in contrast to the stalk, is dissolved into a solution of potash and a content with vacuoles but without distinct nuclei in glycerin preparations. The stalk is hollow and widened out towards the sac, which is here more or less pointed.

These structures were sometimes found on the left sometimes on the right side to the number of one to four; they were found in the following number of specimens in one sample from Ingolf, and in 11 from Thor: viz: Ingolf St. 19 2 specimens; Thor St. 152 ($^{19}/_{6}$ 1904) 25 specimens, St. 153 ($^{20}/_{6}$ 1904) 20, St. 154 ($^{21}/_{6}$ 1904) 3, St. 78 ($^{10}/_{7}$ 1904) 8, St. 285 ($^{1}/_{9}$ 1904) 5, St. 214 ($^{22}/_{7}$ 1904) 1, St. 183 ($^{11}/_{7}$ 1904) 6, St. 104 ($^{24}/_{5}$ 1904) 10, St. 164 ($^{29}/_{8}$ 1905) 1 and St. 72 ($^{8}/_{6}$ 1905) 3 specimens. It is rather curious to notice that the distribution of these "parasites", which in some features are not unlike spermatophors, is very irregular within the area; they were most common in Denmark Strait, and very scarce at the southern stations. At the station (Thor $^{9}/_{5}$ 1904 St. 70) at which the greatest number of specimens of *G. tenuispinus* viz 890 f♀ were collected, these structures were not observed.

Occurrence. The Ingolf Exp. has gathered this species at the following stations in Davis Strait.

$^{25}/_{6}$ 1895. St. 24. 63°06 L. N. 56°00 L. W. V.[1] 200—0 fathoms. Temp. at surface 4·2° C. 1 f♀.
$^{26}/_{6}$ 1895. St. 25. 63°30 L. N. 54°25 L. W. V.[1] 200—0 fathoms. — 2·9° C. 1 f♀.
$^{1}/_{7}$ 1895. St. 27. 64°54 L. N. 55°10 L. W. V.[1] 200—0 fathoms. — 3·9° C. 1 f♀.

In the Atlantic south-east of Greenland it has been taken at 2 stations.

$^{20}/_{6}$ 1895. St. 20. 58°20 L. N. 40°48 L. W. V.[1] 200—0 fathoms. Temp. at surface 6·1° C. 2 f♀.
$^{18}/_{6}$ 1895. St. 19. 60°29 L. N. 34°14 L. W. V.[1] 300—0 fathoms. — 9° C. 5 f♀, 1 y♀ (V); 1 y♂ (V).

In Denmark Strait it has been taken.

$^{21}/_5$ 1895. St. 11. 64°34 L. N. 31°12 L. W. V.[1] 200—0 fathoms. Temp. at surface 8·2° C. 1 f♀.

The S/S. Thor has in Denmark Strait at four stations from 1904 taken numerous specimens, of which numerous were infected with "parasites" of both kinds.

$^{19}/_6$ 1904. St. 152. 65°00 L. N. 28°10 L. W. Yt. 800 M. Wire about 100 f♀; 1 y♀ (V); 1 y♂ (V).
$^{20}/_6$ 1904. St. 153. 65°20 L. N. 27°12·5 L. W. Yt. 800 M. Wire 80 f♀; 3 y♀ (V); 2 y♂ (V).
$^{21}/_6$ 1904. St. 154. 65°27 L. N. 27°10 L. W. Yt. 800 M. Wire 85 f♀; 1 y♀ (V); 1 y♂ (V).
$^{18}/_6$ 1904. St. 150. 65°50 L. N. 26°53 L. W. Yt. 400 M. Wire 1 f♀.

In the Atlantic south of Iceland the S/S. Thor has taken numerous specimens from deeper layers; comparatively few specimens were infected with the said parasites.

Thor $^{10}/_7$ 1904. St. 78. 63°08 L. N. 21°30 L. W. Yt. 750 M. Wire 50 f♀.
$^{10}/_7$ 1904. St. 180. 61°34 L. N. 19°03 L. W. Yt. 400 M. Wire 26 f♀.
$^{1}/_9$ 1904. St. 285. 62°49 L. N. 18°40 L. W. Yt. 500 M. Wire 125 f♀; 3 y♂ (V).
$^{11}/_7$ 1904. St. 183. 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire about 100 f♀; 14 f♂; 4 y♀ (V); 7 y♂ (V).
$^{24}/_5$ 1904. St. 104. 62°47 L. N. 15°03 L. W. Yt. 1500 M. Wire 35 f♀; 2 y♂ (V).

In the Iceland-Færoe channel the S/S. Thor has taken the species at four stations a single time in big numbers, only few specimens bore "parasites".

Thor $^{29}/_8$ 1905. St. 164. 61°20 L. N. 11°00 L. W. Yt. 300 M. Wire 1 f♀.
$^{22}/_5$ 1904. St. 99. 61°15 L. N. 9°35 L. W. Yt. 1700 M. Wire 2 f♀.
$^{9}/_5$ 1904. St. 70. 63°35 L. N. 6°20 L. W. Yt. 100 M. Wire 890 f♀; 4 y♀ (V); 7 y♂ (V).
$^{27}/_7$ 1904. St. 124. 61°04 L. N. 4°33 L. W. Yt. 100 M. Wire 28 f♀.

Outside the Ingolf area the S/S. Thor has taken the species at the following stations.

Thor $^{15}/_6$ 1905. St. 82. 51°00 L. N. 11°43 L. W. Yt. 1200 M. Wire 2 f♀.
$^{8}/_6$ 1905. St. 72. 57°52 L. N. 9°53 L. W. Yt. 1500 M. Wire 23 f♀; 1 y♀ (V); 1 y♂ (V).
$^{31}/_8$ 1905. St. 167. 57°46 L. N. 9°55 L. W. Yt. 1500 M. Wire 8 f♀; 1 y♀ (V); 3 y♂ (V); 1 y♀ (IV).

North of Iceland the species was taken by S/S. Thor at a single station.

$^{22}/_7$ 1904. St. 214. 67°19 L. N. 17°55 L. W. Yt. 800 M. Wire 60 f♀; 2 f♂; 1 y♀ (V); 3 y♂ (V).

Distribution. The species has previously been recorded fairly common in the eastern part of the north polar basin crossed by Nansen; specimens were found as far north as 85 Lat. N., and here near the surface; at the other stations they were found at considerable depth. From Spitsbergen it has been recorded by Mràzek. In the ocean lying between Spitzbergen and Greenland it was found fairly common from altogether 18 stations, scattered all over the area crossed by the Duc d'Orléans as far north as 80° L. N. 2°47 L. E.; its range was between 100 and 700 meters in depth. In the Norwegian Sea it was found a few times between Finmarken and Jan Mayen between 500 and 1000 meters. From the west coast of Greenland it has been recorded from "Lille Karajakfjord" by Vanhöffen. It is, as seen from the above, fairly common in the Iceland-Færoe channel between 100—0 meters, and so it is in the Færoe-Shetland channel; its shallowest record here is according to Farran (1911 p. 97) "from a haul of 100—0 meter in 143 meters of water from a station lying to the east of Shetland". It has as far south as 55° L. N. "several times been met with in small numbers in the deep water of the Atlantic slope off the south west coast of Ireland at depths of from 500 to 600 fathoms". The species has not been taken by the Monaco; the records from the Gauss and the Siboga Expeditions seem to be very doubtful, and shall presently be discussed.

The Ingolf and the Thor's records of this species from Baffin Bay, Danmark Strait, the sea north of Iceland and the Atlantic south of Iceland as far south as 60 to 51° L. N. complete the picture of this species as a North Atlantic and arctic species from the intermedial layers.

Remarks. That the described species is identical with Sars' *G. tenuispinus* does not seem doubtful, in spite of the slightly bifurcate rostrum and the stiff broad bristles on the inner margin of the second basal segment of the fourth pair of legs, which were not mentioned by the author; the latter character was well described by Wolfenden for his species *G. borealis*; Wolfenden has later on identified his species with *G. tenuispinus*, but has in the list of species, probably by a slip of the pen, given it the name *G. pungens* Giesbr.

Wolfenden has identified specimens from Cap and the Antarctic ocean with the northern form; he has examined specimens from the northern as well as the southern regions without being able to find great differences; he may be right; but as the differences between the species are often so small, and as too few characters are generally used by the authors, I prefer to look forward to further investigations, not the least on account of the different localities. It is on that account that I have given so full a description of this species.

A Scott is certainly right in regarding his father's species *Euchæte Hessii* var. *similis* (1894 pp. 58—59 Pl. VI figs 24—25) as being related to *Gaidius*; but as its size is only 2·2 mm., as the terminal segment of the left pes V is somewhat swollen at the base and as it "wants the prominent rostrum of *Euc. Hessei*" (his figure does not show any rostrum), I do not think his identification ought to be accepted. A. Scott identifies his *G. similis* Th. Scott with *G. pungens* Gbt.; in this he may possibly be right. He writes (p. 52). "I regard the form described by Sars as *Gaidius tenuispinus* ... to be identical with this species". His figures of the pes V and of the rostrum of the male, which are somewhat insufficient, do not support his view.

24. **Gaidius brevispinus?** G. O. Sars.

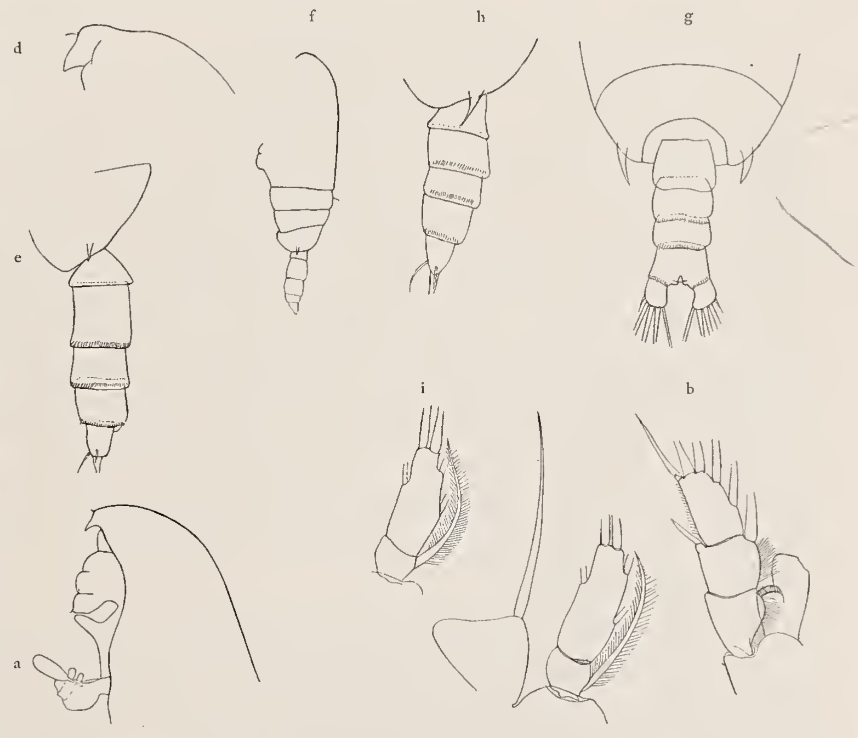
(Pl. II figs. 7 a—h; pl. III figs. 1 a—j; textfigs 24 a—i).

1900? Chiridius brevispinus n. sp. G. O. Sars, p. 68, pl. XIX.
1902? Gaidius — G. O. Sars. Mràzek, p. 521.
1903? — — — G. O. Sars, pp. 162—163; suppl. pl. VI.
1903? — — — Norman, p. 136.
1904. — major n. sp. Wolfenden, pp. 114—115; pl. IX figs 7—8.
1905? Gaidius brevispinus G. O. Sars. G. O. Sars, p. 3.
1905? — affinis n. sp. G. O. Sars, p. 9.
1905. — brevispinus G. O. Sars. Farran, p. 33.
1906. — — — Pearson, p. 13.
1908. — — — v. Bremen, p. 35.
1908. — affinis — Farran, p. 32.

Description. f♀. Size of specimen from Thor St. 183 4·05 mm.; anterior division 3·13 mm., urosome 0·92 mm. Sars' specimens measured 4·8 mm., Wolfenden's specimens 4·65 mm. and Farran's specimens measured 3·9—4·5.

The shape of the body is practically as figured by Sars, except for the distinctly longer lateral spines of the thorax, which are directed downwards and backwards. The rostrum is not undivided as stated by Sars, but is, as shown in fig. 7 a (Pl. II), distinctly bifurcate terminally. On each side of the vulva a somewhat triangular plate was found, and a short receptaculum seminis was observed (fig. 7 b); the structure of the genital apparatus was rather complicated, but was not examined in the details; figs 7 b—c will give an impression of its structure. The furcal rami are 1·4 as long as wide, and a little shorter than the anal somite.

The *antennulae* do not reach to the end of the anal somite, but only somewhat beyond the end of the genital somite. The segment 2 is 1·1 as long as 8 ∾ 9, which is scarcely 1·1 as long as segment 13, and 1·2 shorter than segment 20; segment 19 is a little longer than 20 and 22 which are of almost equal length, and longer than segment 2. The appendages differ from those of *G. tenuispinus* by the presence of a Sp. in segment 13.



Text-fig. 24. *Gaidius brevispinus* G. O. Sars.
a. f♀. Head from the left with parasite attached to maxilla × 18. b. f♀. Pes I sin. in ant. view × 80. c. Pes II sin. Ri in ant. view × 80. d. f♂. Rostrum × 57. e. f♂. Abdomen × 33. f. f♂. × 9. g. Y♀. (Stage V) × 33. h. Y♀. Abdomen lateral view × 33. i. y♀. Pes II Ri in ant. view × 80.

The *antennae* have the Re about 1·5 as long as Ri, but are scarcely different in other respects. The *maxillulae* differ from those of *G. tenuispinus* by Li 3, which only bears 4 setae in addition to the sensory lobe, and by the Re III, which possesses 6 Sa + 1 Sp. The *maxillae* (fig. 7 d) have the exterior margin less strongly convex than the preceding species; the Sp. 2 of the first lobe is three times as long as the lobe itself, and the Sp. of lobe IV is stronger as well as longer than the corresponding Sp of lobe V. The *maxillipes* differs from those of the preceding species by a rounded lamelli-form protuberance on the exterior surface of the second basipodite (fig. 1 a). The articulation between the Re I—II of the *first pair of legs* is better developed than in *G. tenuispinus* (text-fig. 24 b), and so is the articulation between Ri I—II of the second pair of legs (text-fig. 24 c), the St. of pes II has only 19 teeth; along the inner margin of the second basipodite of the fourth pair of legs distally and posteriorly one to two rows of broad stiff bristles were observed (fig. 1 c).

The oral surface of the *labrum* has a well developed longitudinal series of hairs, which are, however, only indistinctly divided into the usual 5 groups as seen in fig. 7 f; group III is fairly well marked, and group IV has in addition to the inner series a lateral one with 10 short hairs. The transverse series around the fourth pair of central spots is less prominent than in the preceding species. The lateral group of hairs is assymmetrical in one of the examined specimens. The granular *lamina labialis* with the area in front of it is shown in fig. 7 f. Behind the lamina labialis four partly fused groups of short spines are placed near the middle line. On the area labialis and the lobi labiales altogether 5 longitudinal series of hairs (Pl. II fig. 7 f S^1—S^5) arranged as shown in figure were found.

f ♂. Size of specimen from St. 183 Thor 1904 was 3·34 mm.; anterior division 2·53 mm.; urosome 0·81 mm. Wolfenden's specimen measured 3·1 mm.

The shape of the body is practically like that of preceding species, but for the shorter lateral spines (text-figs 24 d—f). The *antennulae* extend almost to the end of the abdomen; the segment 22 is 1·4 as long as the segment 17, but in other respects they are scarcely different from those of preceding species. The *antennae* are comparatively more clumsy, with comparatively shorter Re; the manducatory part of the mandibulae is comparatively more thin-skinned (Pl. III fig. 1 d), but in other respects the mandibulae are scarcely different. The *maxillulae* (fig. 1 e) are fairly well developed; the Le I has as usual 9 setae; the Li I does not possess any setae, but a number of short rounded sensory organs; the Li II which is quite rudimentary, and the Li III which has at least one real setae, possess similar organs. The third basipodite has at least 2 setae and the Ri I—III 3 + 3 + 6 setae. The Re has as usual 11 setae. The *maxillae* are scarcely different from those of preceding species (cf. fig. 2 h). The *maxillipeds* (fig. 1 f) have the third basipodite 1·3 as long as the basipodites I—II and 2.5 as long as Ri; the basipodites I—II have a rudimentary Li I and a fairly well developed Li IV.

The first pair of legs has the articulation of Re I well developed (fig. 1 g), but not only Se Re I but also Se Re II are completely wanting. The St. Re III of pes II has 37 teeth, and the inner margin of the second basipodite in the fourth pair of legs is smooth and has, as seen by comparing figs 7 g and 7 e another shape than in the female. The *fifth pair* of legs (Pl. III fig. 1 h) is very similar to that of *G. tenuispinus*, but the basal segments are comparatively shorter, especially the third one of the right side. The left endopodite shows no trace of segmentation, and has no small terminal seta; the left Re III has, as shown in fig. 1 i, a rather characteristic structure.

Y (Stage V). Size of female from St. 183 Thor 3·22 mm.; anterior division 2·53 mm.; urosome 0·69 mm.

The shape of the body, except for the structure of the abdomen, is scarcely different from that of the adult female. The *antennulae* extend distinctly to the end of the last abdominal somite; the Sp. of segment 23 is only 1·5 as long as the segments 24—25. The *maxillulae* have only 10 setae in Re, the exterior margin of the basipodite of the *maxillae* is less distinctly convex, and the laminous process of the exterior surface of the second basipodite of the maxillpeds is less prominent, with a distal tooth. The *pes II* has the articulation between the Ri I—II slightly developed (text-fig. 24 i), and the marginal hairs of the second basipodite of the fourth pair of legs are in the male only fewer (about 10) than in the pes III, but not different; in the female, however, not only the number is smaller (17 against

32), but the hairs are stiffer, and the row is distally turning around margin posteriorly. The fifth pair of the legs (fig. 7 h) is in several respects different from that of *G. tenuispinus* (fig. 8 a).

Parasites? "Sacshaped" structures, like those of preceding species in a similar position were found in a single female from Thor St. 152 and in 29 females from Thor St. 183.

Occurrence. The Ingolf Expedition has not taken this species, but the S/S. Thor gathered it at a few stations in Denmark Strait and south of Iceland viz:

19/6 1904. St. 152. 65°00 L. N. 28°10 L. W. Yt. 800 M. Wire 11 f♀.
20/6 1904. St. 153. 65°20 L. N. 27°12·5 L. W. Yt. 800 M. Wire 1 f♀.
1/9 1904. St. 285. 62°49 L. N. 18°40 L. W. Yt. 500 M. Wire 1 f♂.
11/7 1904. St. 183. 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 160 f♀; 3 f♂; 10 y♀ (V); 42 y♂ (V).
24/5 1904. St. 104. 62°47 L. N. 15°03 L. W. Yt. 1500 M. Wire 2 f♀.

Distribution etc. As the circumscription of this species is not quite sure, I feel obliged before discussing its distribution, to write a few words about the synonymy.

The described species differs from Sars' *G. brevispinus* by the somewhat smaller size, by the divided rostrum and by the much longer lateral spines; as Sars does not seem to have realised the importance of the characters found in the laminous process of maxillipeds and in the curious setae of the second basipodite of pes IV, the fact that he does not mention these characters is scarcely of importance. Wolfenden's description of the female as well as of the male is very incomplete; the females are bigger than my specimens, and the lateral corners seem to be like those of my specimens. Farran has (1908 p. 32) examined specimens from the west coast of Ireland, which, as far as his few remarks go, show exactly the same differences from Sars' description as my specimens do; really I do not doubt that they belong to the same species. Farran has, however, referred his specimens to Sars' *G. affinis*, and Sars has himself confirmed this identification, though his original specimens of *G. affinis* only measured 3·6 mm. Sars' description is too incomplete to be of much value. Though Sars regards *G. brevispinus* as well as *affinis* from the Monaco Expedition as different species, it is most probable that the animals which are recorded from the Færoe channel and the north-east Atlantic under the name of *G. major, affinis* and *brevispinus* ought to be referred to the same species, varying in size from 3·6 to 4·65 mm. If this species is not identical with *G. brevispinus* its name ought to be *G. major* Wolf. This species or variety is distributed as far north as Denmark Strait and the Færoe-Iceland channel, and is found as far south at least as 50° L. N.; *G. brevispinus* proper which, as seen above, differs from the southern form by the larger size and shorter lateral spines, has been taken in the western part of the polar basin crossed by Nansen (at 84° L. N. rather plentifully), once in the sea between Finmarken and Jan Mayen, but rather curiously not in any of the numerous samples brought home by the Duc d'Orléans.

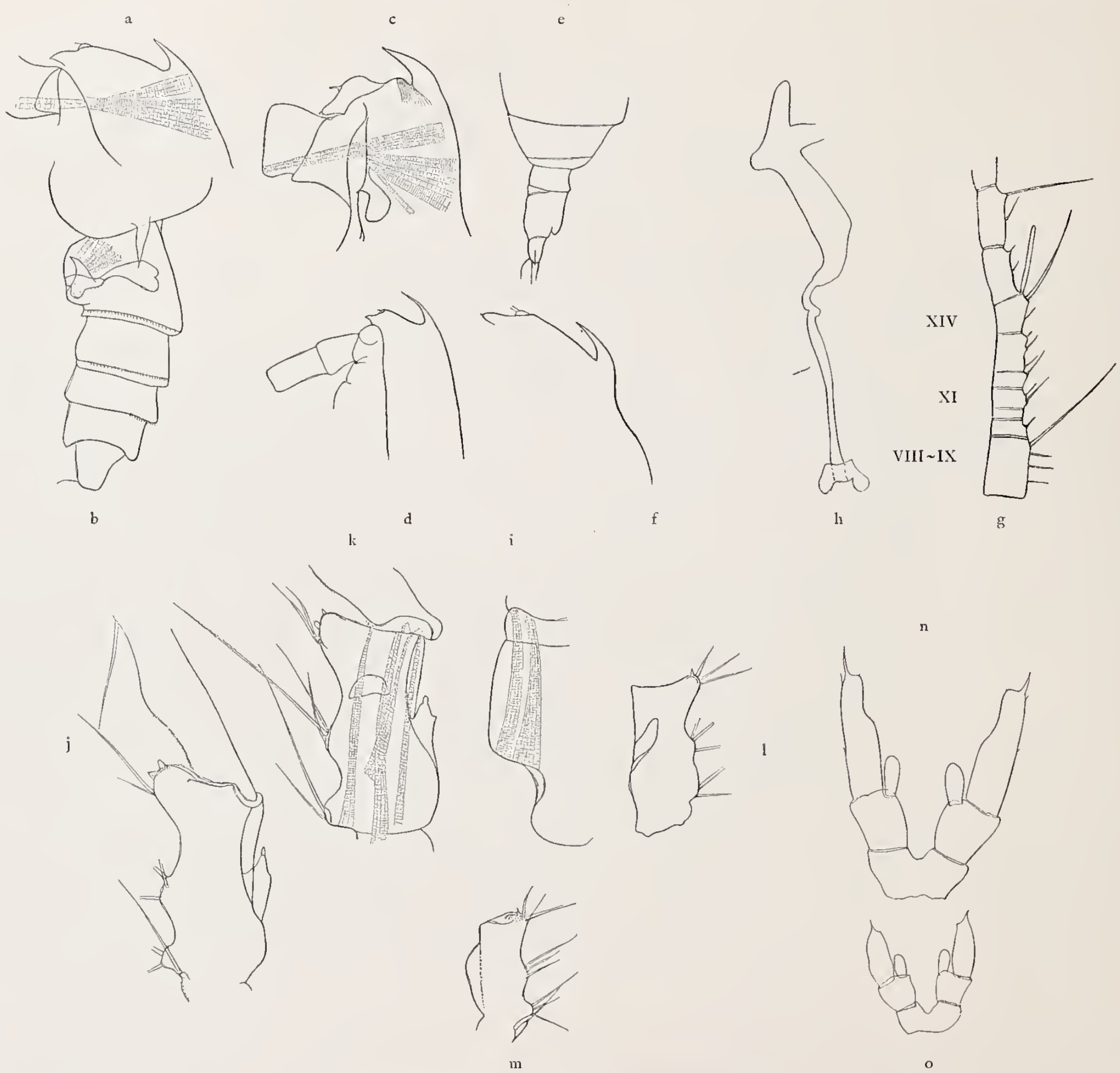
From *G. intermedius* Wolf. it differs by the less pointed lamina of the basipodite of the maxillipeds.

25. Gaetanus Kruppi? Giesbr.

(Pl. III figs 3 a—h; text-figs 25 a—o).

April 1903? Gaetanus Kruppi n. sp. Giesbrecht, p. 202, pl. VII fig. 8, pl. VIII fig. 29.
1903? Gaetanus armiger Giesbr. J. C. Thompson, p. 17.
June 1903? — major n. sp. Wolfenden, p. 125.

1903? Gaetanus armiger Giesbr. Norman, p. 137.
1904? — major Wolf. Wolfenden, p. 114, pl. IX figs 7—8.
1905. — — — Farran, p. 33.
1905. — Kruppi, Giesbr. G. O. Sars, p. 4.
1906. — major Wolf. Pearson, p. 14.
1908. — — — Farran, pp. 36—37.
1908? — — — v. Bremen, p. 40, fig. 45.
1908? Gaetanus Kruppi Giesbr. v. Bremen, p. 41, fig. 47.
1908? — major Wolf. Wolfenden, p. 31.
1908? — Kruppi, Giesbr. Wolfenden, p. 32.
1909 ♀? — — — A. Scott, pp. 48—49, pl. IX figs 9—15.
. ♂ nec. — — — A. Scott, pl. X figs 1—9.
1911? — major Wolf. Wolfenden, p. 231.



Text-fig. 25. *Gaetanus Kruppi* Giesbr.
a. f♀. Head × 33. b. f♀. Abdomen × 33. c. f♂. Head × 33. d. Y♂ (st. II). Head × 33. e. Y (st. III). Abdomen × 33. f. Abnormal spec. Head × 33. g. f♂. Antennula sin. segments 8 ∾ 9—17 × 33. h. Intestinal tract × 9. i. Maxilla dext. in post. view × 57. j. Maxillipes sin. in post. view × 57. k. Maxillipes dext. in anterior view × 57. l. Y♂ (st. IV). Maxillipes sin. in anterior view × 57. m. Y♂ (st. III). Maxillipes × 57. n-o. Y♂ (st. V—IV). Pes V anterior view.

Description. f♀. Size: Specimen from Thor St. 104 measured 5.4 mm.; anterior division 4·2 mm., urosome 1·2 mm. Wolfenden's specimens measured 5 mm.

The body, which appears moderately slender, is 2·7 as long as wide, and has a well developed frontal spine (text-fig. 25 a), which is directed forwards and slightly downwards, and smoothly continued into the dorsal outline of the body. The rostrum is short, and is terminally slightly bifurcate. The lateral spines of the fifth thoracic tergite (text-fig. 25 b) are suddenly set off, slightly divergent and reach the middle of the genital somite. The anterior division is 3·5 as long as the urosome, which has the 4 somites and the furca of the following relative length viz. 46, 23, 19, 15 and 21; the furcal rami are about 1·2 as long as wide. The genital area is similar to that of *Gaidius* (text-fig. 25 b).

The *antennulae*, which extend somewhat beyond the end of the abdomen, have the segments 24—25 almost completely fused and the appendages like those of *Gaidius tenuispinus* and *Gaetanus armiger*; the Sp. segm. 23 is at least twice as long as segments 24—25. The segments 2, 8 ∾ 9 and 20 are of about equal length and about 1·1 shorter than segment 19. The *antennae* differ from those of *Gaetanus armiger* (cf. Giesbrecht p. 221) by the Re II, which is distinctly twice as long as Re I, and has not only the second but also the third Se placed on a conical protuberance. The *mandibulae* differ from *G. armiger* by the fairly long plumous Si 1 of the third basipodite and the short Se 2 with a few branches. The *maxillulae* and *maxillae* are scarcely different from those of *G. armiger* (text-fig. 25 i). The third basipodite of the *maxillipes* is 1·3 as long as the two first segments and 3 times as long as the endopodite; the second basipodite has almost in the middle anteriorly on the exterior surface a laminous process with a concavity turning forwards; its tip is somewhat produced and rounded, and proximally to it a more or less distinct tooth is found (text-figs 25 k and j). The fourth Li of the basp. II has in addition to the usual sensory lobe and two hairs a small conical process representing the third hair.

The pes I has the articular line between Re I and II distinct anteriorly, except near the inner margin; posteriorly only a faint line was observed; the pes II has the St., which has 25 well separated teeth, distinctly longer than the Re III, in length almost equal to Re I—II. The basp. II of the fourth pair of legs (fig. 3 a) has about 25—30 stiff triangularly pointed marginal bristles, in the main placed on the posterior surface. The number of secretory pores is completely like that of *Gaidius*, with a pore at the base of Se Re I in pes II.

The oral surface of the *labrum* is in most respects like that of *G. latifrons* (cf. fig. 5 d); the bristles in group 3—5 are more like spines; the transverse rows of hairs between the circular spots of group IV, as seen in fig. 3 b, are more like *Gaidius tenuispinus*. The lateral outline of the labrum is very much like that of *G. brevispinus*, with three small elevations; no setae were observed on the anterior surface in front of marginal row. The *lamina labialis* (fig. 3 c) is smooth and of another shape than in *G. latifrons*, but in other respects, except for a somewhat different arrangement of the serrulae behind the lamina, the labial appendages etc. are similar to those of *G. latifrons*.

As most specimens are very pellucid the intestinal tract, especially the black hindmost portion is generally quite distinct. It shows a characteristic structure with a large somewhat pointed coecal sac directed towards the frontal spine, a small dorsal one opposite the wide oesophagus, and behind the latter a gentle concavity, in which the oviducts with big eggs are placed (text-fig. 25 h).

♂. Size of specimen from Thor St. 183(?) was 5·04 mm.; anterior division 4 mm., urosome 1·04. Wolfenden's specimen measured 4·65 mm.

The shape of the body is more slender; the anterior division is 3 times as long as wide and almost 4 times as long as the urosome. The bifurcate *rostrum* is shorter and more clumsy than in the female; dorsally to the frontal organ the outline is first bulked; above this a concavity, and beneath the frontal spine another proeminence adorned with about 10 transversely placed chitinous lines, laterally somewhat convergent, are found. The comparative length of the first four abdominal somites and the furca is 15, 34, 23, 23 and 14; the anal somite is, seen from above, almost completely covered, and the furcal ramus is only a little longer than wide.

The *antennulae* (text-fig. 25 g) extend about to the end of the second abdominal somite, but not as in the female beyond the end of the abdomen. The segmentation from segm. 8—14 is difficult to make out, partly because the articular membranes are rather indistinct and partly because a number of faint transverse lines were seen between the real membranes; it seems, however, that only the segm. 12 and 13 are really fused; the segments 20 and 21 are completely, and 24—25 only partly fused. The number of "Æstetasken" is like Giesbrecht's description of *Aetidius* (Taf. 14 fig. 13), but the segments 8 ∾ 9 possess 4. The segments 11—13 bear two setae each, of which the proximal is the longer, and is inserted in a small protuberance; the Sd of segments 14, 15, 16 and 17 are placed on small protuberances. The posterior seta of segm. 23 extends somewhat beyond the middle of segment 24. In the Re II of the *antennae* no setae were observed. The *mandibulae* possess a large but soft manducatory part without distinct teeth but with a short Sdi; the Basp. 2 has an ovoid minutely granular area, and the third one as well as Ri I has no setae; the setae of the Ri and Re are better developed than in the female. The *maxillulae* are in main features like those of *G. brevispinus* (fig. 1 e) but the Basp. III seems only to have a single delicate seta, and the Re only 10 setae. The *maxillae* and *maxillipeds* are scarcely different from those of *Gaidius*.

The pes I is more slender than in the female; the articular line between Re I—II is wanting posteriorly; the Se Re II is represented by a very short delicate bristle; the glandular pore in the outer margin of Re III, which is only indicated in the female, is well developed. The inner margin of the second basipodite was found smooth not only in the fourth, but also in the third pair of legs. The fifth pair of legs (Pl. III figs 3 d—f) is in main features like that of *Gaidius*, but is as a whole distinctly more slender. The right endopodite, which is half as long as Re I and distally and posteriorly has a short tooth, is distally inflated and spoon-shaped; the Re II has the anterior process which encloses the bowel-shaped cavity shorter and more prominent (fig. 3 f). The endopodite of the left legs is almost $^2/_3$ of the length of the Re I; it is indistinctly divided into 3 segments, of which the second is the shortest, and has no terminal seta. Inwards, at the base of Re III, a small process bearing 4 short hairs is found.

Y (Stage V). Size: female from Thor St. 183 (?) 4·0 mm.; anterior division 3·2; urosome 0·8 mm. Farran's young male measured 4·3 mm.

The relative length of the four abdominal somites and the furca is: 19, 21, 18, 19 and 17; the furcal rami are 1·3 as long as wide. The *antennulae* are distinctly longer than in the adult, and the measurements are slightly different. The *maxillulae* have, in contrast to the female, only 10 setae in the Re, and the lob. IV of the second basipodite of the maxillipeds bears 3 setae as in the male, in addition to the sensory lobe. The articulation between Re I and II in the first pair of legs is only indicated anteriorly as a faint line; the St. of the Re III in the second pair of legs has only 20 teeth, the setae along the inner margin of the basipodite of the fourth pair of legs are rather stiff. The male differs from the female by the presence of a fifth pair of legs which as shown in text-fig. 25 n, is like that of *Gaidius*.

Y (St. IV). Size of male from Thor St. 165 was 3·29 mm.; anterior division 2·6; urosome 0·69 mm.

The body is comparatively slender, a distinct limitation between the head and the first thoracic tergite is observed, the somites IV and V are as in other stages fused with well marked lateral spines. The relative length of the abdominal somites and the furca is 11, 17, 19 and 13; the furcal rami are 1·4 as long as wide. The *antennulae* extend about 3 segments beyond the end of the abdomen. The *maxillulae* differ as usual by the 9 setae of Re, but the Basp. III has only 3 Sa + 1 Sp, and the Ri I—II each 2 Sa + 1 Sp; the laminous process of the maxillipeds has a slightly different shape without terminal tooth (text-fig. 25 l). The pes I has Re II—III fused, but Se Re II is present; the fourth pair of legs (fig. 3 g) has like the two preceding pairs, the Re II ∾ III fused, with 3 Se and 16 teeth in the terminal seta; the secretory pore corresponding to the Se Re II is missing. The only difference between the 2 sexes is found in the presence of a fifth pair of legs of the usual rudimentary type in the male (text-fig. 25 o).

Y (St. III). Size of specimen Thor St. 167 2·48 mm.; anterior division 2·07 mm.; urosome 0·41.

The shape of the body is distinctly more slender, and so is the frontal spine; the *rostrum* is blunt; the head is as in preceding stage well separated from the first thoracic somite, but also the fourth from the fifth one, which has no lateral spines. The relative length between the two abdominal somites and the furca, which is 1·4 as long as wide, is 12, 20 and 11. The *antennulae* extend 4 segments beyond the tip of the abdomen; the segments 2—3 and 4—5 seem to be fused, and the measurements are in several respect rather different; it is curious that the segment 25, which is well separated from the preceding one, is not only relatively but also absolutely longer than in any of the preceding stages (it is shortest in the f♀). The *maxillulae* are like those of preceding stage, but differ by 8 setae in the Re and by the Li I, in which one of the posterior setae is wanting (only 3 present), and one of the anterior ones (S 5) is represented by a short spine. The other mouth appendages, except the *maxillipeds* which have the the laminous process rounded, are in main features like those of preceding stages (text-fig. m).

The pes II, which like pes III—IV have the Ri unsegmented, has a fairly distinct limitation between Re I and Re II—III, and is in main features like fig. 3 g; the pes III differs from II by less distinct limitation between Re I and Re II ∾ III, but the latter segment has only 2 Se; the pes IV is again more reduced, as seen in fig. 3 h, as all the segments are completely fused, and as only a single secretory pore was found.

Variation etc. A single specimen from Thor St. 152 showed a rather curious shape of the dorsal outline behind the frontal spine; as the species was in all other respects like the rest, the structure ought perhaps to be regarded as a kind of deformity (text-fig. 25 f).

"Sacshaped structures" like those described in *G. tenuispinus* are found in several specimens, mostly adult females, but also in young ones of the penultimate stage; the following number of "parasites" were found in samples from the following 6 stations of Thor viz. 19/6 1904 St. 152 7 parasites in f♀ and 1 in y♂, 11/7 1904 St. 183 2 par. in f♀ and y♂, 1/9 1905 St. 167 13 in f♀ and 2 in y♂♀, 9/5 1905 St. 72 15 in f♀, and 14 in y♂♀, 29/8 1905 St. 165 1 in f♀ and 22/5 1904 St. 99 1 parasite in f♀.

Occurrence. The Ingolf Exp. has not taken any specimens of this species, but it was gathered in several hauls by the Thor.

In Denmark Strait:

19/6 1904 St. 152 65°00 L. N. 28°10 L. W. Yt. 1000 M. Wire 6 f♀, 1 y♀ (V), 2 y♂ (V).
800 M. Wire 7 f♀.
? 15 f♀, 3 y♀ (V), 12 y♂ (V).
? 18 f♀, 2 f♀ (V), 10 y♂ (V), 2 y♀ (IV).
20/6 1904 St. 153 65°20 L. N. 27°12·5 L. W. Yt. 800 M. Wire 1 f♀, 4 y♂ (V).
21/6 1904 St. 154 65°20 L. N. 27°10 L. W. 2 f♀, 2 y♀ (V), 2 y♂ (V).

In the Atlantic south of Iceland it was gathered at the following stations.

10/7 1904 St. 180 61°34 L. N. 19°05 L. W. Yt. 1800 M. Wire 1 f♀, 1 y♂ (V).
11/7 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 39 f♀, 23 f♂. 10 y♀ (V), 31 y♂ (V), 4 y♀ (IV), 4 y♂ (IV).
25/5 1904 St. 104 62°47 L. N. 15°03 L. W. Yt. 1500 M. Wire 10 f♀, 4 f♂, 15 y♀ (V), 9 y♂ (V), 1 y♀ (IV), 1 y♂ (IV).

East and south-east of Iceland it was gathered at 2 stations:

22/5 1904 St. 99 65°15 L. N. 9°53 L. W. Yt. 1700 M. Wire 3 f♀, 1 y♀ (V), 1 y♀ (IV).
12/7 1903 St. 164 62°10 L. N. 4°36 L. W. 1 f♀.

South-west of the Færoes outside the Ingolf area the species was taken at the following stations:

15/6 1905 St. 82 51°00 L. N. 11°43 L. W. Yt. 1200 M. Wire 2 y♂ (V); 2 y♀ (IV), 1 y (III).
800 M. Wire 1 y♀ (V).
8/6 1905 St. 72 57°52 L. N. 9°53 L. W. Yt. 1500 M. Wire 80 f♀, 5 f♂, 36 y♀ (V), 83 y♂ (V), 7 y♀ (IV), 16 y♂ (IV), 2 y (III).
29/8 1905 St. 195 60°00 L. N. 10°35 L. W. Yt. 1500 M. Wire 5 f♀, 1 y♀ (V).
1/9 1905 St. 167 57°46 L. N. 9°55 L. W. Yt. 1500 M. Wire 46 f♀, 12 y♀ (V), 13 y♂ (V), 5 y♂ (IV), 4 y (III).

Distribution and Remarks. I have examined specimens of this species which were determined *G. Kruppi* Giesbr. by Professor Sars. *G. Kruppi* Giesbr. differs from my specimens by the much smaller size (♀: 3·6—4 mm.; ♂: 3·7 mm.), and on that account I am not quite sure that they are identical. I have on that account at a earlier date preferred the name *G. major* Wolf., and this name is printed on Plate III. But as the description of *G. Kruppi* was published a few months previous to that of *G. major* (as stated by A. Scott), and as Wolfenden not only in his original description (1903 p. 114) says "the lamellar appendage of the posterior foot-jaw is absent", but reiterates the same statement as late as 1911 (p. 231), well aware of the importance of this character, I feel obliged to accept the name *G. Kruppi* at present. As Wolfenden has identified drawings of specimens from the west coast of Ireland which were submitted to him by Farran as belonging to *G. major*, and as Farran (1908), about the species which he names *G. major* Wolf., writes "*G. Kruppi* appears to be at most a rather smaller Mediterranean variety of this species", it seems probable that Farran's specimens belong to the species described above. The female of which A. Scott in the Siboga Expedition has given figures and has identified with *G. Kruppi*, is possibly identical with this species (Size 5·7 mm.; lobe IV maxillipeds with 3 setae and frontal spine rather short), but the male is scarcely so on account of the different shape of Re dextr. pes V. Scott regards Esterly's *G. brevicornis* (1906 p. 56—57) as identical with *G. Kruppi*, though the lamella of the maxillipeds has quite another shape, and his *G. clarus* (pp. 57—58) as the male of this species; in the latter supposition he is possibly right, but it is in any case different from the male from the Atlantic.

If *G. Kruppi* and *major* of the different authors are identical, its distribution is wide (Indian Ocean, South and North Atlantic and the Mediterranean); if only the localities which certainly belong to the species described here are taken into consideration its range encompasses the North East Atlantic as far south as 50° L. N. and as far north as 65° L. N.; it is distributed as far west as Denmark Strait (L. W. 28°), and as far east as the Færoe-Iceland channel (L. W. 4°). All records show that it is a deep sea species.

26. Gaetanus minor Farran.

(Pl. III fig. 4a).

1905. Gaetanus minor n. sp. Farran, p. 34, pl. V figs 1—11.
1906. — — Farran. Pearson, p. 14.
1908. — — — Farran, p. 37.
1908. — — — v. Bremen, p. 41, fig. 46.
1908. — — — Wolfenden, p. 32.
1909. Gaetanus minor Farran. A. Scott, pp. 47—48, pl. IX figs 1—8.
1911. — — — (minimus? n. sp.) Wolfenden, pp. 233—234, text-figs 20 a—e.

Description. f♀. Size: 2·3 mm., anterior division 1·89; urosome 0·44 mm. Farran's specimens measured 2·4 mm.

The short rostrum is undivided. The anterior division is 4·3 as long as the urosome. The lateral spines reach the end of the genital somite (fig. 4 a). The genital somite is rather swollen below, with a distinct receptaculum seminis. The caudal rami are almost as long as wide. The relative length of the abdominal somites and the furca is 20, 9, 8, 8 and 7.

The *antennulae* reach just beyond the end of the genital somite; the measurements are practically as given by Farran, and the appendages are as in preceding species. The Re of the *antennae* is scarcely 1·4 as long as Ri; the Ri I is twice as long as Re II, which is again 2·6 as long as Re I, and 1·6 shorter than Re III. The Re II has the short Se 2 placed on a conical protuberance, but has none for the more slender Se 3. The *maxillulae* differ from those of *G. Kruppi* by the 2 spinelike Sp. of the Li 2. The third basipodite of the *maxillipeds* is 1·1 as long as the 2 first, and 2·7 as long as the Ri; the second basipodite has, as stated by Wolfenden, a rounded lamellous process, and the lobe IV has as usual 3 setae + a sensory lobe; the third basipodite has in a similar way as in *G. miles* Giesbr. (cf. Taf. 14 fig. 24) the inner margin produced into a rounded process which slopes most gradually towards the base, and here bears the usual row of teeth. This process is distinct but much lower in *G. Kruppi*, and is only indicated in *Gaidius*.

The terminal seta in the exopodite of pes II, which has 14 well separated teeth, is 1·1 as long as the Re I—II. The second basipodite in the fourth pair of legs has 12 stiff pointed bristles of the usual structure. The secretory pore at the base of Se Re I is wanting in pes II, present in III—IV.

Occurrence. The Thor has gathered a single adult female $^{20}/_{6}$ 1904 St. 88 48°09 L. N. 8°30 L. W. Yt. 300 M. Wire. This species has been recorded from the west coast of Ireland from a depth of about 400 fathoms, from the middle of the South Atlantic between 5° L. N. and 30° L. S. and from the Malay Archipelagos.

Though Farran does not mention the process of the Re II of the antennae nor the lamellous process of the maxillipeds, I do not doubt that the described species is identical with his *G. minor*; the mentioned features are found in Wolfenden's species, which he somewhat prematurely proposed to name *G. minimus*, if it should turn out to be another species than *G. minor*; the only difference between Wolfendens specimens and mine is the somewhat shorter antennulae, which do not extend beyond the end of the genital somite, and the smaller size (1·75—2 mm.). Between my specimen and Scott's description of specimens from the Siboga Expedition no difference except the shorter antennules of the females from the Siboga Expedition was found.

27. Gaetanus pileatus Farran.

(Pl. III fig. 6 a; text-figs 26 a—e).

1903. Gaetanus pileatus n. sp. Farran, p. 16, pl. XVII figs 1—11.
1904. — caudani Canu. Wolfenden, p. 114, pl. IX, figs 20—22.
1905. — pileatus Farr, Farran, p. 33.
1905. — caudani Canu. G. O. Sars, p. 4.
1906. — — — Pearson, p. 13.
1908? — — — Wolfenden, p. 31.
1908. Gaetanus caudani Canu. v. Bremen, p. 42, fig. 48.
1908. — pileatus Farr. Farran, pp. 35—36.
1909. — caudani Canu. A. Scott, pp. 46—47, pl. VIII figs 9—15.
1911. — pileatus Farr. Wolfenden, pp. 229—231, taf. 27 figs. 1—2, textf. 17 a—c.

Description. f♀. Size: Specimen from St. 82 measured 5·74 mm.; anterior division (including frontal spine 0·4 mm.) 4·7; urosome 1·04 mm.

The frontal spine has, as seen in (text-fig. 26 a) and as described by the authors, a very characteristic shape; the frontal organ is rather indistinct; the rostrum, which is very short, is in some specimens undivided, in others terminally slightly bifurcate. The fourth and fifth thoracic somites show dorsally trace of segmentation. The lateral spines are rather suddenly produced, slightly divergent, and almost reach the end of the genital somite. The anterior division is distinctly 4 times as long as the urosome, the genital somite is distinctly produced below, and the structure of the receptaculum etc. is in lateral view like that of *G. latifrons* (cf. fig. 5 b).

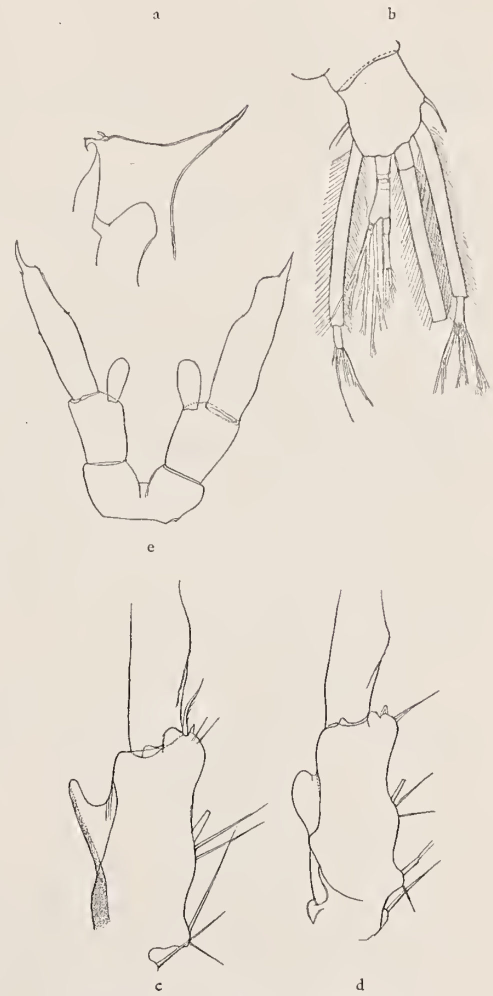
The relative length of the abdominal somites and the caudal rami, which are almost as long as wide, is 42, 23, 19, 19 and 20.

The *antennulae* extend 6—7 segments beyond the end of the abdomen. The measurements provide some similarity to *Gaetanus miles*, but differ especially by the more slender distal segments; the segment 19, which is the longest segment, is twice as long as segment 2, 1·7 as long as segments 8∾9 and 1·2 as long as segment 22; the segment 19 is 2·3 as long as segment 24. In the *antennae* the Re is only 1·1 as long as Ri, and the Ri I is 2·5 as long as Re II, which only possesses a terminal seta, and is only a trifle shorter than the Re VII. The *maxillulae* possess no spinules on the posterior surface of Li 1, but has about 14 fairly strong spinules on the anterior surface of Li III. The third basipodite of the maxillipeds is 1·1 as long as the two first ones and 2·8 as long as the Ri; the exterior margin of the second basipodite bears a fairly slender rounded lamella (text-fig. 26 d) and the fourth lobe is divided most distinctly by a deep cleft into a posterior smooth division and an anterior one, which possesses 3 setae in addition to the sensory lobe.

The Re I—II of the first pair of legs are completely fused with the exception of a small lateral incision. The terminal seta of the second pair of legs has 19 teeth, and is distinctly longer than the Re III. The second basipodite of the fourth pair of legs has 20 lamellous bristles. The secretory pore of Re I is wanting in pes II, present in III—IV.

The *labrum* is anteriorly scarcely different from that of the preceding species; orally it is as seen in fig. 6 a in main features like *G. Kruppi* (Pl. III fig. 2 e); the longitudinal series has in most groups two or more rows of hairs. The transverse groups of short hairs around the median circular spot Nr. 4 are on each side dissolved into a somewhat triangular group as seen in fig. 6 a, and somewhat behind it a transverse area of short spines or granules is found.

The *lamina labialis* is like that of fig. 5 e but is almost smooth; in front of this we have the usual two lateral series of slender spines, of which the more lateral is almost semicircular, while the median one is very short. In front, by a smooth area separated from the lamina, a wide area covered with flat granules and almost fused with the corresponding part of the other side is found. The 4 transverse groups of densely placed short spines behind the lamina are like those of *G. Kruppi* (fig. 3 c). The lateral longitudinal series shows the following structure: Ser. Nr. 1 consists of 10 short hairs in a transverse group and of 30 in a longitudinal group, continued upon the lobus labialis and partly confluent with the series Nr. 2, which has 20 slender hairs placed longitudinally. The series Nr. 3 has two groups behind, of which the more lateral is more posterior (in contrast to fig. 7 f Pl. II), and a longitudinal row which on the posterior surface of the lobus labialis is continued to near the tip. The series Nr. 4 is posteriorly placed almost transversely, forming a convexity, turning backwards and almost reaching corresponding part of opposite side, and is anteriorly continued to tip of the lobus labialis. The series Nr. 5 consists of a median transverse group of about 30 longer and shorter setae placed near the middle, and a more lateral partly longitudinal group; this group is not continued directly into any series on the labial lobe, but probably corresponds to the most medial one which is dissolved into independent groups. Possibly the series 5 corresponds also to the longitu-



Text-fig. 26. *Gaetanus pileatus* Farr.
a. f♀. Head × 18.
b. f♀. Right caudal ramus in abnormal specimen × 57.
c. f♀. Maxillipes sin in anterior view × 57.
d. y♂ (Stage V) m. s. in ant. view × 57.
e. y♂ (Stage V) pes V in anterior view × 57.

dinal group medially to the serrula 6-dentata and the inner series in front of the lamina (cf. Pl. II fig. 7 f s 6); if this interpretation is right, the serrula 6-dentata (fig. 7 f s 7) perhaps corresponds to Ser. 4.

Y⚥ (Stage V). Size of female from Thor St. 82 was 5·74, anterior division 4·2 mm., urosome 0·87.

The relative length of the abdominal somites and the furcal rami, which are about 1·2 as long as wide, is 20, 23, 18, 20 and 17. The appendages show similar differences from those in the adult as *G. Kruppi*; the lamina of the second basipodite of the maxillipeds is shorter and more rounded (text-fig. 26 d); but the inner margin of basip. II pes IV is smooth; the fifth pair of legs is in main features like those of *G. Kruppi* (text-fig. 26 e). In contrast to Canu's description of a young male of *G. caudani* the Re I—II of pes I are completely fused without Se Re I.

Y⚥ (St. IV). Size of a male from Thor St. 82 was 3·72 mm., anterior division 3·01 mm., urosome 0·71 mm.; a female measured 3·5 mm.

The relative length of the abdominal somites and furca was 19, 18, 24 and 13. The antennulae extend at least 8 segments beyond the end of the abdomen; the differences in the other appendages are scarcely different from those described in *Gaetanus Kruppi*.

Parasites and Abnormity. Sac-shaped parasites like those described in *G. tenuispinus* were found in one specimen from Thor St. 78 and 99, in 5 from Thor St. 183, in 28 adult females from Thor St. 82 (Yt. 1200 M. W.) and in 60 from St. 72. In a single adult female the setae of the right caudal ramus was branched (text-fig. 26 b).

Occurrence. The Ingolf Expedition has not gathered this species, but it has been captured at the following stations by the S/S Thor in Denmark Strait.

19/6 1904 St. 152 65°00 L. N. 28°10 L. W. Yt. 1000 M. W. 1 y♀ (V).
? 8 f♀.
20/6 1904 St. 153 65°20 L. N. 27°12·5 L. W. 5 f♀, 1 y♂ (V).
21/6 1904 St. 154 65°27 L. N. 27°10 L. W. 1 f♀, 1 y♂ (V).

In the Atlantic south of Iceland.

12/7 1903 St. 164 62°10 L. N. 19°36 L. W. 1 y♂ (IV).
11/7 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 19 f♀, 1 y♂ (V).
24/5 1904 St. 104 62°47 L. N. 15°03 L. W. Yt. 1500 M. Wire 34 f♀, 1 y♂ (V).
2/9 1904 St. 286 61°49 L. N. 14°11 L. W. Yt. 800 M. Wire 3 f♀, 1 y♀ (V).

In the Iceland-Færoe channel.

12/5 1904 St. 78 61°7 L. N. 9°30 L. W. 3 f♀.
22/5 1904 St. 99 61°15 L. N. 9°35 L. W. 7 f♀.

In the Atlantic, south-west of the Færoes.

15/6 1905 St. 82 51°00 L. N. 11°43 L. W. Yt. 1200 M. Wire 270 f♀, 38 y♀ (V), 15 y♂ (V), 3 y♀ (IV), 1 y♂ (IV).
Yt. 800 M. Wire 40 f♀, 4 y♀ (V), 3 y♂ (V).
8/6 1905 St. 72 57°52 L. N. 9°53 L. W. Yt. 1500 M. Wire 180 f♀, 23 y♀ (V), 1 y♂ (V), 1 y♂ (IV).
21/8 1905 St. 165 60°00 L. N. 10°35 L. W. Yt. 1500 M. Wire 1 f♀, 1 y♂ (V).
20/6 1905 St. 88 48°09 L. N. 8°30 L. W. Yt. 300 M. Wire 2 f♀.

Distribution. About this species Farran writes (1908 p. 36) "this species is a very noticeable feature in the deep-water fauna off the west coast of Ireland, occurring often in considerable numbers, in almost every tow-net from 200 to 1150 fathoms".

The gatherings of the Thor seem to show that it is much more abundant south of 60° L. N. even if it is found in Denmark Strait as far north as 65° L. N. By Wolfenden it has been recorded from the South Atlantic, and it was found by the Monaco Expedition, as well as at 5 stations from the deep water of the Malay Achipelago (5 females only).

Remarks. Though I have not seen Farran's original description, I am quite sure that my species is identical with his *G. pileatus* and different from Canu's *G. caudani* (if this author has not examined an abnormal specimen). As I have examined specimens determined by Sars as *G. caudani*, no doubts exist about its identification with the Monaco's species; and the same is the case with Wolfenden's species, from the South Atlantic. As the lamina of the maxillipeds (Pl. VIII fig. 13) was differently shaped in the Siboga specimens (length 5·7 mm.), I am not quite convinced of Scott's identification. Scott regards Esterly's *G. unicornis* as identical with his *G. caudani*, which he regards as the synonym of *G. pileatus*, but he is scarcely right, as the lamina of the maxillipeds has quite another shape in Esterly's species (1906 Pl. XII fig. 54).

28. **Gaetanus miles** Giesbrecht.

(Pl. III figs 7 a—b).

1888.	Gaetanus	miles	n. sp.	Giesbrecht, p. 335.
1893.	—	—	Giesbr.	Giesbrecht, p. 219, taf. 14 & 36.
1895.	—	—	—	Giesbrecht, p. 248.
1898.	—	—	—	Giesbrecht & Schmeil, p. 32.
1903.	—	—	—	Norman. p. 136.
1903.	—	—	—	J. C. Thomsen, p. 17.
1904.	—	—	—	Cleve, p. 191.
1905.	Gaetanus	miles	Giesbr.	G. O. Sars, p. 3.
1906.	—	—	—	Pearson, p. 14.
1908.	—	—	—	Farran, p. 36.
1908.	—	—	—	v. Bremen, p. 39, fig. 42.
1909.	—	—	—	A. Scott, pp. 44—45, pl. VIII figs 1—8.
1913.	—	—	—	Wolfenden, p. 231.

Description. f♀. Size of specimen from Thor St. 82 was 4·21 mm.; anterior division 3·4, urosome 0·81 mm. Giesbrecht's specimen measured 3·5, Scott's 4·3 and Wolfenden's 3 mm.

The shape of the body is scarcely different from Giesbrecht's figure; the anterior division is 4·2 as long as the urosome, which has the relative length of the somites and furcal rami as follows: 34, 13, 11, 11, 15; the furcal rami are 1·3 as long as wide. The *antennulae* differ from those of Giesbrecht's specimen by the proportional length of the segments; the segment 19 is a little longer than 22, which is the longest according to Giesbrecht, and this again is a little longer than 20; the segments 8∾9, 13 and 24∾25 are in *G. miles* of almost equal length, but in my specimens segment 13 is 1·1 as long as 8∾9 and 1·2 as long as 24∾25. The mouth-appendages, with the exception of the *maxillipeds*, are scarcely different from those of G. miles; in this pair of appendages the third basipodite is 3 times as long as the endopodite, and 1·3 as long as the Basp. I—II; the plate-shaped process of the exterior surface of the second basipodite is rounded and almost semicircular (fig. 7 a), and distinctly different from Giesbrecht's fig. 24. Taf 14. In the first pair of legs the articular line between Re I — II was scarcely indicated; the Ri of the second pair of legs has the articulation between Ri I—II fairly distinct anteriorly, and scarcely indicated posteriorly; the second basipodite of the fourth pair of legs possesses 15 strong knife-shaped spines (Pl. III fig. 7 b). The glandular pore at the base of Se Re I is wanting in the second pair of legs but found in pes III—IV.

The oral surface of the *labrum* is in the main like that of *G. pileatus* (cf. fig. 6 a Pl. III); the first group in the longitudinal series consists of numerous short setae (2—3 setae deep), and the second of somewhat longer ones; in the third group only a single row of fairly long spines were observed, and in the third one a few very short ones were observed laterally in addition to the inner row of long knife-shaped spines (cf. fig. 5 d). The *lamina labialis* is smooth as in *G. Kruppi*, but the area in front of and behind it is like that of *G. latifrons*.

Y♀ (St. V). Size of female from St. 88 3·34 mm.; anterior division 2·76 mm., urosome 0·58.

The relative length of abdominal somites and furcal ramus, which is 1·1 as long as wide, is 15, 13, 9, 12 and 11. The measurements of the antennulae are more like those of the *G. miles*, as segment 22 is a little longer than 19, and as segments 8 ∾ 9, 13 and 24 ∾ 25 are of almost equal length. In other respects of any importance the appendages are scarcely different from those of the adults, except by the structure of the second basipodite in the fourth pair of legs, which is smooth and has the inner margin almost straight, not suddenly produced as seen in fig. 7 b.

Occurrence. The Ingolf Expedition has not taken this species, but the Thor has gathered a few specimens at four stations viz.

$^{11}/_{7}$ 1904.	St. 183.	61°30 L. N.	17°08 L. W.	Yt.	1800 M. Wire	1 f♀.
$^{10}/_{7}$ 1904.	St. 180.	61°34 L. N.	19°05 L. W.	Yt.	400 M. Wire	1 f♀.
$^{15}/_{6}$ 1905.	St. 82.	51°00 L. N.	11°43 L. W.	Yt.	1200 M. Wire	1 f♀.
$^{20}/_{6}$ 1905.	St. 88.	48°09 L. N.	8°30 L. W.	Yt.	300 M. Wire	1 y♀.

Distribution. This species has previously been recorded from the west coast of Ireland, from the area explored by the Monaco Expedition, from the South Atlantic between 20 and 40 L. S., from the Malay Archipelagos and from the Pacific (3° L. S.—5° L. N. 99°—115° L. W.).

Remarks. I am not quite sure that the specimens which I have examined really are identical with Giesbrecht's *G. miles,* which is smaller, has the relative measurements of the antennulae somewhat different, the lamina of the second basipodite of the maxillipeds quite differently shaped and only 5 instead of 15 spines marginally in the second basipodite of the fourth pair of legs. Scott's specimens agree with mine in the number of the mentioned spines, in the size and partly in the shape of the lamina of the maxillipeds, but differ in the measurements of the antennulae. As Scott's specimens form a connecting link between Giesbrecht's and the Atlantic specimens, I do not think the establishment of a new species is warranted.

29. Gaetanus latifrons G. O. Sars.

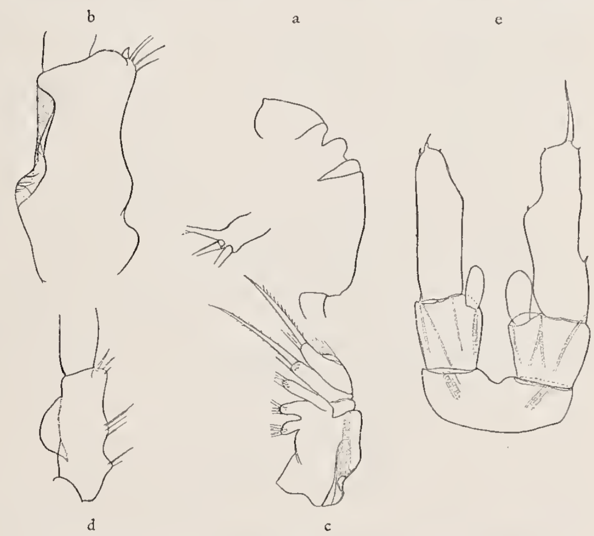
(Pl. III figs 5 a—g; text-figs 27 a—e).

1905. Gaetanus latifrons n. sp. G. O. Sars, p. 11.
1905. — holti n. sp. Farran, pp. 33—34, pl. VI figs 1—12.
1905. — longispinus n. sp. Wolfenden, pp. 7—8, pl. III.
1906. — latifrons G. O Sars. Pearson, p. 14.
1908. — — — Farran, p. 36.
1908. Gaetanus latifrons G. O. Sars. v. Bremen, p. 39, fig. 43.
1908. — holti Farran. Wolfenden, p. 31.
1909. — — — A. Scott, pp. 49—50, pl. X figs 10—17.
1911. — — — Wolfenden, pp. 232—233, fig. 19.

Description. f♀. Size of specimen from Thor St. 183 was 5·1 mm.; anterior division 4 mm.; urosome 1·1 mm. Sars' specimens measured 4·85 mm., Farran's specimens 5·1, Scott's 5·4 and Wolfenden's 3·7—4 mm.

The frontal spine, which has a triangular base, has as seen in fig. 5 a the tip directed forwards and upwards. The distance between the base of the frontal spine and the frontal organs, which are placed on a small process, is almost straight with a low crest. The rostrum is terminally bifurcate. The shape of the body is scarcely different from Farran's figure; the anterior division is 2·5 as long as wide and 3·6 as long as the urosome. The genital somite (fig. 5 b), which is distinctly 1·4 as wide as long and 1·1 as deep as long, has a fairly prominent receptaculum seminis. The relative length of the abdominal somites and the furcal rami is the following: 42, 23, 19, 18 and 21; the furcal rami are 1·1 as long as wide.

The *antennae,* which have the Re about 1·3 as long as the Ri, have the Ri I almost twice as long as Re II, which is 1·7 as long as Re I, and a little shorter than Re VII. The Re I has a single terminal seta on a conical protuberance, and the Re II has 3 setae, of which the basal is the longest and like the median one is placed on small protuberances. The *maxillulae* possess 5 setae on Li II; the Li I has no spinules posteriorly and the Li III has none anteriorly. The third basipodite of the *maxillipeds* is 3 times as long as the endopodite and 1·3 as long as the first and second basipodites combined; the lamina of the second basipodite (text-fig. 26 b), which is folded in a characteristic way, is in the whole length fastened to the anterior surface of the segment; the inner margin of the third basipodite is basally not straight as shown in Farran's figure, but slightly convex as figured by Scott.



Text-fig. 27. *Gaetanus latifrons* G. O. Sars.
a. f♀. Maxilla sin in post. view × 57. b. f♀. Maxillipes sin. in ant. view × 57. c. Y (stage III). Maxilla dext. in ant. view × 57. d. Y (stage III). Maxillipes sin. in anterior view × 57. e. Y♂ (stage V). Pes V in anterior view × 57.

The *first pair* of legs has a well developed articulation between Re I and II, and the Se of Re II almost reaches the end of Re II. The *second pair* of legs has a well developed articulation between Re I and II, and a glandular pore at the base of Se Re I; the terminal seta, which has 23 teeth, is a little longer than the Re III, and of equal length to Re I—II.

The second basipodite in the fourth pair of legs has about 25 knife-shaped spines as shown in fig. 5 c.

The oral surface of the *labrum* is fairly characteristic, as shown in fig. 5 d, especially the transverse rows of granules around the median circular spot Nr. 4; the *lamina labialis* has a characteristic granulation as seen in fig. 5 e, which also illustrates the area in front of it. The arrangement of setae in the lateral series behind the lamina labialis is not unlike that of *G. pileatus*: Ser. set. 1 consists of about 70 short setae placed in a longitudinal group: The series 2 seems to be represented by 3 groups with from 10—25 slender setae, of which the first is placed behind near the middle, while the third, which is more longitudinal, is placed laterally more in front. The series Nr. 5, to which the two most medial groups mentioned ought perhaps to be referred, falls in this species naturally into three divisions, forming together an outwards convex figure (like that in fig. 7 f Pl. II) consisting of 2 hairs most medially, well separated from the group of 14 hairs, which is almost fused with the dense longitudinal row almost reaching the end of the labial lobes; the series Nr. 3—4 are scarcely different from those of *G. brevispinus* (Pl. II fig. 7 f).

Y♂♀ (St. V). Size of female from Thor St. 183 was 4·16 mm.; anterior division 3·29 mm.; urosome 0·87.

There is indication of an articular line between head and first thoracic tergite, and between the fourth and fifth ones. The relative length of the abdominal somites and the furcal rami, which are 1·2 as long as wide, is the following: 19, 19, 17, 19 and 17. The first abdominal somite is somewhat produced below, more so than in the male. The inner margin of the second basipodite is in both sexes almost straight, and distinctly different from that described in the adult female; in the female we find about 20 stiff pointed setae, and in the male about 9 setae of usual structure (in pes II a close row of 20 is observed). The fifth pair of legs is very similar to that of *G. Kruppi* (text-fig. 27 e).

Y♂♀ (St. IV). Size of female from Thor St. 183 was 3·13 mm.; anterior division 2·53 mm.; urosome 0·60. A male measured 3·45 mm.

The relative length of the abdominal somites and the furca is as follows 15, 18, 19 and 13. The *antennulae* extend by at least 2 segments beyond the end of the abdomen. The *maxillulae* show differences corresponding to those described in *G. Kruppi.* The lamina of the *maxillipeds* has a less complicated structure, is more prominent and of obtusely triangular shape. The *pes I* has the Re I—II fairly well separated, and has 3 Se pes I; the second basipodite of the fourth pair of legs has only 3—4 setae along the inner margin. The only difference between the male and female is found in the presence of a fifth pair of legs (cf. text-fig. 27 o).

Y (St. III). Size of specimen from St. 82 was 2·48; anterior division 2·04; urosome 0·44 mm.

The head and the first thoracic somite as well as the fourth and fifth ones are well separated. The frontal spine is scarcely different from that of the adult females, but the lateral corners of the thorax are rounded without trace of spines. The relative length of the abdominal somites and the furca is 15, 18 and 9. The *antennulae*, which extend 3 segments beyond the end of the abdomen, show similar differences from those of the adult ones as in *G. Kruppi.* The *maxillulae* have only 8 setae in Le, but in other respects show similar differences as in preceding; the Li II possesses 5 setae as in the adult females. The exterior margin of the *maxillae* (text-fig. 27 c) is almost straight, in contrast to the structure in the adult females, the structures in the two preceding stages forming intermediary steps. The lamina of the maxillipeds is more regularly rounded and apparently more prominent (text-fig. 27 d).

In the first pair of legs the segmentation of the exopodite is only indicated laterally; 3 Se are present, but the two proximal ones are very short; the 3 last pair of legs are scarcely different from those of *G. Kruppi.*

Variations etc. In a single young female of stage V the third seta of the left caudal rami was dichotomous.

Sac-shaped "parasits" like those described in *G. tenuispinus* were found in four adult females and in a young male from St. 183.

Occurrence. The Ingolf Exp. has not taken this species, the S/S Thor has gathered it at the following stations.

19/6 1904	St. 152	65°00 L. N.	28°10 L. W.			1 y♀ (V).
11/7 1904	St. 183	61°30 L. N.	17°08 L. W.	Yt.	1800 M. Wire	8 f♀, 2 y♀ (V), 5 y♂ (V).
22/5 1904	St. 99	61°15 L. N.	9°36 L. W.			1 f♀.
15/6 1905	St. 82	51°00 L. N.	11°43 L. W.	Yt.	1200 M. Wire	1 y (III).
8/6 1905	St. 72	57°52 L. N.	9°53 L. W.	Yt.	1500 M. Wire	1 f♀, 5 y♀ (V), 4 y♂ (V), 1 y♀ (IV), 1 y♂ (IV).
31/8 1905	St. 167	57°46 L. N.	9°55 L. W.	Yt.	1500 M. Wire	1 y♂ (V), 1 y♀ (IV).

Distribution. The species has been taken at several stations by the Monaco Expedition, and is fairly common on the west coast of Ireland "at depths of from 330 to 1150 fathoms". According to Wolfenden it is "anschinen im Atlantischen Ocean sehr häufig, erscheint von dort auch in den Fängen des "Gauss" und erstreckt sich nach Norden bis zur Westküste Grönlands". A single specimen has by been collected the Siboga Exp. in the Malay Archipelago.

Remarks. Between this species and Sars' description of *G. latifrons* scarcely any difference was found; in spite of some small differences, enumerated above, it is certainly identical with Farran's *G. holti*; Wolfenden's specimens were as a whole somewhat smaller, but in other respects scarcely different. This species seems to differ from Scott's description by the shorter antennulae and the different shape of the lamina of the maxillipeds.

30. **Gaetanus ferox** n. sp.

(Text-figs 28 a—b).

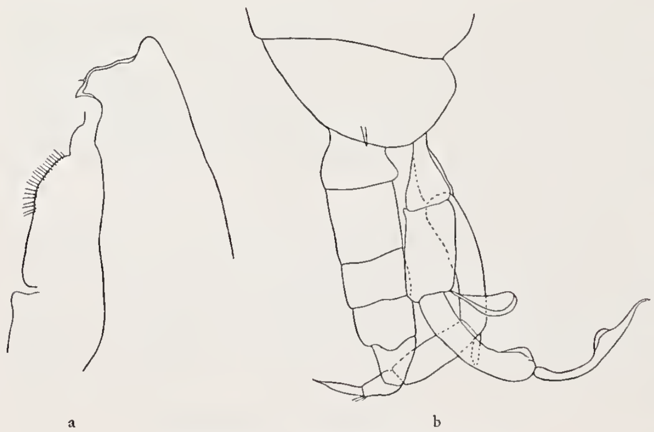
Description. f♂. Size: 3·4 mm., anterior division 2·6 mm.; urosome 0·78 mm.

The shape of the body is most like that of *Gaidius tenuispinus*, but the head dorsally terminates in a prominent, obtusely rounded keel (partly broken in the examined specimen). Below the frontal spine the outline is almost straight, and is then convex towards the base of the clumsy rostrum, which possesses two terminal points (text-fig. 28 a). The head and the first somite as well as the two last thoracic ones are completely fused; the lateral corners are regularly rounded, but somewhat in front of the margin are seen rather short slender spines, which probably only extend slightly beyond margin (broken in examined specimen). The anterior division is 3·3 as long as the abdomen, which as usual consists of 5 somites; the second somite is 1·5 as long as the third, which is a little longer than the first and fourth; the fifth somite is just visible from above. The genital pore is found on the left side. The furcal rami are almost as long as wide; the St. 2 is somewhat longer than the abdomen (text-fig. 24 b).

The antennulae extend distinctly beyond the end of the abdomen; the segments 20—21 are completely fused, and the segment 22 has, at least on the left side, a characteristic structure, as it is widened out from the narrower middle portion towards the base as well as towards the tip.

The measurements and appendages differ scarcely from those of *G. Kruppi*. The *antennae* are like those of *G. Kruppi*, but the two branches are almost of same length. The *mandibulae*, *maxillulae* and *maxillae* are scarcely different from those of *G. Kruppi*. The third segment of the *maxillipeds* is 1·2 as long as the first and second combined, and 2·7 as long as the endopodite, but in other respects this pair of appendages is scarcely different from those of *G. Kruppi*.

The *first pair* of legs is like that of *Gaidius brevispinus* (Pl. III fig. 1 g), but the articular line between Re I—II is indicated anteriorly, though wanting posteriorly; the Se of Re I and II are wanting. The Se of Ri I of the pes II is wanting; the St, which has about 30 teeth, is a little longer than Re III, which is again a little longer than the Re I—II; no glandular pore is found at the base of Se Re I. The pes III—IV have a secretory pore at the base of Se Re I; the basipodite of the third pair has a marginal row of setae, but that of the fourth pair is completely smooth. The *fifth pair* of legs (text-fig. 28 b) is in most features like that of *Gaet. Kruppi* (Pl. III fig. 3 d); the right leg is less slender, especially the third basipodite, which is, however, less clumsy than in *G. brevispinus* (Pl. III fig. 1 h); the first segment of the right exopodite has exteriorly a slight concavity almost in the middle and, proximally to it, a slender seta (Se Re I), thus indicating that this segment really corresponds to Re I ∞ II; the Re III differs from that of *G. Kruppi* by the structure of the terminal portion (that distal to inner process) which is only two thirds as long as the basal part and not in the least as long as, and, proximally to a hair-shaped terminal part, has an inner lamina in the distal half. The right endopodite when observed from behind, is almost completely like that of *G. Kruppi* (fig. 3 d), but viewed anteriorly it is seen to have a very characteristic form on account of a wide deep "cavity"? and a terminal tooth not unlike a Prussian helmet, but with a prolongation towards the base, as if to give protection to the back of the neck. The *pes V sin* has the Ri of a similar shape as in *G. Kruppi*, but it is comparatively shorter, reaching only slightly beyond the middle of Re I, and has the segmentation more indistinct; the first segment of the exopodite has the outer margin somewhat convex, and is terminally somewhat produced inwards; the Re III, which is scarcely 1·1 as long as Re II, has a fairly long terminal spine, near the base of which a delicate seta is observed, as well as some hairy spots.



Text-fig. 28. *Gaetanus ferox* n. sp.
a. Head from the left × c. 40.
b. Abdomen × c. 40.

Remarks etc. Of this species I have only examined a single male, brought home by the S/S Thor, and taken 8/6 1905 57°52 L. N. 9°53 L. W. Yt. 1500 M. Wire.

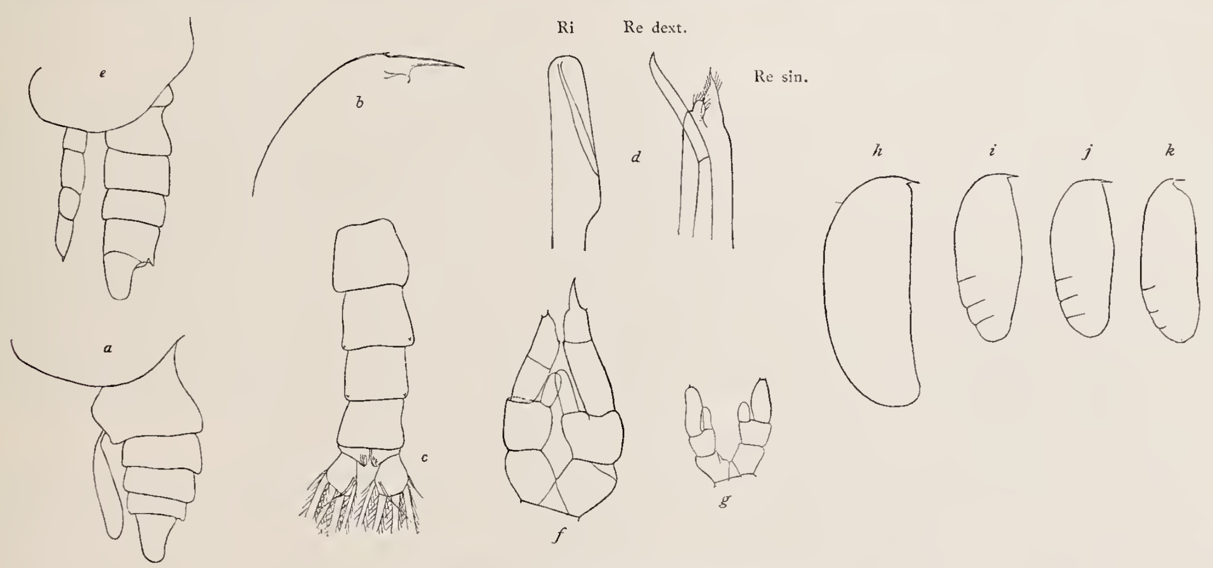
As except in the shape of the forehead it is in almost all characters like the male of *G. Kruppi*, I think it is rightly referred to *Gaetanus*. It is certainly not the male of any of the species of *Gaetanus* which has been mentioned in this paper; nothing indicates that it is the male of any of the described species of *Gaidius* or *Gaetanus*.

31. **Euchirella rostrata** Claus.

(Pl. IV figs 1 a—h; text-figs 29 a—k).[1]

1866. Undina rostrata n. sp. Claus, p. 11, taf. I fig. 2.
1883.? Euchæte hessii n. sp. Brady, p. 63, pl. XX figs 1—13.
1892. Euchirella rostrata Claus. Giesbrecht, p. 232, taf. 15.
1898. — — — Giesbrecht & Schmeil, p. 36.
1900.? — — — Cleve, p. 4, pl. 2 figs 1—12.
1902.? — — — Wolfenden, p. 367.
1903. Nec. — — — Thompson & Scott, p. 244.
1903. — — — Norman, p. 137.
1903. — — — J. C. Thompson, p. 18.
1904. — — — Wolfenden, p. 129.
1905. Euchirella rostrata Claus. G. O. Sars, p. 4.
1905. — — — Th. Scott, p. 223.
1905. — — — Esterly, pp. 152—153.
1905. Nec. — — var. magna Wolfenden, p. 18.
1905. — — — Farran, p. 36.
1906. — — — Pearson, p. 15.
1908. — — — Farran, p. 38.
1908 — — — v. Bremen, p. 47, fig. 52.
1911. — — — Wolfenden, p. 235.
1912. — — — Esterly, p. 311.

Description. f♀. Size: Specimen from Ingolf St. 19 measured 4·07 mm.; anterior division 3·26; urosome 0·81 mm. The size of specimens from other stations varied from 3·25—4·2 mm. Giesbrecht's specimens measured 2·95—3·1 mm., Farrans 3·3—4·2 and Wolfendens from 2—3 mm.



Text-fig. 29. *Euchirella rostrata* Claus.
a. f♀. Abdomen × 45. b. f♂. Rostrum × 45. c. f♂. Abdomen × 45. d. f♂. Tips of pes V from the right × 150. e. y♂ (St. V). Abdomen × 45. f. y♂ (St. V) Pes V × 60. g. y♂ (St. IV) Pes V × 60. h. f♀. Body × 33. i—j. y♀—♂ (St. V) × 33. k. f♂ × 33.

The long and pointed rostrum is more vertical and the head is much more suddenly raised than seen in Giesbrecht's fig. 23 (Taf. 36) (text-fig. 29 h). The genital somite has the ventral protuberance more regularly raised, especially behind, than shown in Giesbrecht's fig. 17 (text-fig. 29 a).

The *antennulae* differ from Giesbrecht's description by the comparatively longer segment 2, which is almost as long as segments 8 ∾ 9. The *maxillulae* differ from Giesbrecht's description (fig. 28) by one instead of 2 delicate Sa in Li 2, and by the presence of a posterior process bearing two rudimentary setae (?) on the Li 3 in addition to the two well developed Sa. The sensory conical process of Lob. IV of the second basipodite of the maxillipeds is rather small.

The *pes I* is completely like Giesbrech's fig. 11 (Taf. 15); the Re III has a minute pore in the outer margin, somewhat posteriorly, and nearer the base than the tip. The *pes II*, which has 22 teeth in the terminal setae, has the systems of glands of the Re well developed, in a similar way as figured by Giesbrecht (fig. 27); the pores are placed on small rounded elevations somewhat removed from the margin; the Re I has no pore, the Re II has one near the base of Se and the Re III has 2, placed at the base of Se I and Se III; the Ri III possesses a minute pore near tip on the anterior surface.

The *pes III—IV* have, in addition to the mentioned pore, one near the base of Se Re I; the pes IV is like Giesbrecht's fig. 27, except for the somewhat different shape of the glands and the different number and arrangement of the spines on the inner margin of the second basipodite. In one specimen (Pl. 4 fig. 1 a) 7 triangular lamellae were observed, decreasing in size distally and posteriorly; the seventh is placed on the hinder surface; in addition to these, 3 quite rudimentary teeth were found; in no specimen was the number of spines greater, in several it was smaller, and sometimes almost completely like Giesbrecht's fig.; the arrangement is not always symmetrical.

The area behind the rostrum is almost straight; separated from this by a transverse groove the *labrum* proper, which consists of a convex anterior portion by a shallow groove, separated from the projecting free hinder margin adorned with two series of bristles; no bristles were observed in front of the free margin.

The oral surface (Pl. IV fig. 1 b) shows a very characteristic structure. In front of the first central circular spot is a transverse row of minute granules; behind the spot I a transversely placed group of spinules is found, probably formed by the fused *first* groups of the longitudinal series. The *second group* is, as shown in figure, assymmetrical, and seems partly to be fused with the lateral group; it consists of a number of acicules and bristles. The *third group* consists of about ten fairly long setae, and is fairly well separated from the following group, the *fourth* one, with 15 comparatively short setae. This group is almost completely fused with the *fifth* one; laterally to these two groups a longitudinal series of about 20 setae is found. Behind the central spot Nr. 3 a rather irregular transverse group of spinules is observed, and behind the spot Nr. 4 a transverse row of more delicate spinules is found.

The *lamina labialis* is granular, and has a concave posterior margin (fig. 1 c); the area in front as well as that behind the lamina has as seen in figure a fairly interesting structure. The lateral series of setae behind and upon the labial lobes show as seen in fig. 1 d an arrangement which is distinctly different from that of *Gaidius,* as the two first series and partly the third are represented by four areas of spinules.

♂. Size of specimen from Ingolf St. 47 was 2·99 mm.; anterior division 2·18 mm.; urosome 0·81 mm. Cleve's specimen measured 2·58 mm.

The body is comparatively longer and more slender than in the female; no frontal keel is found, and the rostrum is fairly long and slender (text-fig. 29 b); no trace of limitation between head and first thoracic somite was found. The anterior division is 2·6 as long as the abdomen. The first abdominal somite, which has the genital opening as a vertical split on the left side, is about as long as the second one; this is a little longer than the third, which is again a little longer than the fourth; the striated seam along the hinder margin of somites II—IV is only indicated dorsally (text-fig. 29 c). The *antennulae* extend about to the middle of the abdomen; the segment 10 is separated by a rather indistinct line from 8—9; the limitation between segments 12—13 is indistinal posteriorly. The segments 20—21 are well separated on both sides. The measurements are very similar to those of the female, but the segments beyond 18 are comparatively shorter. The differences in the appendages are as in *E. messinensis.* The *antennae* have the endopodite at least as long as the exopodite, and it extends beyond the Re VI; the setae are better developed; the Re II has in the middle inwards a rudimentary tooth (for a Si). The *mandibulae* have as seen in fig. 1e a fairly well developed but soft-skinned manducatory part with a few rudimentary teeth. The *maxillulae* (fig. 1h) have 7 plumous setae, of which the 2 proximal are somewhat shorter in Le 1; the Li 1, which is fairly well developed but soft-skinned, possesses a number of soft setae, of which some, though more or less swollen at the base, have not yet lost ther original shape, while others are represented by short eminences; the Li 2 seems to be represented by a short, somewhat ringed eminence without setae; the Li 3 (?) has a single setae; the basipod 3 + the Ri possess 4 plumous setae. The Re has 11 setae. The *maxillae* form a ringed, elongate, soft-skinned organ, which bears slender setae along its inner concave margin. The *maxillipes* is longer and more slender than in the female; the second basipodite has setae only on the Lobe IV, namely a strong plumous one and a shorter one in addition to a sensory lobe. The *pes I* differs from that of the female by the almost straight margin (fig. 1f); the St. of Re III of *pes II* has 37 teeth. The inner margin of the second basipodite in the *fourth pair of legs* is only sligthly convex, without setae or teeth.

The *pes V* (text-fig. 29d) provides great similarity to that of *Gaetanus,* but is nevertheless distinctly different (Pl. IV fig. 1g). The Ri dext. is long and somewhat enlarged towards the end, where, inside, it bears two short delicate setae. The Re I ∾ II (?) of the right leg is fairly long and slender. The Re III (?) is somewhat enlarged inwards, and then rather suddenly attenuated; exteriorly, at the base of the terminal part, which distally has an inner membrane and has the pointed tip curved outwards, a slender Se is placed; the distal part is at least 1·5 as long as the proximal. The Ri sin. is fairly long and slender; the Re III of left leg, at the base of which a tuft of hair is found, is short, almost fused with preceding segment and produced into a hairy spine-shaped protuberance.

The structure of the oral surroundings is in the main like that of the female (cf. fig. 1e); the *labrum* proper, which partly overlaps the chitinous bed in which the manducatory part of the mandibulae is placed, is well developed, but appears, but for a terminal tooth, to be smooth outside as well as inside. The *labial lobes,* which consist of soft ringed chitin, are just indicated, and do not possess any hairs. The *lamina labialis* etc. are completely wanting. This structure corresponds well with the rudimentary state of the masticatory part of the maxillulae, not being adopted for predatory purposes, nor even for taking any nourishment at all.

Y⚥ (St. V). Size of female from Ingolf St. 47: 3·06 mm.; anterior division 2·44; urosome 0·62 mm. A young male measured 2·14.

The limitation between the head and first thoracic somite is generally better marked than in the adult female (text-figs 29i—j). The first one of the four abdominal somites is ventrally produced in the female, barely so in the male (text-fig. 29e). The appendages show the usual differences from those of the adult females; the St. of Re III pes II has 14 teeth; an interesting difference is found in the wanting glandular pore at the base of Se I Re III; the second basipodite of the fourth pair of legs is smooth, while 7 short hairs are found in the females, corresponding to the spines of the adult females. The *fifth pair* of legs is as seen in text-fig. 29f rather clumsy and quite unlike Cleve's fig. 3 Pl. II; the Re dext., which is longer than the Ri dext., and which has a strong terminal spine, is distinctly longer than the Re sin.

Y♂♀ (St. IV). Size of female from Ingolf St. 47 is 2·24 mm.; anterior division 1·85; urosome 0·39 mm. A male from the same station measured 2·1 mm.

The appendages show similar differences as in *G. Kruppi*, f. inst. glandular pores are only found at the base of Se Re II and Se 3 Re III; the St. of pes II has only 13 teeth; the inner margin of the basipodite of the fourth pair of legs appears smooth. The only difference between the male and female is found in the presence of a fifth pair of legs in the former (text-fig. 29 g).

Y (St. III). Size of specimen from Ingolf St. 47 was 1·65 mm.; anterior division 1·3 mm.; urosome 0·35 mm.

The thoracic somites IV—V are well separated; the antennulae extend scarcely to the end of the abdomen. The appendages show differences corresponding to those in *G. Kruppi*.

Abnormality. In a single adult female the right furcal branch had the third and the second terminal setae dichotomously branched. There is a well marked difference between pellucid and less transparent specimens with more prominent eggs. In most specimens the intestinal tract consists of a wide stomach which, in front of the insertion of the narrow oesophagus, is continued into a wide coecal sac and behind is turned upwards to meet the following portion, and the intestine proper. In a single specimen the connection between the stomach and the intestine was twisted, and not lying on the same level.

Occurrence. The Ingolf Exp. has on the west coast of Greenland collected a young male (stage IV) 26/6 95 St. 25 63°30 L. N. 54°25 L. W. V 200—0 fm. Temp. 2·9° C. The Ingolf Expedition has not collected this species in Denmark Strait, but the Thor has taken it at the following stations:

Thor 19/6 1904 St. 152 65°00 L. N. 28°10 L. W. Yt. 1000 M. Wire 1 f♀, 1 y♀ (V), Yt. 100 M. Wire 1 f♀, Yt. ? 3 f♀, 3 y♀ (V), 3 y♂ (V).
20/6 1904 St. 153 65°20 L. N. 27°12·05 L. W. Yt. 800 M. Wire 1 y♀ (V).
20/6 1904 St. 154 65°27 L. N. 27°10 L. W. Yt. 80 M. Wire 1 f♀, 2 y♀ (V).
18/6 1904 St. 150 65°50 L. N. 26°53 L. W. Yt. 400 M. Wire 1 y♀.

In the Atlantic south-west and south of Iceland the Ingolf Expedition has gathered the species at the following stations:

18/6 1895 St. 19 60°29 L. N. 34°14 L. W. V^1 300—0 fm. Temp. 9° C. 48 f♀, 8 y♀ (V), 4 y♂ (V).
17/6 1895 St. 18 61°44 L. N. 30°29 L. W. V^1 200—0 fm. — 10° C. 13 f♀.
16/6 1895 St. 17 62°54 L. N. 26°34 L. W. V^1 200—0 fm. — 9·1° C. 2 f♀, 1 y♀ (IV).
3/6 1896 St. 68 62°06 L. N. 22°30 L. W. V^1 100—0 fm. — 8·8° C. 1 f♀.
9/8 1895 St. 40 62°03 L. N. 21°36 L. W. V^1 100—0 fm. — 13·5° C. 9 f♀.
1/6 1896 St. 63 62°40 L. N. 19°05 L. W. V^1 100—0 fm. — 8·3° C. 6 f♀, 2 y♀ (V).
19/5 1896 St. 55 63°33 L. N. 15°02 L. W. V^1 100—0 fm. — 8·4° C. 1 y♂ (V).
12/5 1896 St. 47 61°32 L. N. 13°40 L. W. V^1 100—0 fm. — 10·6° C. 2 f♀, 17 y♀ (V), 4 f♂, 10 y♂ (V), 1 y♀ (IV), 1 y♂ (IV), 1 y (III).

S/S Thor has south of Iceland gathered the species at 14 stations, but at 9 of these only a few adult females were found.

Thor	$^{1}/_{9}$ 1904	St. 285	62°49 L. N.	18°46 L. W.	Yt. 100	M. Wire	148 f♀, 1 y♀ (V), 1 y♂ (V).
	$^{2}/_{9}$ 1904	St. 285	62°49 L. N.	18°46 L. W.	Yt. 800	M. Wire	31 f♀.
	$^{11}/_{7}$ 1904	St. 183	61°30 L. N.	17°08 L. W.	Yt. 1800	M. Wire	750 f♀, 3 y♂ (V).
	$^{25}/_{5}$ 1904	St. 104	62°47 L. N.	15°03 L. W.	Yt. 1500	M. Wire	2 y♂ (V).

In the Iceland—Færoe channel the Ingolf Expedition has taken the species at 3 stations, and the S/S Thor at 5 stations.

$^{20}/_{5}$ 1896	St. 57	63°37 L. N.	13°02 L. W.	V^{1} 100—0 fm.	Temp.	8·2° C.	1 y♂ (V).
$^{20}/_{5}$ 1896	St. 59	65°00 L. N.	11°16 L. W.	Apstein 12 11·45 p. m.	—	1·5° C.	1 y♀ (IV).
$^{11}/_{5}$ 1896	St. 45	61°31·5 L. N.	9°43 L. W.	V^{1} 100—0 fm.	—	9·1° C.	1 y♂ (V).

Thor	$^{28}/_{8}$ 1905	St. 163	62°36 L. N.	12°05 L. W.	Yt. 300	M. Wire	3 f♀.
	$^{22}/_{5}$ 1904	St. 100	61°21 L. N.	10°39 L. W.	Yt. 180	M. Wire	1 f♀, 3 y♂ (V).
	$^{29}/_{8}$ 1905	St. 164	61°20 L. N.	11°00 L. W.	Yt. 300	M. Wire	35 f♀.
	$^{29}/_{8}$ 1905	St. 165	60°00 L. N.	10°35 L. W.	Yt. 100	M. Wire	1 f♀.
	$^{23}/_{7}$ 1905	St. 124	61°04 L. N.	4°35 L. W.	Yt. 1000	M. Wire	1 f♀.

The Danish East-Greenland Expedition has, $^{18}/_{9}$ 1900 10 p. m. F. 346 at the surface near Kap Dan (Tarsuak Fjord), taken a single adult female.

Lundbeck has $^{18}/_{5}$ 1890 55°25 L. N. 29°5 L. W. gathered 1 f♀, 1 y♀ (IV).

The S/S Thor has, outside the Ingolf area south west of the Færoes, taken the species at four stations, but at the two only a few adult females.

Thor	$^{8}/_{6}$ 1905	St. 72	57°52 L. N.	9°55 L. W.	Yt. 1500	M. Wire	125 f♀ (one with spermatophor).
	$^{21}/_{6}$ 1905	St. 90	47°47 L. N.	8°00 L. W.	Yt. 300	M. Wire	139 f♀ (one with spermatophor).

Distribution. This species has been recorded from the Mediterranean, and from the Atlantic as far north as 55° L. N. 10° L. W.; it has been taken by the Monaco and by the Gauss Expeditions in the Mid and South Atlantic; by the Gauss it has been taken at 45 L. S. 35 L. E. south of the Cape. It was not taken by the Siboga, but Esterly records it from the Californian Bay, and based on somewhat too small material he draws the following conclusion (1912 p. 311) "evidently, the species moves upwards at night if the numbers taken then as compared with those during the day can be taken as representative of the whole population".

I think we are right in regarding this species as in the main an Atlantic one, which frequents the intermedial strata, but occasionally is found from the surface down to a depth of about 1000 meters.

Remarks. The described species is certainly identical with that described by Giesbrecht, in spite of the larger size, the wanting seta of Le 2 of maxillulae and the structure of the spines in the Basp. II pes IV. The male, which Cleve refers to this species, is possibly identical with mine; his description is too incomplete to settle the question at present. I think that Giesbrecht is right in referring the small Atlantic specimens of *E. Hessii* Brady to this species, the bigger ones may perhaps be identical with *E. rostromagna* Wolf.

32. **Euchirella curticauda** Giesbrecht.

(Pl. IV figs 3a—m; Pl. VIII, figs 2 a—c; text-figs 29 a—e.)

1888. Euchirella curticauda n. sp. Giesbrecht, p. 336.
1892. — — Giesbr. Giesbrecht, p. 233, taf. 15, 36.
1898. — — — Giesbrecht & Schmeil, p. 36.
1902. — — — J. C. Thompson, p. 18.
1904? — — — var. atlantica n. var. Wolfenden, p. 116.
1905? — atlantica n. sp. Wolfenden, p. 20.
1905. — curticauda Giesbr. G. O. Sars, p. 4.
1905. Euchirella curticauda Giesbr. Farran, p. 35.
1906. — — — Esterly, p. 59, pes 9, 10, 12—13.
1906. — — — Pearson, p. 15.
1908. — — — v. Bremen, p. 48, fig. 54.
1908. — — — Farran, p. 38.
1909. — — — A. Scott, p. 55.
1911. — — — Wolfenden, p. 236.

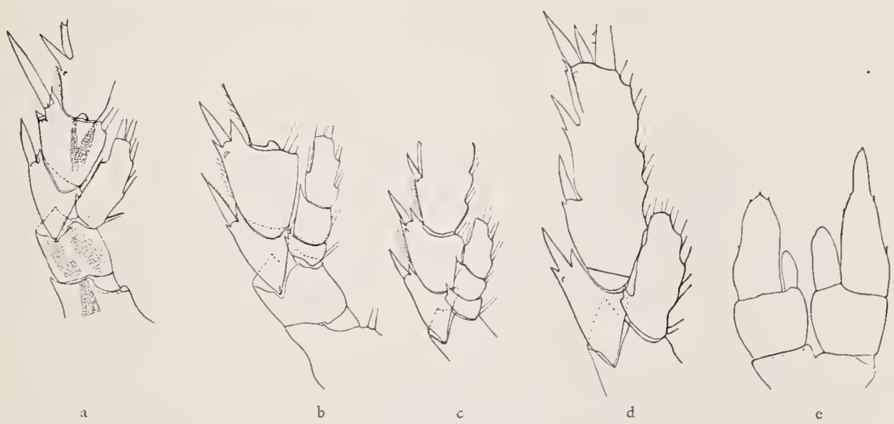
Description. f♀. Size: Specimen from Thor St. 88 4·26 mm.; anterior division measured 3·61 mm.; urosome 0·65 mm. Giesbrecht's specimen measured 3·5, Farran's 4·3—4·8.

The head has a prominent rounded frontal keel (Pl. IV fig. 3a); the frontal organ is fairly prominent at the base of a low prolongation downwards from the keel; the rostrum, which is only visible from beneath, is short and undivided, but sometimes asymmetrical with an accessory tooth on the right side. The articular membrane between the head and the first thoracic tergite is indicated in some specimens, but is completely wanting in others. The posterior margin of the first to fourth tergites is strongly chitinized, and falls on each side naturally into a lateral and two median divisions; behind the hinder margin of the fourth tergite and partly covered by it, the fifth thoracic tergite, hollowed like a gutter, is found. The cephalosome is about 6·5 as long as the abdomen. The genital somite is distinctly produced below, and has, on each side of the vulva, a lateral projection, generally visible from the side; along the hinder margin of this somite is a marginal seam. The *antennulae* almost reach to the end of the genital somite, the appendages are as in *E. messinensis,* but the measurements are distinctly different, as the distal segments are comparatively shorter; the 8∾9 segments, f. inst., are about as long as segment 15, not much shorter. The *antenna* is in its main features like Giesbrecht's fig. 3 Taf. 15, but a distinct articulation is found between Re I and Re II. The *maxillulae* stand as pointed out by Giesbrecht, between *E. rostrata* and *messinensis;* the Le 1 has 9 setae, but the Li 1 has, as in *messinensis,* only 3 posterior setae, and the Li 2 4 strong setae; the Li 3 and basipodite 3 are also like this species, but the Ri has 3 setae only. The *maxillipes* has, exteriorly, near the tip of the anterior surface of the second basipodite, as mentioned by Giesbrecht, a characteristic knob-formed process.

The margin between Se 1—2 of Re I∾II in the *first pair* of legs is only slightly concave, with a minute pore. The *pes II* (text-fig. 29 a), which has 26 teeth in the St., has a well developed first Se in Ri, and the same number of secretory pores as in the preceding species. The *pes III* has a distinct accessory tooth at the base of Se Ri I; the glandular pore in Re I seems to be wanting (text-fig. 29 b). The number of spines interiorly on the posterior surface of basipodite II in *pes IV* varies from 7 to 13, and is most often different on the two sides; the accessory tooth of Se Ri I is smaller; the secretory pore in the Re I is sometimes indicated.

The anterior surface of the *labrum* is like that of *E. rostrata.* The chitinous system which supports the oral surface of the labrum attains a characteristic development, as seen in fig. 3 c, as the anterior bars are directed towards the middle, almost touching each other, and almost encircling the median circular spot Nr. 3. The groups of setae in the longitudinal series show a characteristic arrangement: the *first group* consists of an area covered with about 30 short strong spines; the *second group* is represented by a longitudinal row of about 20 minute spines; the *third group* (cf. Pl. IV fig. 3 c) consists of 5 fairly long and slender setae placed more forwards, and lateral, and of 2—3 placed more inwards and backwards; the *fourth group,* which consists of 20—25 fairly strong setae, has a characteristic shape, as it is convex, and has its right and left parts converging towards the middle, and almost touching each other in front; the *fifth group* is a continuation backwards of the fourth, and consists of about 30 more delicate setae. Behind this group an oblique, almost transverse row of short "spines" is observed. Behind the central spot Nr. 3 no transverse row of setae is observed, but behind Nr. 4, which is single, two transverse rows of rather delicate setae are observed. The *lamina labialis* (fig. 3 d), which is distinctly granular, is indistinctly divided into three parts. In front of it, in the middle, is a longitudinal row of short spines on each side, followed by the two areas of acicules, forming a curvature corresponding to the outer row of setae (cf. fig. 1 c); the latter is single behind, double in front, as a lateral row of shorter setae is found. The arrangement of the spinous areas behind the lamina as well as of the series of hairs on the labial lobes is seen in figs 3 d—e.

The intestinal tract is almost straight, with a short restriction between the anterior and posterior divisions, and with a slender coecal sac in front.



Text-fig. 30. *Euchirella curticauda* Giesbr.
a. f♀. Pes II sin. in ant. view × 40. b. f♀. Pes III × c. 40. c. y♀ (stage V). Pes III × c. 40. d. y♂ (stage IV, a single specimen from Thor $^{20}/_{6}$ 1905 St. 88 not mentioned in the text). Pes III sin. × c. 50. e. y♀ (St. V). Pes V × 60.

f♂. Size of male from Thor St. 88 3·73 mm.; anterior division 2·92 mm.; urosome 0·81 mm.

The head has a distinct frontal keel (fig. 3 f), somewhat longer and lower than in the female; the body is rather elongate, and attenuated in front as well as behind. The head and the first thoracic tergite are completely fused; the articular membranes between the thoracic tergites are like those of the females. The anterior division is 3·5 as long as the urosome; the genital pore is found on the left side of the first abdominal somite; the furcal rami are short, rounded, and about as long as wide; their St. 2 is a little longer than the abdomen, and almost twice as long as the Si.

The *antennulae* extend a little beyond the end of the cephalothorax; the segments 2 and 3, 4 to 7, 8∾9 and 10 as well as 11 to 14 are more or les fused; the segments 20—21 are completely fused on the right side, well separated on the left side. The appendages are scarcely different from those of *E. messinensis;* they are as a whole more soft-skinned than in the female, and the Sp. of segment 23 is much shorter than that of segment 24. The segment 2 is almost 1·1 as long as segment 17, which in length is equal to 15, 16 and 19, and about 1·1 as long as segments 8∾9. Segment 20 is on the left side about as long as 8∾9, but 20∾21 on the right side combined is the longest segment, and almost 1·4 as long as segment 2. The *antennae* have the Re 1·5 as long as Ri, and have well developed distal setae; the Re I and II are well separated, but the medial tooth of Re I is wanting. The Le of the *maxillulae* possesses 9 setae, of which the 2 proximal ones are extremely short, the third one is distinctly shorter than the strong powerfull S 4—9, of which again S 6—7 are the longest. The Li I is well developed but has only a few short soft appendages; the Li I—II were not observed; the Basp. III (?) is quite rudimentary, with at least a single almost rudimentary seta, and the Ri I—III (Basp. III?) bears 4 stiff fairly long plumous setae. The Re has 10 well developed plumous setae in addition to an inner quite rudimentary one. The *maxillae*, have as seen in fig. 3 h, in the main preserved the shape in the female and so has the maxillipes, which is however much more slender, and it has preserved the knob-shaped process of the second basipodite, though it is less prominent than in the female.

The *first pair* of legs (Pl. VIII, fig. 2 a) is distinctly different from that of the female; the anterior surface of the Ri has the process, which is situated laterally at the end of the chitinous list, forming the margin of the rounded lobe, more prominent and perforated by about 3 canals for delicate ducts; between the Re I and II a distinct articulation is found; the Se Re I is short, delicate and swollen at the base; the outer margin of Re II is almost straight, with a distinct pore placed somewhat beyond the middle; the pore in the outer margin of Re III, which is scarcely indicated in the female, is well developed, and placed somewhat beyond the middle. The *pes II* differs by well developed articulation between Ri I and II ∾ III, and by the comparatively short Se Re I and the *pes IV* with the smooth inner margin of the second basipodite. The *fifth pair* of legs shows similarity not only to that of *E. messinensis* but also to that of *E. rostrata;* the two legs are almost of equal length (figs 3 g—i). The *pes dext.* has a rather short second basipodite, partly fused with the corresponding one of the left side, and a long strongly enlarged third basipodite, which has an inwards process, which bears the rather slender Ri (Pl. VIII fig. 2 c) extending somewhat beyond the end of Re I ∾ II; it is most narrow in the middle, extending, as well, towards the base, but especially towards the tip, and the anterior surface is slightly concave, with the lateral margin somewhat turned over inwards; the lateral margin has two distal processes, of which the one is placed near the tip. The Re I—II is long and slender, without distinct processes. The Re III is as seen in fig. 3 j irregularly curved, and has near the base a plate-shaped process; in the distal half the inner margin possesses a few big teeth, and a more distally dense serration. The *left leg* has the basal segments long and slender, as seen in fig. 3 i; the obtuse and slender Ri extends somewhat beyond the proximal third of the Re I. The Re I is moderately long and slender; it bears a delicate Se at the base of Re II; the Re II is rather short, and apparently excavated outwards and backwards (fig. 3 m); interiorly it is produced into a somewhat hairy process; at the base of this process is the slightly curved, attenuated but blunt Re III (fig. 3 l seen from in front and from the inside), which inwards has two hairy processes basally, and terminally a marginal seam of short hairs.

Y⚥ (St. V). Size of female from Thor St. 88 was 3·63 mm.; anterior division 3·06 mm.; urosome 0·57 mm.

The body is more slender, and the abdomen consists of 4 somites without any difference between the first somite in the male and the female. The *antennae* of the female are scarcely different from those of the adult, except by the Ri, which is one fourth as long as Re, but they are distinctly different from those of the male, in which the Ri is almost half as long as Re, well developed and possessing 5 well developed setae in Le and 3 long + 2 rudimentary ones in Li, a number which is smaller than that of the adult male (6 + 7), and bigger than that of the female (3 + 2). The legs are in minor features different from those of the adults; the Re III has no secretory pore at the base of Se I; the outer tooth of Ri I pes II is blunt, and the corresponding accessory tooth of pes III is just indicated (text-fig. 30 c). The inner margin of the second basipodite is smooth in the male, but has in the female about 10 short delicate but rather stiff bristles. The *pes V* is similar to that of *E. rostrata*, but there is no indication of subdivision of Re; the terminal spine of Re dext. is longer and less sharply set off, and that of left Re is much shorter (text-fig. 30 e).

Variation. In a single male the exopodite of the second foot was curiously transformed, as seen in fig. 2 b (Pl. VIII).

Occurrence. The Ingolf Expedition has not taken any specimen of this species, but the Thor has gathered it at the following stations.

In Denmark Strait:

19/6 1904	St. 152	65°00 L. N.	28°10 L. W.	Yt. 1000	M. Wire	1 f♂.
20/6 1904	St. 153	65°20 L. N.	27°12·5 L. W.			3 f♀.
21/6 1904	St. 154	65°27 L. N.	27°10 L. W.			1 f♀.

In the Atlantic south of Iceland:

9/7 1904	St. 178	63°08 L. N.	21°30 L. W.	Yt. 750	M. Wire	1 f♂.
10/7 1904	St. 180	61°34 L. N.	19°05 L. W.	Yt. 1800	M. Wire	1 f♀.
11/7 1904	St. 183	61°30 L. N.	17°05 L. W.	Yt. 1800	M. Wire	14 f♀ (3 with spermatophors).
25/5 1904	St. 104	62°47 L. N.	15°03 L. W.	Yt. 1500	M. Wire	10 f♀.
1/9 1904	St. 285	62°49 L. N.	18°44 L. W.			13 f♀.
29/8 1905	St. 164	61°20 L. N.	11°00 L. W.	Yt. 300	M. Wire	16 f♀ (5 with spermatophors).
22/5 1904	St. 99	61°15 L. N.	9°35 L. W.	Yt. 1400	M. Wire	1 y♂ (V).
12/5 1904	St. 78	61°07 L. N.	9°30 L. W.			2 f♀.

Outside the Ingolf area south-west of the Færoes a fairly large number of specimens has been captured.

15/6 1905	St. 82	51°00 L. N.	11°43 L. W.	Yt. 1200	M. Wire	1 f♀, 3 f♂, 1 y♀ (V).
				Yt. 800	M. Wire	11 f♀ (3 with spermatophors).
11/9 1905	St. 167	57°46 L. N.	9°55 L. W.	Yt. 1500	M. Wire	16 f♀ (5 with spermatophors).
8/6 1905	St. 72	57°52 L. N.	9°53 L. W.	Yt. 300	M. Wire	51 f♀, 1 f♂, 1 y♂ (V).
20/6 1905	St. 88	48°09 L. N.	8°30 L. W.	Yt. 300	M. Wire	200 f♀ (30 with spermatophors), 7 f♂, 2 y♀ (V), 2 y♂ (V).
21/6 1905	St. 90	47°47 L. N.	8°00 L. W.	Yt. 300	M. Wire	5 f♀, 1 f♂.

Distribution. "This species" is according to Farran "of frequent occurrence, and often moderately common" on the west coast of Ireland "at depths of from 200 to 1000 fathoms". It has been taken by the Monaco Exp. and by the Gauss' Exp. as far south as c. 10° Lat. S. It has been recorded from the Bay of California and from the Malay Archipelago.

Remarks. This species is certainly identical with that described by Giesbrecht and Esterly, though it is somewhat bigger, and in spite of some features, e. g. shape of fifth thoracic tergite, which are not mentioned in Giesbrecht's rather short description. The species is probably identical with Wolfendens *var. atlantica*, as the differences set forth viz: "head separated from first thoracic segment", basipodite II of pes IV, which has "only six rather broad-based and long spines", and the smaller size (3·8 mm.) are not of much importance. It is more doubtful, if it is identical with *E. atlantica* Wolf., in which the abdomen is only $^1/_8$ of the anterior division in length. Most probably the described male belongs to this species, especially on account of the characteristic articular membranes of the thoracic tergites, the frontal keel, the almost absolete rostrum and the knob-like process of the second basipodite of the maxillipeds. The arrangement of secretory pores and the structure of Se of Ri I in the legs are like those of the females. Some of the differences are certainly due to sex, f. inst. longer abdomen, longer endopodite of antennae with greater number of setae; a few of the other differences are not quite the same as those found in related species, but it must be remembered that sexual differences are apt to vary from the one species to the other.

33. **Euchirella messinensis** Claus.

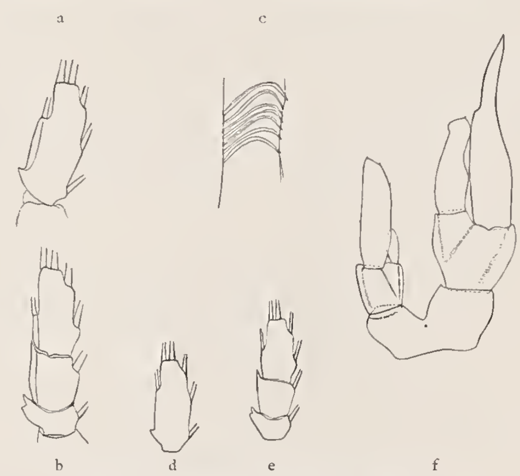
(Pl. IV figs 2 a—c; Pl. VIII fig. 1; text-figs 31 a—f.)

1863. Undina messinensis n. sp. Claus, p. 187, pl. XXXI.
1892. Euchirella messinensis Claus. Giesbrecht, p. 232, taf. 15 & 36.
1894. Nec. — — — Th. Scott, pp. 45—46.
1896. — — — Canu, p. 424.
1898. — — — Giesbrecht & Schmeil, p. 31.
1903. — — — Giesbrecht, p. 201.
1903. — — — Thompson & Scott, p. 244.
1904. Euchirella messinensis Claus. Cleve, p. 190.
1905. — — — Esterly, p. 151, fig. 18.
1905. — — — G. O. Sars, p. 4.
1908. — — — Farran, p. 37.
1909. — — — Pesta, p. 23.
1909. — — — A. Scott, p. 56.
1912. — — — Pesta, p. 13.
1911. — — — Wolfenden, p. 237.

Description. f♀. Size of specimens from Thor St. 183 5·7 mm.; anterior division 4·5 mm.; urosome 1·2 mm. Giesbrecht's specimens measured 4·75 mm.

The sac-shaped protuberance of the genital somite, which is rather variable in the specimens examined, differs somewhat in shape from Giesbrecht's fig. 18 (Taf. 36); it is distinctly widened out towards the end, does not reach much behind the end of the third somite and beyond a distinct concavity at the right side the tip is directed towards the right; the protuberance is dorsally excavated. The Ri of the antennae possesses 5 setae in Le and 3 (not 4) in Li. The *first pair of legs* has the outer margin between the Se of Re I—II almost straight with a distinct pore, continued into a conical process at least in one specimen. The glandular pore in the outer margin of Re III pes I is placed $^1/_3$ of the length of Re III measured from the base. The number of glandular pores is as in *E. rostrata*; in the Re I exteriorly distinctly removed from the tip a transverse split (secretory pore) was observed not only is pes II but also in pes III—IV, in which the real pore is found; a similar one was observed in Basp. III medially to the insertion of Se I, and in Re III near to the insertion of Si 4.

Somewhat behind the insertion of the antennulae a well marked elevation is found, which is well separated from the labrum proper by an anteriorly convex chitinous line; in connection with the mentioned elevation as well as with a transverse chitinous bar behind the mouth a strong chitinous system forming a covering for the manducatory part of the mandibulae is found. The anterior surface of the *labrum* does not possess any setae in front of the marginal row; this consists, on each side of the median concavity, of a medial transverse row of about 25 more spine-shaped setae. The chitinous system of the oral surface of the labrum (fig. 2 a) shows as seen in figures (cf. 3 c) some similarity to that of *E. curticauda*, but the arrangement of the groups of hairs in the longitudinal series is distinctly different, and is indeed very characteristic. The *first group* consists of about 30—40 setae, placed in a single inwards convex row; the *second group*, which is perhaps fused with the lateral group, is represented by a big group of minute acicules; the *third group* consists of about 20 fairly long setae, and is converging towards the front; the *fourth group*, consisting of about 25 fairly strong setae, has the anterior portion placed almost transversely, and is almost fused with corresponding part of the other side; the *fifth group*, which consists of about 40 rather slender setae, is partly fused with the fourth; the sixth group is transverse, and consists of short delicate hairs. No transverse series of spinules is observed behind the median circular spot Nr. 3, and the two series behind the fourth median spot are fused to a square area, beset with spinules.



Text-fig. 31. *Euchirella messinensis* Claus. a—b (to the left). f♀. Ri pes II—III × 57. c. Pes V dext; ridges of Re III × 175. d—e (in the middle below) y♂ (St. V) Ri pes II—III × 57. f. y♂. Pes V ant. view × 57.

The *lamina labialis*, as seen in fig. 2 b, is smooth and very insignificant; the arrangement of setae in front of lamina is, as seen in fig. 2 c, somewhat different from that of *E. curticauda*. Behind the lamina 3—4 spinous areas are observed on each side. The series of hairs behind and upon the labial lobes show a rather regular arrangement, as seen in fig. 2 c, the medial posterior groups of a few hairs could not naturally be referred to any of the series. The *first* series consists of a number of short hairs, placed in a rounded area; the *second* series consists of two rather independent almost transverse rows; the *third* series seems only to be represented on the labial lobes, and the *fourth* one has in addition to the regular row on the lobe a more medial and posterior portion; the *fifth group*, which consists of somewhat stronger setae, falls naturally into a median portion which is fused with the corresponding part of the other side, and a lateral one which is continued to the end of the labial lobe.

♂. Size of specimen from Thor St. 183 5·46 mm.; anterior division 4·37 mm.; urosome 1·09 mm. Giesbrecht's specimen measured 3·95 mm.

The frontal keel is distinctly higher than figured by Giesbrecht (Taf. 36 fig. 25). The oral appendages are practically like Giesbrecht's description, but the mandibulae possess as in *Euch. rostrata* a well developed manducatory portion; the labrum and labium show a similar development as in this species.

According to Giesbrecht (p. 240) the only difference between the natatory legs in males and females is found in the completely smooth inner margin of the fourth pair of legs in the males; in my specimens, however, the difference is even better marked than in *E. rostrata* and *curticauda* (Pl. VIII fig. 1). The articulation between Re I and II pes I is indicated, but the Se Re I is wanting; the Se Re II is quite rudimentary; the pore in the outer margin of Re II is well developed, but that of Re III seems to be wanting: The St. of the Re III pes II has about 50 instead of c. 25 teeth.

The *fifth pair* of legs is scarcely different from Giesbrecht's fig. 21 (Taf. 15); the teeth along the inner margin of Re III pes V dext. correspond really to transverse keels, as seen in text-fig. 31 c.

Y♂♀ **(Stage V).** Size of male from Thor St. 88 4·19 mm.; anterior division 3·29 mm.; úrosome 0·90.

The shape of the body is in the main as in adult female, without frontal keel. The appendages are in the main like those of the adult female, except the *antennae;* these organs show similar differences as in *E. curticauda*; the antennae of the female is in the main like those of the adult, with rudimentary Ri, which, however, has the setae of Ri 2 better developed (in Li 4 setae); the antennae of the male are like those of the adult by the more powerful Ri, which, however, only reaches the middle of Re 2, and has a similar number of setae as in the female. The *natatory legs* differ somewhat from those of the adult by the less developed Se of Ri I, as seen in text-figs 31 d—e, as well as by the wanting glandular pore at the base of Se 1 Re III. The inner margin of the second basipodite in the fourth pair of legs is smooth in the male, but has in the female about 6 short delicate bristles. The *fifth pair* of legs has, as seen in text-fig. 31 f, a characteristic structure resembling that of the adult male.

Occurrence. The S/S Thor has gathered a few specimens of this species at the following stations:

11/7 1904	St. 183	61°30 L. N.	17°08 L. W.	Yt. 1800 M. Wire	5 f♀.
24/6 1905	St. 93	49°25 L. N.	12°20 L. W.	Yt. 200 M. Wire	1 f♀.
15/6 1905	St. 82	51°00 L. N.	11°43 L. W.	Yt. 1200 M. Wire	2 f♀, 1 y♂ (V).
				800 M. Wire	2 f♀, 2 f♂.
20/6 1905	St. 88	48°09 L. N.	8°30 L. W.	Yt. 300 M. Wire	2 f♀, 1 f♂, 1 y♀ (V), 1 y♂ (V).

Distribution. The species, according to Farran, is fairly common on the west coast of Ireland "at depths of from 350 to 700 fathoms". It has been recorded from the North-east Atlantic, the South Atlantic, the Mediterranean, the Malay Archipelago and the Pacific (Bay of California).

Remarks. In spite of the mentioned small difference the female must be regarded as identical with *E. messinensis*; if the difference in the first pair of legs between my male and Giesbrecht's is really a constant one, the identification of the males seems to be rather doubtful.

34. **Euchirella intermedia** n. sp.

(Pl. IV figs 4 a—c; Pl. VIII fig. 3; text-figs 32 a—f.)

1902? Euchirella carinata n. sp. Wolfenden, pp. 366—367.
1911? Euchirella gracilis n. sp. Wolfenden, pp. 237, text-fig. 22, tafel XXVII figs 8—10.

Description. f♀. Size of specimen from Thor St. 82 5·66 mm.; anterior division 4·66 mm.; urosome 1 mm.

No frontal keel is found; the short strong rostrum is directed forwards and downwards (cf. text-fig. 32 e). The articular membrane between head and first thoracic tergite is present laterally; the articular membranes between the thoracic tergites show similarity to those of *Euch. curticauda*; the fifth somite is laterally indicated as a mere marginal seam, and the lateral corner is rounded as seen in fig. 4 a.

The abdomen, which is $\frac{1}{4 \cdot 6}$ as long as the anterior division, has the furcal rami about as long as the fourth somite, and about as long as wide. The genital somite, which is as deep as wide, is somewhat wider than long; in dorsal view it is distinctly asymmetrical and more convex on the left than on the right side; on the left side, near the hinder margin, we observe a lamellous process with broad base, and directed backwards and somewhat outwards; behind this, as seen in fig. 4 a, another less prominent elevation was observed. The genital area is well produced in front, and the median prominent crista, which is prominent in Giesbrecht's fig. 21 (Taf. 36) of *E. venusta,* was not seen. The triangular teeth along the hinder margin of abdominal somites 1 ∾ 2, 3 and 4 are only poorly developed.

The antennulae reach the end of the body, their appendages are scarcely different from those of *E. messinensis,* and the measurements are very much alike. The endopodite of the *antennae* is about half as long as the exopodite, and its second segment has 9 setae in Li and 9 in Le. The Re I, which has a well developed conical process without any seta, is fairly well separated from Re 2 (Pl. VIII fig. 3). The *maxillulae* differ from those of *Euc. messinensis* by the presence of a less powerfull Sa in Ri I. The *maxillae* have the outer margin rather suddenly produced as in *E. rostrata*, but are in other respects scarcely different from *E. messinensis*; the *maxillipeds* differ from those of the latter species by the almost straight exterior margin of the third basipodite. The glandular pore in the outer margin of Re III of pes I is more removed from base, in other respects the first pair of legs is like *E. messinensis.* The Se of Ri I of pes II is more prominent than in *E. messinensis* (cf. text-fig. 31 a); the accessory tooth of the Se Ri I is indistinct in pes III, and completely wanting in pes IV. As in *E. curticauda* no glandular pore was found in Re I of pes III—IV. The second basipodite of the fourth pair of legs has only a single strong spine, extending to end of segment (text-fig. 32 a).

The *labrum* is in lateral view like that of *Euc. messinensis*; its oral surface (fig. 4 b) is in structure lying between that of *E. messinensis* and *curticauda* (fig. 2 a and 3 c). The *first group* consist of an area with densely placed, fairly strong spines; the *second group* is represented by 2—3 longitudinal rows of short teeth, laterally to which a similar longitudinal row is seen; the *third group* consists of about 5 fairly long spines, placed medially to and partly in front of the posterior part of second group. Behind the median spot Nr. 4 a square area of small spinules and a posterior transverse row are found. The *lamina labialis* (cf. fig. 5 f) is like that of *E. maxima* Wolf., but is more distinctly granular posteriorly. The area in front of lamina labialis is like that of *E. messinensis,* and so is the area behind, which, however, in the posterior groups shows some not quite unimportant differences.

f ♂. Size of male from Thor St. 88 5·3 mm.; anterior division 4·2 mm; urosome 1·1 mm.

The body is distinctly more slender than in the female. No frontal keel is found, but the rostrum is longer and directed more downwards (text-fig. 32 b); the lateral corners are rounded, and the fourth and fifth thoracic tergites are completely fused. The *abdomen* is distinctly one fourth as long as the anterior division. The furcal rami are a little wider than long; the serrated seam along the hinder margin of somites II—IV is fairly well developed.

The *antennulae* extend to the end of the abdomen; the appendages are scarcely different from those of *E. messinensis*; segments 8 ∾ 9 are completely fused with segment 10; segments 12 and 13, 14 and 15 are more or less fused. The exopodite of the *antennae* is 1·4 as long as the endopodite, the

Le of which has 5 setae, while its Li has 7 setae. The *maxillulae* are scarcely different from those described in *E. curticauda*; the *maxillae* agree in general shape (cf. fig. 3 h Pl. IV), but the setae of the four proximal lobes are poorly developed, while the fifth lobe has a long, soft, somewhat contorted sensory seta in addition to one fairly slender and one very short of usual structure; the *maxillipeds* are as usual more slender than in the female.

The *first pair* of legs is as usual well distinguished from that of the female; the first and the second outer segments are marked off from each other by a small incision, proximally to which the short, at base swollen, Se is found; the Se of Re II is short and moderately slender; the position of the glandular pores in the outer margin of Re II and III is as in the female. The *third pair* of legs differs by the better developed accessory tooth of the Se Ri I, and the *fourth pair* by the smooth inner margin of the second basipodite.

The *fifth pair* of legs is much longer than the abdomen, and extends almost to the end of the furcal setae; both legs are very similar to those of *E. messinensis* (text-figs 32 c—d); the processes on the margins of the rami of the right leg are slightly different from those of the mentioned species. The right endopodite seems to be wanting; the right exopodite is terminated by three somewhat hirsute processes (cf. text-fig. 32 d), of which the first is hook-shaped with three teeth, the second is flat and rounded, while the third one is slightly hook-shaped without serrations.

Text-fig. 32. *Euchirella intermedia* n. sp.
a. f♀. Pes IV sin. in post. view × 33. b. f♂. Head × 135. c. f♂. Pes V in post. view × 145. d. f♂. Pes V sin. × 275. e. y♀ (St. V) head × 33. f. y♂ (St. V) pes V in anterior view × 57.

Y⚥ (St. V). Size of female from Thor St. 88 4·78 mm.; anterior division 3·91 mm.; urosome 0·87 mm.

The shape of the body is practically like that of the adult female with the usual differences in the shape of the abdomen; triangular teeth are found along the hinder margin of somites II—III. The only difference of importance which was observed in the mouth appendages was found in the antennae, which in the female as well as in the male is like that of the adult female, but in Le Ri only 6 setae are found and in Li 7. The Se of Ri I is blunt, and only slightly prominent in the second pair of legs, and its accessory tooth is almost obsolete. The inner margin of the second basipodite in the fourth pair of legs is smooth in the male as well as in the female. The *fifth pair* of legs of the male shows (text-fig. 32 f) on the one side a distinct similarity to that of *E. messinensis,* but is on the other side distinctly different, f. inst. by the short rounded left endopodite.

Occurrence. The S/S Thor has gathered this species at two stations viz:

15/6 1905 St. 82 51°00 L. N. 11°43 L. W. Yt. 800 M. Wire 2 f♀, 19 y♀ (V), 2 y♂ (V).
20/6 1905 St. 88 48°09 L. N. 8°30 L. W. Yf. 300 M. Wire 1 f♂, 2 y♀ (V), 1 y♂ (V).

Remarks. The male of this species is very similar to *E. pulchra* Giesbr., while the female seems to be nearly related to *E. venusta* Giesbr., but is distinctly different by the shape of the genital somite, the larger size, the much longer endopodite of the antennae with greater number of setae and the single spine in the second basipodite of the fourth pair of legs. It is possibly identical with Wolfenden's *E. gracilis* (p. 237 1911) from the South Atlantic, which agrees with it in several of these characters, as far as can be seen from the short description, but as the genital somite in dorsal view has a different outline and laterally is "ohne Auswüchse", and as the endopodite of the antennae has 8 + 7 terminal setae, I feel justified in regarding my species as a new one. Between Wolfenden's description of a young male of *E. carinata* and this species there is some similarity.

In spite of the somewhat curious difference found in the number of setae in the endopodite of the antennae I do not doubt that the young specimens belong to the same species. In all features of importance, even the wanting glandular pore in Re I of pes III—IV, they aggree with the females.

In several respects this species bears similarity to *E. curticauda* Giesbr.

35. **Euchirella maxima** Wolf.

(Pl. IV figs 5 a—h; Text-figs 33 a—i.)

1905. Euchirella maxima n. sp. Wolfenden, p. 18, pl. VI figs 9—11.
1908. — — Wolf. Farran, p. 38.
1909. Euchirella maxima Wolf. A. Scott, pp. 57—58, pl. XII figs 12—20.
1911. — — — Wolfenden, pp. 238—239, taf. 28 figs 3—5; text-figs 24 a—b.

f♀. Size of specimen from Thor St. 88 was 7·8 mm: anterior division 6·5 mm.; urosome 1·3 mm. A specimen from Thor St. 167 measured 8·5 mm. Wolfenden's specimen measured 7·5—8·7 mm.

The head is mounted with a well marked frontal keel. The rostrum is short, undivided and in lateral view almost triangular. The first thoracic tergite is fused with the head. The fifth thoracic tergite is, as stated by Scott, well separated from the fourth; it is narrow above, but below it is widened out, and on the left side produced into an irregular, rounded lamina (fig. 5 b), but on the right produced into a somewhat shorter pointed process (fig. 5 c); this interesting structure, which is rather variable within the different specimens, has not been described by previous authors. The articular membranes of the thoracic tergites are developed in a similar way as in *E. curticauda.* The abdomen is only one fifth of the anterior division; the somites are short and dorsally along the hinder margin have short bristles. The lower surface of the genital somite (fig. 5 d) is produced, and has, somewhat in front of middle, on the left side, a prominent pointed process, which is curved forwards and inwards. On the left side and behind, a small protuberance, scarcely visible from above, is seen, and on the right a small anterior process and a fairly prominent bigger one, which is placed more posteriorly and is partly visible in dorsal view. The furcal rami are about as long as wide.

The *antennulae* reach about to the end of the genital somite; the segment 17 is about as long as segment 2 and 1·6 as long as segments 8 ∾ 9 and segments 24—25. The endopodite of the *antennae* is only $^1/_3$ of the exopodite; its Le of the second segment has only 3 moderately long almost naked setae, and the Li has 5 somewhat shorter ones (the number of setae is according to Wolfenden as well as to Scott 5 + 5); the Re I—II is distinctly longer than Re III—VII; the Re I, which has a prominent conical process without hair, is well separated from the Re II, which possesses a basal, a median and distal short conical protuberance without any hairs (the 2 first are shown in Scott's fig. 17). The Le of the *maxillulae* possesses 8 setae, of which the 3 basal are rather short and delicate, and the fifth moderately long, but much shorter than the fourth as well as the following one, which are long and powerful; the number of setae is else as in the *E. curticauda*. The *maxillae* differ from those of *E. messinensis* by somewhat stronger spines and more pronounced spinulation on the posterior surface of the lobes. The *maxillipeds* are most like those of *E. curticauda;* the third basipodite is 2·5 as long as the Ri, which has 4 setae in the Ri 2.

The *first pair* of legs is scarcely different from that of *E. curticauda;* the *second pair* of legs has a well marked tooth in Ri I, and the Se Re II extends as shown by Wolfenden at least to the tip of Se I Re III; the *third pair* of legs has the accessory tooth, corresponding to Se Ri I pointed and well developed; the second basipodite of the *fourth pair* of legs, which is strong, broad and of triangular shape, extends barely to the end of the somite, and seems, as figured by Scott fig. 20 Pl. XII, to be formed by the fusing of about 4 spines. The pores are like those of *E. messinensis.*

The *labrum* (fig. 5 e), as seen in figure, has the inner marginal row well developed, but the outer one seems to be represented by a few minute granules. The oral surface is in all main features like that of *E. curticauda,* but differs as seen in figures, as f. inst. by the third group, which is not converging but diverging posteriorly. The *lamina labialis* (fig. 5 f) is striated but not distinctly granular; the area in front of the lamina is rather similar to that of *E. curticauda* (cf. fig. 3 d), but the lateral series, which forms the continuation of the serrula 6-dentata, has only a single row of fairly strong spines, and the inner series has about 25 short spines in a single row in addition to the usual area covered with acicules, which starts behind the end of the inner series. The arrangement of setae behind the lamina labialis and at the labial lobes (fig. 5 g) is, as far as series III—V are concerned, practically like that of the preceding species, but as far as the first series is concerned is rather different.

f♀. Size of specimen from Thor St. 167 was 6·7 mm.; anterior division 5·1 mm.; urosome 1·6 mm.

The body (text-figs 33 a—b) is moderately slender; the head and first thoracic somite are completely fused; the lateral corners are rounded, and the fourth and fifth somites are completely fused. The head is surmounted by a fairly big, prominent, rounded, keel and has a short, strong, compressed and undivided rostrum. The abdomen is about one third as long as the anterior division; the first and second somites, which are of equal length are somewhat longer than the third, and about as long as the fourth; the serration along the hinder margin of somites II—IV is short and delicate. The furcal rami are about as long as wide; the St. II, which is distinctly longer than the abdomen and twice as long as Si, is longer than St. I—III, and again longer than St. IV.

The *antennulae* extend to the end of the second abdominal somite; they are in most respects like those of *E. curticauda.* The exopodite of the *antennae,* which has an indication of a protuberance in Re I, is 1·4 as long as the endopodite, which possesses 5 setae in Le and 7 setae in Li.

The *maxillulae* possess 8 setae in Le, completely like those of the female; the Li I and II are fairly well developed, and possess a few soft contorted appendages, and the Si of the Re is fairly long, but in other respects the appendages are scarcely different from those of *E. curticauda;* the *maxillae* and *maxillipeds* are practically like those of the preceding species.

The *first pair* (text-fig. 33 c) of legs is in most respects like that of *E. curticauda;* the process on the anterior surface of Ri with 3 teeth, perforated by delicate canals, is almost obsolete; the Se of Re I is fairly long and slightly swollen at the base; the pore in the outer margin of Re III is placed distinctly nearer the base than the middle. The *pes II* shows a similar difference as that of *E. curticauda,* with fairly well developed articulation between Ri I and II and comparatively short Se Re II. The *pes III—IV* are like those of the females, but the inner margin of the second basipodite in the fourth pair of legs is completely smooth.

The *fifth pair* of legs (text-figs 33 b and e—g) shows most similarity to that of *E. curticauda;* the right and the left legs are of almost equal length; the Ri dext., which extends almost to the end of Re I ∾ II, is terminally inflated, and outwards has two rounded processes in the middle; the Re III is

Text-fig. 33. *Euchirella maxima* Wolf.

a. f♂. Head × 34. b. f♂. Abdomen × 20. c. f♂. Pes I × 66. d. f♂. Pes IV sin. Ri × 66. e. f♂. Pes V dext. Re II—III × 66. f. f♂. Pes V sin. Re III (from below) × 107. g. f♂. Pes V sin. Re III (in exterior view) × 66. h. y♂. (stage V) Pes V in ant. view × 33. i. y♂. (stage IV) Pes V in ant. view × 60.

slender, gradually attenuated towards the tip and is in distal half, in a similar way as in *E. messinensis,* regularly serrated along the margin (text-fig. 33 e). The left leg has a long and slender Ri, which extends to the end of Re I and terminally is rounded and slightly convex in its whole length; the Re I is fairly long and slender, somewhat concave inside and here possessing a few protuberances; the Re II is somewhat shorter, with a basal rounded process and 2 distal ones, of which the one is short and conical, while the other is about one third as long as the segment, and gradually attenuated, the Re III, which is distinctly half as long as the Re II and placed at the base of the last mentioned process, is triangularly pointed beyond a distal conical process and hairy along inner margin proximal to it (text-fig. 33 f).

Y♂♀ (St. V). Size of female from Thor St. 88 is 6·04 mm.; anterior division 4·96 mm.; urosome 1·08.

The shape of the body is like that of the adult, but the frontal keel is somewhat lower; the lateral corners are rounded (fig. 5 h), not produced, and the fifth somite is dorsally as well as laterally represented by a mere seam. The abdomen is about one fourth as long as the anterior division. The *antennae* of the female are scarcely different from those of the adult female, but for the presence of 5 setae instead of 3 in Le; the antennae of the male are more similar to those of the adult male, as the Ri is half as long as Re and has 7 setae in Li and 5 in Le. In the *maxillulae* of the female the S 14 of Li I is distinctly shorter than S 13; this structure is probably due to individual variation, as S 13 and 14 in the male are of equal length. The legs differ from those of the adult female by the less prominent Se of Ri I and by the completely smooth inner margin of the second basipodite in the fourth pair of legs in male as well as in female. The *fifth pair* of legs (text-fig. 33 g) is distinctly different from that of preceding species, as both Re as well as Ri are of almost equal length, and as the left leg is distinctly pointed.

Y♂♀ (St. IV). Size of female from Thor St. 88 4·69 mm.; anterior division 4·0 mm.; urosome 0·69.
The fifth thoracic somite was not marked out; the *antennulae* extend a little beyond the end of the abdomen. The *antennae* are practically like those of the female of the preceding stage, but the Li of Ri has 6 setae; the Ri in the male, which has 6 setae in Le, is not distinctly longer than in the female. The Re of the *maxillulae* possess as usual in this stage 9 setae only. The *first pair* of legs has as usual Re I—III completely fused; the Se Re I is much longer than Se Re II; the secretory pore in the outer margin of Re II is wanting; while that in the outer margin of Re III is well developed; the pes II—IV show the usual differences; the inner margin of the second basipodite of the fourth pair of legs is smooth in both sexes; glandular pores are in pes III—IV found at the base of Se Re I and at the base of Se 3 Re III. The *fifth pair* of legs is very similar to that of *E. rostrata,* but the endopodites are comparatively longer, and the Re dext. is more elongated with fairly long St. (text-fig. 33 i).

Occurrence. The S/S Thor has gathered this species in six samples viz:

$^{11}/_{7}$	1904	St. 183	61°30 L. N.	17°08 L. W.	Yt.	1800	M. Wire	1 y♀ (V).
$^{15}/_{6}$	1905	St. 82	51°00 L. N.	11°43 L. W.	Yt.	1200	M. Wire	6 y♀ (V), 6 y♂ (V).
					Yt.	800	M. Wire	1 y♂ (V).
$^{11}/_{9}$	1905	St. 167	57°46 L. N.	9°55 L. W.	Yt.	1500	M. Wire	1 f♀, 1 y♀ (V), 1 y♂ (V).
$^{31}/_{8}$	—	—	—	—	Yt.	300	M. Wire	2 f♂.
$^{8}/_{6}$	1905	St. 72	57°52 L. N.	9°53 L. W.	Yt.	1500	M. Wire	2 f♀.
$^{20}/_{6}$	1905	St. 88	48°09 L. N.	8°30 L. W.	Yt.	300	M. Wire	4 f♀, 1 y♀ (V), 6 y♂ (V), 5 y♂ (IV), 4 y♀ (IV).

Distribution. This species is recorded from five stations on the west coast of Ireland at depths of from 350 to 1000 fathoms; it has been taken at a great depth by the Gauss Expedition in the South-Atlantic as far south as c. 35° L. S. (5° L. E.), and in the Malay Archipelago by the Siboga Expedition.

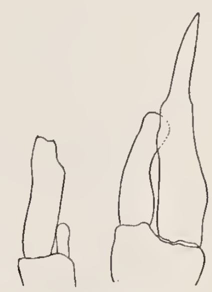
Remarks. In spite of small differences, partly enumerated above, this species is certainly identical with that described by Wolfenden. I think that the described male is most naturally referred to this species in spite of the comparatively small size, fairly long rostrum and rounded lateral corners of the thorax, and especially on account of the shape of the frontal crest and the well developed accessory teeth in Se Ri I of pes III—IV.

36. Euchirella bitumida n. sp.

(Pl. V figs 9a—g; Pl. VIII figs 4a—e; text-fig. 34.)

Description. f♀. Size of specimen from Thor St. 82 6·6 mm.; anterior division 5·4; urosome 1·2. Another specimen measured about 7 mm.

The head is produced into a prominent rounded helmet-shaped crista (Pl. VIII fig. 4a), like that of *E. galeata,* which is well marked off behind, and not continued into a dorsal keel; below the crest the margin falls steeply towards the prominent but rather short rostrum. The body is rather slender, with the head and the first thoracic tergites coalesced; the fifth tergite is not distinctly marked out, and the lateral corners are rounded (figs 9a—b). The anterior division is 4·5 as long as the abdomen. The *genital somite* has in dorsal view a better marked convexity on the right than on the left side, and possesses, slightly in front of middle on each side, a rounded protuberance, bigger on the right side and with a shallow impression between the two; the genital somite is in lateral view rather characteristic, partly on account of the ventral outline which is suddenly produced in front and falls rather smoothly behind; in ventral view it appears rather simple (fig. 9c). The caudal rami are about as long as wide; the terminal setae, which are somewhat longer than the interior one, are of almost equal length and a little shorter than the abdomen.



Text-fig. 34. *Euch. bitumida* n. sp. Y♂. Pes V in anterior view × 57.

The *antennulae,* which almost extend to the end of the abdomen, have the appendages completely like those of *E. messinensis*, and the measurements almost alike, except segment 17, which is the longest segment, a little longer than segment 19. The *antennae* (Pl. VIII fig. 4a) have the endopodite one third as long as the exopodite; the endopodite has 6 setae of equal length in the Le and 6 in the Li, of which the two inner are rather short. The *maxillulae* differ from those of *E. messinensis* by the relative length of the setae in Le; the two first and the fifth one are distinctly shorter than the others. The *maxillae* are, as seen in fig. 9d, in main features like those of *E. messinensis.* The *maxillipeds* have the exterior margin of the third basipodite, which is 1·3 as long as Basip. I ∾ II and about twice as long as Ri, somewhat sinuated; the Ri II has only 3 setae.

The *first pair* of legs (fig. 4b) has a small pore in the almost straight margin of Re II, and a very indistinct one placed near the base on the outer margin of Re III. The Se of Ri I (fig. 4c) of the undivided endopodite in the second pair of legs is poorly developed, as seen in fig. 4c, and the Se of Re II extends slightly beyond base of Se 1 Re III. The accessory tooth of Se Ri I is only indicated in the third pair of legs (fig. 4d). The *fourth pair* of legs has on the posterior surface of the second basipodite in the type specimen on the left side a single straight, fairly strong spine, which almost extends to the base of the third basipodite, and on the right side is substituted for by 3 more slender spines (fig. 4e); in another specimen the spine was wanting on the right side; in a third specimen a single spine was observed on the left side, while none was observed on the right side (perhaps broken?); in two specimens a single spine was observed on both sides, and in a single one a spine on the left and one on the right side.

The number of glandular pores is like that of *E. messinensis* with a pore in Re I of pes III—IV.

The main difference between *E. messinensis* and this species, found in the structure of the labrum, is observed in the 2 first groups of the oral surface (fig. 9 e), which are fused to a single group consisting of numerous short spinules. The *lamina labialis* (fig. 9 f) is distinctly granular; the arrangement of setae in front of the lamina as well as of the spinulous areas behind it is in the main like that of *E. messinensis*. The development of the series of setae behind and upon the labial lobes is, as seen by comparing figs 9 g and 5 g (Pl. IV), most like that of *E. maxima*.

Y♂♀ (St. V). Size of female from Thor St. 88 was 4·66 mm.; anterior division 3·85 mm.; urosome 0·81. A male from the same sample measured 4·99 mm.

The shape of the body is as in the adult female; the antennulae extend slightly beyond the end of the abdomen. The antennae are in the young female, scarcely different from those of the adult female but in the young male the exopodite is twice as long as the endopodite, which is much more powerful and has 7 setae in Li.

The second basipodite of the fourth pair of legs has in the middle on the inner margin 3 rather short and stiff hairs, while the margin is smooth in the male. The *fifth pair* of legs in the male is very much like that of *E. messinensis* (cf. text-fig. 34), but the Re dext. is more regularly rounded, and does not possess any terminal hair.

Occurrence. The Thor has gathered the species in four samples; the first locality is not quite certain, owing to a mistake.

2/9 1904	St. 285	62°49 L. N.	18°46 L. W.	Yt.	?	Wire	1 f♀.
15/6 1905	St. 82	51°00 L. N.	11°43 L. W.	Yt.	1200	M. Wire	6 f♀ (1 with spermatophor), 1 y♀ (V).
					800	M. Wire	1 f♀.
20/6 1905	St. 88	48°09 L. N.	8°30 L. W.	Yt.	300	M. Wire	2 f♀, 2 y♀ (V), 1 y♂ (V).

Remarks. This species, of which I was not able to find any description in the literature, is nearly related to *E. messinensis;* in the shape of the head it provides some similarity to Giesbrecht's rather imperfect description of *E. galeata,* but his fig. 22 (Taf. 36) of the genital somite is very different.

37. Undeuchæte minor Giesbr.

(Pl. V figs 3 a—g; text-figs 35 a—g.)

1856? Undina plumosa n. sp. Lubbock, p. 18, pl. IX figs 3—5.
1883♀. Euchæte pulchra Lubb. Brady, pp. 63—64, pl. XIV figs 6—9.
♂? — australis n. sp. Brady, p. 65, pl. XXI figs. 8—9
1889. Undeuchæte minor n. sp. Giesbrecht, p. 335.
1892. — — Giesbr. — p. 228, pl. 14 and 37.
1893? Euchæte australis Brady Th. Scott, p. 58, pl. VI fig. 23.
1895. Undeuchæte minor Giesbr. Giesbrecht, p. 251.
1896. — — — Canu, p. 424.
1898. — — — Giesbrecht & Schmeil, p. 34.
1903. — — — Thompson & Scott, p. 244.
1904. — — — Wolfenden, p. 111.
1904. Undeuchæte minor Giesbr. Cleve p. 198.
1905. — — — Esterly, p. 149, fig. 17.
— — — Farran, p. 35.
— australis Brady. G. O. Sars, p. 4.
1906. — minor Giesbr. Pearson, p. 15.
1907. — — — G. O. Sars, p. 3.
1908. — — — Farran, p. 37.
1908. — — — v. Bremen, p. 44, fig. 50.
1909. — plumosa Lubb. A. Scott, pp. 62—63, pl. XXII figs 1—8.
1911. — minor Giesbr. Wolfenden, p. 244.

Description. f♀. Size of specimen from St. 88 was 4·65 mm.; anterior division 3·68 mm.; urosome 0·97 mm. Giesbrecht's specimens measured 3·2, Farran's 4·2, and A. Scott's 3·5—4·5 mm.

The strong and short rostrum (text-fig. 35 a) is directed forwards and downwards. The lateral corner of the thorax is triangularly pointed on the left side and rounded on the right (text-figs 35 b—c). The first abdominal somite is as described by Giesbrecht asymmetric, and possesses on the right side, dorsally, a strong curved spine; on the left side at the posterior margin we find in most specimens two vertical rows of from 4—10 teeth, placed the one above the other; on the right side a more regular row of teeth is observed. The structure of the vulva seems to be rather simple (fig. 3 a). Only in a single specimen was there found on the left side of the third abdominal somite near the hinder margin a structure somewhat like the hairy cumulus, which was figured (Taf. 37 fig. 55) by Giesbrecht. In a single specimen a moderately long slender seta was observed in Re I of the *antennae*. In the lobe IV of the second basipodite in the *maxillipeds* no sensory process was observed. The *first pair* of legs has no Se Re I, but Se Re II extends almost to the base of Se Re III; the articulation between Re I and II is fairly well marked except anteriorly and medially. The lateral margin of Re II has a glandular pore near the base of Se Re II, and that of Re III has one placed near base. The Se Ri I has a well developed accessory tooth in pes II, and a somewhat smaller one in pes IV; the inner margin of the second basipodite is smooth in the fourth pair of legs. Glandular pores were found in Re II and in Re III at the base of Se 3, and in pes III —IV as well in Re I.

Text-fig. 35. *Undeuchæte minor* Giesbr.

a. f♀. Head × 33. b—c. f♀. Left and right lateral corner × 33. d. f♂. Head × 39. e. f♂. Abdomen × 39. f. f♂. Pes V. Ri sin × 59. g. y♂ (St. V) Pes V in ant. view × 59.

The lateral outline (text-fig. 35 a) of the *labrum* is somewhat similar to that of *Euchæte*. Behind the transverse chitinous list, which is placed somewhat behind the insertion of the antennulae, a low hairy elevation is found; this is separated by a depression from the well raised labrum proper. On the said elevation a median group of long setae and on each side lateral ones of short setae are observed. Along the posterior margin of the labrum long setae are placed in the middle, and shorter spine-shaped ones laterally. The oral surface of the labrum is very similar to that of *U. major* (cf. fig. 2 a), but the number of setae in the first group is somewhat larger. The *lamina labialis* and the two series of setae in front of it are in the main like fig. 2 b, but the number of setae is larger; the arrangement of hairs on the labial lobes and behind is similar to fig. 1 c.

f♂. Size of specimen from Thor St. 90 was 3·93 mm.; anterior division 2·89; urosome 1·04 mm. A. Scott's specimens measured 3·2—3·6 mm.

The rostrum is straight and directed directly downwards; the head is raised but has no frontal keel. The body is rather slender and in dorsal view somewhat attenuated towards the front; the lateral corners are rounded (text-figs 35 d—e). The *abdomen,* which is at least one third as long as the anterior division, is long and slender. The genital opening is placed on the left side; the fifth somite is scarcely visible from above; the caudal rami are short (only half as long as the fourth somite, rounded and about as long as wide). The terminal setae are distinctly longer than the abdomen, and the Si is one fourth as long as St. 2.

The *antennulae* extend about to the end of the third abdominal somite; the segments 8 ∾ 9 are partly fused with 10, and 12 with 13, but the segments 20 and 21 are well separated on both sides. The measurements are very like those of the female; the appendages are practically like those of *Aetidius.* The *antennae* are scarcely different from those of the female; the manducatory part of the *mandibulae* is well developed and rounded, but soft-skinned, without any teeth, while the terminal setae of the palps are more powerful than in the female. The *maxillulae* have no setae in Li 1—2, but 3 in Li 3; the number of setae in the third basipodite and the Ri is as in the females, but they are more slender. The Re has 10 powerful setae, which were all of equal length. The *maxillae* form an angle-shaped soft-skinned organ, in which distally soft-skinned, irregular twisted appendages are found. In the second basipodite of the *maxillipeds* two setae are found in the fourth lobe; the third basipodite is enlarged basally, and attenuated towards the end; the setae of the endopodite are fewer in number and less powerful.

The *first pair* of legs has a well developed articulation between Re I—II, and the Se Re II is short and strong, and far from reaching the middle of following segment; in other respects the natatory legs are scarcely different from those in the female.

The *right leg* of the *fifth pair* (fig. 3 b) has a short second basal segment, which is fused with the corresponding one of the left side, and is strongly produced outwards, and a much longer and wider third basal segment. The right endopodite (fig. 3 e), which extends to the end of Re I ∾ II, is rather elongated, distally slightly curved and, as shown in fig., somewhat hollowed; its anterior surface is distinctly striated, and marginally we observe a basal tooth, followed by a distinct striated keel, which is most elevated in the middle (figs 3 c and e). The Re I ∾ II of right leg, which are almost completely fused (figs 3 c—d), have in the proximal part the inner surface striated, and the outer one mounted with a few rounded rudimentary teeth, followed by an elongated lamina, and lastly a distinct tooth; the distal portion (Re II) is somewhat attenuated, and has medially a somewhat contorted, irregular lamella; the R III, which is comparatively short, has its inner surface somewhat excavated, and has the posterior inner margin lamellous. The *left leg* (fig. 3 b) has a short second basal segment, but a long and wide third one; the left endopodite (text-fig. 35 f) is long and slender, reaches distinctly beyond the middle of Re (not seen in fig. 3 b), is widest at the base and is distally enlarged to a rounded lamella (text-fig. 35 f). The left exopodite has a fairly short, somewhat curved Re I, a rather short Re II which terminally possesses a strong spine bearing a basal accessory tooth (fig. 3 f), and a moderately long Re III, which possesses a long terminal seta and a group of fairly long setae anteriorly and interiorly; the last segment is laterally connected with the Re II by a real articulation, but medially by a wide, soft membrane of a somewhat complicated structure.

Y⚥ (St. V). Size of specimen from Thor St. 88 was 3·16 mm.; anterior division 2·51 mm.; urosome 0·65 mm.

In the shape of the body etc. it is scarcely different from the adult female, but the lateral corner of the thorax is more pointed, showing, however, a similar difference between a more pointed left and a more rounded right corner. In one of five females a strong spine, similar to that of the adult, directed upwards and slightly backwards was found dorsally near the posterior margin of the first abdominal somite on the right side; in two other specimens the spine was represented by a single tooth, or a few only; along the posterior margin of the second abdominal somite no short teeth were found. The appendages are in the main like those of the adult females; the Re of the maxillulae possess as usual only 10 setae, of which the median are the shortest; the Se of Re II pes I is shorter than in the adult female, but longer than in the adult male, reaching somewhat beyond the middle of the following segment. The male is always easily distinguished from the female by the presence of a rather short and clumsy *fifth pair of legs*, of which the left is the longer (text-fig. 35 g).

Occurrence. The Ingolf Expedition has taken 2 females, of which one with spermatophore.

12/5 1896 St. 47 61°32 L. N. 13°40 L. W. V[1] 100—0 fathoms. Temp. at surf. 10·6° C.

The Thor has gathered it at the following stations:

11/7 1904	St. 183	61°34 L. N.	18°43 L. W.	Yt.	1800 M. Wire	7 f♀.
15/6 1905	St. 82	51°00 L. N.	11°43 L. W.	Yt.	1200 M. Wire	3 f♀, 1 f♂.
29/8 1905	St. 164	61°20 L. N.	11°00 L. W.	Yt.	300 M. Wire	1 f♀.
8/6 1905	St. 72	57°52 L. N.	9°53 L. W.	Yt.	1500 M. Wire	11 f♀ (one with 4 sp.).
20/6 1905	St. 88	48°09 L. N.	8°30 L. W.	Yt.	300 M. Wire	90 f♀ (35 with sp.), 2 f♂, 4 y♀ (V), 6 y♂ (V).
1/6 1905	St. 90	47°47 L. N.	8°00 L. W.	Yt.	300 M. Wire	125 f♀ (85 with sp.), 36 f♂, 3 y♀, 5 y♂.

Distribution. This species seems to have a world-wide distribution. It has been recorded from the warm area of the Færoe-Shetland channel, from the west coast of Ireland as far north as 54° L. N. "at depths of from 400 to 1100 fathoms". It has been taken by the Monaco Expedition and by the Gauss Expedition in the Mid- and South Atlantic as far south as 35° L. S. By the Siboga Expedition it was found rather common in the Malay Archipelago; it was recorded by Giesbrecht from the Pacific (6°20 L. N. 166—173 L. E.) and by Esterly from the Bay of California.

Remarks. In spite of a few minor differences I am fairly convinced that this species is identical with that described by Giesbrecht. Though Scott's fig. 8 Pl. XXII is wanting in details I think his male is identical with that described here. Scott is possibly right in identifying Lubbock's *Undina plumosa* with this male, in spite of minor differences, especially in the structure of the right fifth foot, which may, however, be due to a mistake; as Lubbock's description is rather incomplete, I do not at present accept the name *U. plumosa*.

I think Scott is right in referring the female of Brady's *Euchæte pulchra* Lubb. to *U. minor*. As far as I understand Scott, he refers Brady's *Euchæte pulchra* ♀ and his *E. australis* ♀ to the same species, but when we compare Brady's fig. 5 Pl. 21 and fig. 6 Pl. 14, it is easily realised that the two animals are probably not identical, especially on account of the different shape of the genital somite. I think the similarity with the other species of this genus, as pointed out by Giesbrecht as far as *U. major* is concerned, is better marked, but it may just as well be a species not yet rediscovered. A. Scott also regards the male of Brady's *E. australis* as identical with this species, and so does Sars; Brady's figs 8—9 Pl. XXI show that it belongs to an *Undeuchæte*, but is far too incomplete for the drawing of further conclusions.

38. Undeuchæte major Giesbr.

(Pl. V figs 2 a—d; text-fig. 36).

1883? ♀. Euchæta australis n. sp. Brady, p. 65, pl. XXI figs 5—11.
1888. Undeuchæte major n. sp. Giesbrecht, p. 335.
1892. — — Giesbr. Giesbrecht, p. 227, pl. 37.
1895. — — — — p. 251.
1898. — — — Giesbrecht & Schmeil, p. 34.
1900. — — — J. C. Thompson, p. 278.
1903 ♂. Scolecithrix cristata Giesbr. J. C. Thompson, p. 21, pl. III figs 1—5.
1904. — — — Wolfenden, p. 111.
1904. — — — Cleve, p. 198.
1905. Scolecithrix cristata Giesbr. Farran, p. 35.
1903. ♀. — — — Esterly, pp. 147—148 fig. 16.
1905. Chirudina angulata n. sp. G. O. Sars, p. 13.
1906. Undeuchæte major Giesbr. Pearson, p. 15.
1907. — — — G. O. Sars, p. 3.
1908. — — — Farran, p. 37.
1908. ♀. — — — v. Breemen, p. 43, fig. 49.
1909. — — — A. Scott, pp. 61—62.
1911. — — — Wolfenden, p. 243.

Description. f♀. Size of female from Thor St. 90: 4·92 mm.; anterior division 3·91; urosome 1·04 mm. Giesbrecht's specimens measured 4·5 mm. and Scott's 4·8—6·4 mm.

The lateral corners of the thorax are asymmetrical in a similar way as in *Und. minor*; on the left side it is triangularly pointed, more so than shown in Giesbrecht's fig. 5a (Taf. 37); on the right side it is more rounded, and bears a small conical process just in front of the end. The oblique hinder margin has two groups of short spines.

The *antennulae* are like Giesbrecht's description, but the measurements are somewhat different; the segment 17, f. inst., is scarcely, not distinctly, twice as long as the segment 12. The mouth-appendages are scarcely different from Giesbrecht's description. The *natatory legs* differ in a few minor points from those of *U. minor*; the Se Re II in the first pair of legs extends somewhat beyond the middle of Re III, but does not reach the end of it; the accessory tooth of Se Ri I of pes II, which was just indicated in the preceding species, is fairly distinct. The inner margin of the second basipodite of the *fourth pair* of legs is not quite smooth, but finely undulated, and the posterior surface possesses near margin just above the insertion of Si from one to four closely placed short spines.

The *labrum* is in lateral view like that of the preceding species. The oral surface of the labrum (fig. 2a) shows a structure similar to that of *Chiridina Streetsi* (fig. 4 b), though less complicated; the *first group* consists of about 25 short hairs, placed in an oblique row; the *second* to the *fifth groups* possess a regular median row and a more or less irregular lateral portion. The transverse rows of setae are very regular. The chitinous framework is well developed. The *lamina labialis*, as seen in fig. 2 b, is distinctly divided into three divisions, and is distinctly striated; in front of the lamina a median slightly curved series of about 20 setae is found, and a lateral one of numerous setae, of which the posterior ones are rather delicate. Behind the lamina 4 spinous areas are found on each side, of which the first one is almost obsolete. The arrangement of the setae upon and behind the labial lobes differs from that of following species by the comparatively few and long setae in the second series.

f♂. Size of specimen from Thor St. 90 4·92 mm.; anterior division 3·59 mm.; urosome 1·33.

The head is, as in the female, mounted with a distinct frontal keel; the body is more slender than that of the female and even more so than that of the preceding species. The lateral corners are regularly rounded. The St. 2 of the caudal ramus is longer than the urosome. The *antennulae* extend about to the middle of the abdomen. The mouth-limbs are like those of the preceding species, but soft-skinned, short rounded appendages were observed in the Li I—II of the maxillulae, and the appendages of the maxillae are better developed. The *pes I* shows the same difference as in *U. minor,* and the second basipodite of the fourth pair of legs is smooth.

Text-fig. 36. *Undeuchæte major* Giesbr. f♂. Pes V sin. × 59.

The *fifth pair* of legs differs from that of *U. minor* by a few features only; the inner margin of the Ri dext. (fig. 2 c) has basally a distinct tooth, followed by a lamina with a distinct process in the middle, in shape different from that of the preceding species; the outer margin of Re I dext. has a rather low keel, but no distinct teeth. The Re III sin. (fig. 2 d) differs by shorter terminal seta and by the different arrangement of the setae. The left endopodite is more slender (text-fig. 36).

Y♀ (St. V). Size of female from Thor St. 82 4·95 mm.; anterior division 3·91 mm.; urosome 1·04 mm. The shape of body with the frontal keel is scarcely different from that of the adult female. The Se Re II in the first pair of legs is not shorter than in the female; the inner margin of the second basipodite in the fourth pair of legs is completely smooth.

Occurrence. The S/S Thor has gathered this species at three stations only:

15/6 1905 St. 82 51°00 L. N. 11°43 L. W. Yt. 1200 M. Wire 1 f♀ (with sperm.), 2 y♀ (V).
20/6 1905 St. 88 48°09 L. N. 8°30 L. W. Yt. 300 M. Wire 55 f♀ (13 with sp.).
21/6 1905 St. 90 47°47 L. N. 8°00 L. W. Yt. 300 M. Wire 25 f♀ (5 with sp.), 5 f♂.

Distribution. This species was recorded by Farran "on every station of from 350 to 1000 fathoms and in 16 out of 34 gatherings, generally in moderate numbers" on the west coast of Ireland as far north as 54° L. N. It has been met with during the Prince of Monaco's cruises in the East Atlantic and was recorded as rather numerous at several stations in the South Atlantic even south of Africa at about 40° L. S. 35° L. E. by the Gauss Expedition.

It has been recorded by Esterly from the Gulf of California, by Giesbrecht from the Pacific (L. N. 20 L. E. 173) and by Scott from the Malay Archipelago.

Remarks. In spite of the few differences enumerated above, I do not doubt that my Atlantic specimens are identical with Giesbrecht's from the Pacific.

A. Scott is certainly right in determining the male referred by Esterly to this species as a species of *Euchæte*, as well as in regarding the male of Thompson's *Scolecithrix cristata* as belonging to this species.

39. Undeuchæte superba n. sp.

(Pl. IV figs 6 a—b; Pl. V figs 1 a—c; text-figs 37 a—f.)

Description. f♀. Size of specimen from Thor St. 183 was 6·42 mm.; anterior division 5·11 mm.; urosome 1·31 mm.

A rounded, rather low, but fairly prominent frontal keel is found; the undivided rostrum is short, but strong (text-fig. 37 a). The head and the first tergite are fairly well separated; the fourth and fifth thoracic tergites are completely fused. The right lateral corner of the thorax (Pl. V fig. 1 a) is fairly regularly rounded and somewhat shorter than the left one, which is triangularly produced and sometimes shows trace of bifurcation (fig. 1 b).

The abdomen is about one fourth of the anterior division; the genital somite is a little deeper than wide and long; on the right side it has a strong, fairly long spine, directed upwards and backwards (fig. 1 a; text-fig. 37 b); in the middle it is strongly produced, and has on the right side of the vulva a strong spine directed backwards. Along the hinder margin of the third somite ventrally short triangular teeth are found; they seem to be wanting in the other somites. The caudal rami are distinctly wider than long; the terminal setae are at least as long as the abdomen, and the Si is one third as long as St. 2.

The *antennulae* extend almost to the end of the fourth abdominal somite. The Re of the *antennae* is 1·7 as long as the Ri. The *maxillulae* have in Le the S 1—3 of moderate length, the S 4 somewhat longer and the S 5—9 much longer, but of almost equal length; the Re has, as in the two preceding species, the median setae distinctly shorter than the others, but not in so marked a degree. The *maxillipeds*, in which the comparative length between Basp. 1 ∾ 2, Basp. 3 and Ri is as 30—52—13, have the setae of Ri even better developed than in the preceding species, so far resembling the corresponding limbs of *Euchœte*. The *mandibulae* and *maxillae* are scarcely different from those of *U. major*.

The *first pair* of legs has the articulation between Re I and II almost obsolete; the Se Re II extends distinctly beyond the middle of Re III, but scarcely to the end of it. The *second pair* of legs has a fairly well developed accessory tooth in Se Ri I (text-fig. 37 c), and the St. has 45—50 serrations. The Se of Ri I in the *fourth pair* of legs has a distinct pointed accessory tooth, even better developed than the more rounded one in pes III; the inner margin of Basp. II is somewhat undulated, and has on the posterior surface, in a similar position as in the preceding species, five short spines (text-fig. 37 d). The glandular pores are as in the other species.

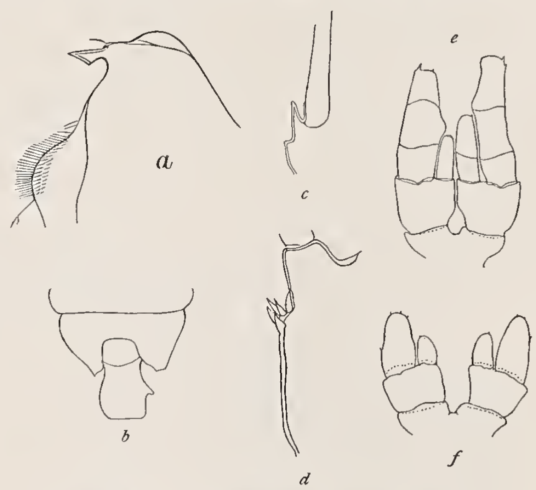
The anterior coecal sac seems to be wanting. The lateral outline of the *labrum* is not quite like that of the two preceding species; the anterior elevation, which on each side possesses about two groups of long slender hairs, forms an obtuse angle with the labrum proper; this is on each side in front beset with a small number (about 50) of short hairs.

The oral surface of the *labrum* is like that of *U. major* (fig. 2 b Pl. V), but shows similarity to that of *Ch. Streetsii* by a larger number of setae; the lateral group of setae, f. inst., consists of 30—40 short spines, and the first group of the longitudinal series has two instead of a single row. The *lamina labialis* and the area in front of it are scarcely different from those of the preceding species. The series of hairs behind and upon the labial lobes is rather characteristic as shown in fig. 1 c (Pl. V). The series I consists of a single oblique row laterally placed; the series II is represented by a large median and posterior group of short hairs; the series III seems to be represented by a fairly big group in the middle, almost fused with the corresponding portion of the opposite side, by a more lateral group partly fused with the fourth group and by two oblique rows on the labial lobe; the series IV consists of a median group fused with the third and fifth series, and of a rather short row on the labial lobe; the fifth series consists of a median group and a lateral row.

f♂. Size of specimen from Thor St. 183 was 5·35 mm.; anterior 4·08 mm.; urosome 1·27.

The rostrum and the frontal keel are scarcely different from those of the adult female. The body is more slender, and the lateral corners are rounded and symmetrical. The abdomen is scarcely different from that of the two preceding species. The *antennulae* extend about to the end of the third abdominal somite, and are also in other respects similar to those of the preceding species. The *antennae* are practically like those of the female, but in the Re I a small conical process was observed medially, apparently bearing a delicate seta. The manducatory portion of the *mandibulae* possesses posteriorly one or two rudimentary teeth. The *maxillulae* have short soft appendages in Li 1—2; the Le has 2 short and 6 long setae, and the 10 setae of the Re are as usual in the male not shortest in the middle; the Li 3 has 3 setae, and the Basp. as well as Ri have a similar number of setae as in the female, but they are softer. The *maxillae* and *maxillipeds* are scarcely different from those of the preceding species. The *first pair* of legs has as usual a well developed articulation between Re I—II, and the Se Re II is comparatively short; the pes II—IV are scarcely different from those of the females.

The *right leg* of the *fifth pair* has the basal segments like those of the preceding species (cf. fig. 3 b Pl. V). The right endopodite is in general shape very much like that of *U. minor* (figs 9 a—b Pl. IV, cf. fig. 3 e Pl. V); it is terminally somewhat curved and has here lamellar margins, turned over to establish a gutter-shaped excavation facing forwards and outwards. Outwards and backwards a well developed conical tooth is found near the base, and beyond this, removed one third of the length of the segment from the base, another striated tooth or elevation is found, which really forms the middle of the marginal, here scarcely indicated, keel present in the two other species; the anterior surface of the endopodite is distinctly striated. The first segment of the right exopodite (figs 6 a—b) is basally and in front produced into a wing-like expansion bearing three serrations, which are followed by a low keel and, somewhat more distally, a well developed tooth, where in the typical specimen a soft-skinned parasite, divided into three globules as seen in figs, is fastened; the second segment, which is almost completely fused with the first, has distinct marginal lamelli-form expansions; the third segment is elongated, somewhat attenuated and includes a gutter-shaped excavation facing inwards.



Text-fig. 37. *Undeuchæte superba* n. sp.
a. f♀. Head × c. 30. b. f♀. Abdomen × 9. c. f♀. Pes II Ri I sin in ant. view × 150. d. f♀. Pes IV basipod. II in post. view × 150. e. y♂ (St. V). Pes V ant. view × 33. Y♂ (St. IV). Pes V ant. view × 59.

The basal segments of the *left leg* are in main features like those of the preceding species; the left endopodite, which extends distinctly beyond the middle of Re I, is elongate and attenuated with undulated margin; the first segment of the exopodite is less robust and somewhat shorter than the third basipodite, and somewhat convex; the second segment is short, about 1·5 as long as the strong curved tooth, which has a distinct accessory tooth; the third segment is similar to that of the preceding species, but the terminal spine is distinctly articulated.

The elevation in front of the labrum is well developed but smooth. The *labrum* is rudimentary without distinct setae, and so is the area labialis; both are soft-skinned with ringed chitin. Laterally we observe one to two groups of very short hairs.

Y♂♀ (St. V). Size of female from St. 167 Thor 1905 was 4·77 mm.; anterior division 3·80 mm.; urosome 0·97 mm. A male from the same station measured 4·88 mm.

Shape of body, but for four abdominal somites and more triangularly pointed lateral corners of the thorax, is like that of the adult female. The Re I of the antennae apparently bears a setigerous process like that of the adult male; the other appendages do not show features of interest.

The only difference between the males and females is found in the presence of the fifth pair of legs, which, as shown in text-fig. 37 e, has a rather characteristic structure.

Y♂♀ (St. IV). Size of male from St. 183 was 3·28 mm.; anterior division 2·70 mm.; urosome 0·58 mm. Size of female from the same station 3·1 mm.

The frontal keel is lower, and the lateral corners of the thorax are less pointed. The mouth-appendages do not show features of great interest. The Re II ∾ III of the second pair of legs are fused, have only 3 Se but the usual number of Si; a glandular pore is only found in Re III at the base of Se 3; the fourth pair of legs has also a glandular pore in Re I, and has the inner margin of the second basipodite smooth. The only difference between the male and female is found in the presence of a fifth pair of legs with undivided Re and Ri as shown in text-fig. 37 f.

Occurrence. The S/S Thor has taken a few specimens of this species at several stations.

19/6 1904	St. 152	65°00 L. N.	28°10 L. W.			1 f♀ (with sperm.), 1 f♂, 1 y♂ (V).
21/6 1904	St. 154	65°27 L. N.	27°10 L. W.			1 f♀ (with sperm.).
10/7 1904	St. 180	61°34 L. N.	19°03 L. W.	Yt.	400 M. Wire	2 f♀ (with sperm.).
1/9 1904	St. 285	62°49 L. N.	18°46 L. W.			1 f♂.
11/7 1904	St. 183	61°30 L. N.	17°08 L. W.	Yt.	1800 M. Wire	11 f♀, 2 f♂, 1 y♀ (V), 6 y♂ (V), 1 y♀ (IV), 1 y♂ (IV).
25/5 1904	St. 104	62°47 L. N.	15°03 L. W.			1 f♀.
2/9 1904	St. 286	61°49 L. N.	14°11 L. W.			2 f♀, 1 y♂.
29/8 1905	St. 165	60°00 L. N.	10°35 L. W.			1 f♀.
22/5 1904	St. 99	61°15 L. N.	9°35 L. W.			1 f♀.

Outside the Ingolf area the species has been taken

15/6 1905	St. 82	51°00 L. N.	11°43 L. W.	Yt.	1200 M. Wire	1 f♀.
31/8 1905	St. 167	57°46 L. N.	9°55 L. W.	Yt.	1500 M. Wire	1 f♀, 3 f♂, 1 y♀ (V), 1 y♂ (V).
8/6 1905	St. 72	57°52 L. N.	9°53 L. W.	Yt.	1500 M. Wire	6 f♀, 1 f♂, 2 y♂.

Remarks. As this species was found not only in the Atlantic south of Iceland, but also in Denmark Strait and in the Iceland-Færoe channel, while it was wanting in some of the more southern stations in which the two other species were found, it is possibly a more northern form.

It belongs naturally to the same group as *U. minor* and *major*, though it is well distinguished from both by combining the right lateral spine of the genital somite and the ventral spine on the right side of the vulva, as well as by the frontal keel and by the teeth on the second basipodite of the fourth pair of legs.

This species is even more related to two newly established species, but if the descriptions are correct, it is scarcely identical with them.

From *U. intermedia,* which was described by A. Scott (1909 p. 63—64; Pl. 23 figs 1—8), it differs by a distinctly raised forehead between the rostrum and the keel, by the different shape and direction of the two characteristic spines of the genital somite, as well as by a few other characters. From Wolfenden's *Mesundeuchæte assymmetrica* (1911 pp. 244—245; Taf. 29 figs 4—7; text-fig. 28) from the South Atlantic, which it is very much like in dorsal view, it differs by the structure of the vulva, as the right spine is wanting in Wolfenden's species. To encompass these species he established a new genus on account of the teeth of the posterior surface of the second basipodite of pes IV; as the presence of such spines (cf. *Aëtidius* Pl. II fig. 1 c), even if they are often wanting, is a rather characteristic feature in the *Aetidiidae*, and as such spines are found in *U. major* as well, the foundation is rather too weak. When all the structural features of males as well as of females are taken into consideration, it is quite evident that the five species go naturally together.

40. **Chirudina Streetsii** Giesbr.

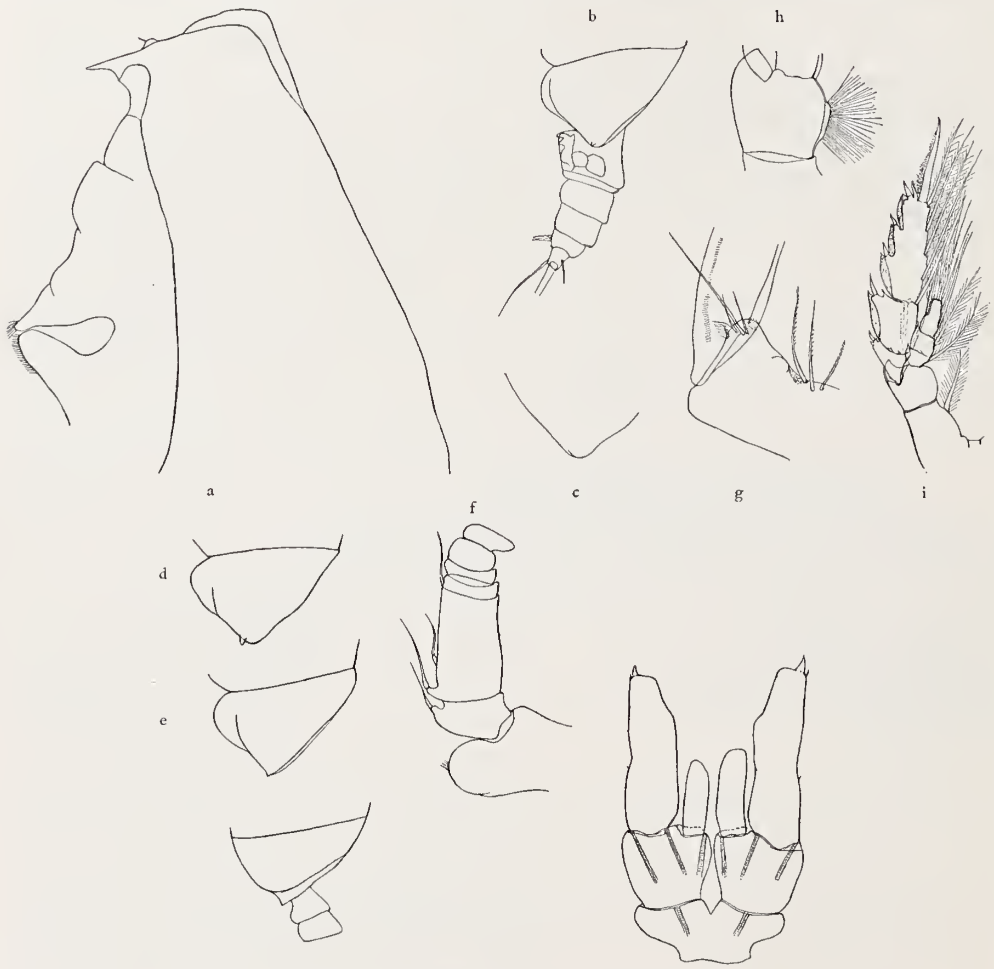
(Pl. V figs 4 a—f; Pl. VIII figs. 5 a—b; text-figs 38 a—k.)

1895. Chirudina Streetsii n. sp. Giesbrecht, pp. 249—250; taf. 1 figs 5—10.
1898. — — Giesbr. Giesbrecht & Schmeil, p. 34.
1902 nec. Euchirella carinata n. sp. Wolfenden, pp. 366—367.
1904? — — Wolf. Wolfenden, pp. 115—116.
1904. Chirudina Streetsii Giesbr. Cleve, p. 187.
1905. — — — G. O. Sars, p. 4.
1906. Chirudina Streetsii Giesbr. Pearson, p. 16.
1906. — — — Esterly, p. 59, pls 9, 10, 12, 14.
1908. — — — Farran, p. 37.
1908. — — — v. Bremen, p. 46.
1909. — — — A. Scott, p. 43, pl. XII figs 1—11.
1913. — — — Wolfenden, p. 241.

Description. f♀. Size of specimen from Thor St. 72 was 5·22 mm.; anterior division 4·18; urosome 1·04 mm. Giesbrecht's specimens measured 5·3 mm. Scott's specimens measured 4·8—5·3 mm.

The frontal keel and rostrum are well developed, as seen in text-fig. 38 a; dorsally there is trace of articulation between the head and the first thoracic somite; the fourth and the fifth thoracic tergites are completely fused, except dorsally, where trace of segmentation may be found. The lateral corners vary very much in the different specimens; they are more or less rounded, but mounted with a pointed process, which is sometimes almost wanting, especially on the right side (text-figs 38 b—e), but is sometimes well developed. The genital somite is in dorsal view slightly asymmetrical, as the right outline is more regularly rounded than the left; the genital area (fig. 4 a), looked at from beneath, is very similar to that of *C. pustulifera*, but observed from the side, a fairly prominent anterior protuberance and a short, sometimes completely covered, posterior one are seen.

The *antennulae* extend about to the base of the furcal branches; the segment 19, which is the longest segment, is about 1·1 as long as 20, which is again longer than 17, the latter being about 1·1 as long as 16; the segment 16 is 1·1 as long as $24 \backsim 25$. The exopodite of the *antennae* is 1·5 as long as the endopodite; the second segment of the endopodite has $7 + 7$ setae; the first segment of the exopodite, which is well defined and about one third as long as the second, has a well developed setigerous process inwards, and the second segment has a similar one at the base in addition to ones sitting in the middle as well as terminally (text-fig. 38 f). The *mandibulae* and *maxillulae* do not show any features which were not mentioned in Giesbrecht's description. The *maxillae* are very much like fig. 5 c of *Ch. abyssalis.* The third basipodite of the *maxillipeds,* which is almost twice as long as the Basp. 1 ∾ 2 and distinctly three times as long as the Ri, has along the exterior margin almost from base to tip on the posterior surface a low transparent lamella with a distinct concavity in the middle; the fourth lobe of the second basipodite is placed posteriorly, and has a fairly long sensory lobe surrounded by slender hairs, in addition to three setae (text-fig. 38 g); anteriorly, and somewhat removed from the tip, a rounded protuberance is found in the second basipodite, probably corresponding to that of *E. curticauda.* The *first pair of legs* has the inner margin of the last basipodite slightly convex, as seen in text-fig. 38 h; the Se of Ri I has no accessory tooth in the *second pair of legs,* and no trace of it in the third and fourth pairs (text-fig. 38 i); the inner margin of the second basipodite in the *fourth pair of legs* is in most specimens completely smooth, but in some has one or two short stiff hairs corresponding to Giesbrecht's "spärlichen kurzen Spitzen". The glandular pores are like those of *Undeuchæte.* The elevation in front of the *labrum* is smooth and fairly well raised; along the posterior margin the labrum proper has as usual a median row of long and slender hairs divided into a right and a left part, and a lateral shorter one, of more spine-shaped setae. The oral surface of the *labrum* (fig. 4 b) is like that of *Undeuchæte.* The *first group* of the longitudinal series is placed obliquely, and consists of about ten fairly strong setae; the *second group* consists of two rather inde-



Text-fig. 38. *Chirudina Streetsii* Giesbr. f♀.
a. f♀. Head × 30. b. f♀. Abdomen × 18. c. f♀. Lateral corner from the right side × 18. d–e. f♀. Left lateral corner × 18. f. f♀. Antenna sin. Re × 57. g. f♀. Maxillipes dext. in post. view × 57. h. f♀. Pes I sin. × 57. i. f♀. Pes IV sin. × c. 20. j. y♀ (St. V). Left lateral corner × 18. k. y♂ (St. V). Pes V in anterior view.

pendent parallel rows; the *third group* as well as the *fourth* and *fifth* has the inner rows of setae in each group fairly well separated, but has the more laterally placed hairs of each group rather irregularly placed. Behind and laterally to the fifth group on each side a large number of very delicate hairs are found. The lateral group in front consists of numerous delicate short hairs. The transverse series around and behind the median circular spot Nr. 4 is shown in fig. 4 b.

The *lamina labialis* is minutely granular and, as seen in fig. 4 c, laterally prolonged backwards; the lateral series in front consists, except posteriorly, of a single row; the medial series, in front of which a minutely granular area is found, is fairly long.

The arrangement of the series of hairs behind and upon the labial lobes is the following (fig. 4 d): the *first series* is almost longitudinal and consists of 10 hairs; the *second series* consists of a group of about 10 hairs; the *third series* consists of two well separated transverse rows, well removed from the longitudinal row upon the labial lobe; in front of the two mentioned transverse rows 2 others are observed, which probably belong to the *fourth series;* this is well developed upon the lobe and has proximally a large group of numerous hairs, partly belonging to the *fifth series,* which medially has a transverse row. In at least one of the specimens several of the hairs are slightly clavate. Behind the transverse line which separates the mandibular and maxillular somites, groups of hairs, as shown in fig. 4 d, are found.

A short but distinct frontal coecal sac is found.

f♂. Size of specimen from Thor St. 88 was 3·80 mm.; anterior division 2·83 mm.; urosome 0·97. Scott's specimen measured 4·1 mm.

The frontal keel and the rostrum are (as seen in Pl. VIII fig. 5 a), somewhat different from those of the female. The body is rather slender and attenuated towards the front, but less so towards the end; the lateral corners are rounded. The anterior division is 3·8 as long as the abdomen, which has the genital opening on the left side and short triangular teeth along the hinder margin of the second to fourth somites. The *antennulae* extend scarcely to the middle of the abdomen; the segments 8 ∾ 9 are almost completely fused with 10 and 12 with 13, but the segments 20 and 21 are well separated on both sides. The exopodite of the *antennae,* which is 1·4 as long as the endopodite, has in the first segment a single process without setae, and in the second 2 basal processes and a single terminal one. The soft-skinned manducatory part of the *mandibulae* has a single well developed tooth and a few rudimentary ones, and the Ri 2 has 9 Sa, but not, as in female, a Sp.

The *maxillulae* possess at least 6 soft sensory (?) appendages in Li 1; the Li 2 was wanting, but in Li 3 at least 3, in Basp. 3 at least 3, and in Ri at least 11 setae were found. The Re has 10 well developed plumous setae in addition to a deliçate interior one, and Le has 2 short, delicate, basal setae in addition to 5 distal, long ones. The *maxillae* (Pl. VIII fig. 5 b) have 5 well developed lobes, of which the fifth one bears a big twisted seta with enlarged base; the endopodite has at least 5 setae. The *maxillipes* is more clumsy than that of the female, in shape ressembling that of the males of *Undeuchæte*; the third basipodite is 1·3 as long as the two first ones and 2·5 as long as Ri; the lob. IV of the second basipodite has a long, slender seta and a rather short, curved, spine-like one in addition to the usual conical one.

The *first pair of legs* differs from that of the female by the very short Se of Re I; the Se of

Ri I in the *third pair* of legs has a fairly distinct accessory tooth, but in other respects scarcely any difference was observed between the natatory legs of the male and female.

The *fifth pair* of legs is in general structure most like that of *Undeuchæte minor* (Pl. V fig. 4 e), to the description of which I partly refer. The right endopodite is about as long as the first segment of the exopodite, enlarged distally and here gutter-shaped; on the posterior surface near the base a short tooth was observed, and along the outer margin a short and low lamina. The first and second segments of the right exopodite are completely fused, and have in the middle an obtuse angle open outwards; the outer margin has proximally two large teeth and a smaller one, and the posterior surface has, near the end, one or two raised keels; the third segment of the exopodite is gutter-shaped, like that of *Undeuchæte* s. s., but has a terminal, well articulated seta, two thirds as long as the segment.

The third basipodite of the *left leg* has inwards near base a blunt tooth; the *endopodite* is slender, projects beyond the end of the first segment of the exopodite, and it distally somewhat hollowed; the second segment of the exopodite is rather short, has the inner surface distinctly hollowed, and has inwards near the end a strong, rather short spine with a blunt accessory tooth as well as a rounded process; the third segment of the left leg (fig. 4 f) is similar to that of *Undeuchæte,* but is less slender, and possesses a short bristle in addition to the terminal setae, which are distinctly half as long as the segment.

Y♂♀ (St. V). Size of female from Thor St. 88 was 4·0 mm.; anterior division 3·15 mm.; urosome 0·85 mm. A male measured 4·02 mm.

The shape of the body is in the main like that of the adult male, but the frontal crest is somewhat lower, and the lateral corners are triangularly pointed, and scarcely different on the two sides; the limitation, between the head and the first tergite as well as between the fourth and fifth ones, is fairly distinct (text-fig. 38 j). The first abdominal somite is better produced in the male than in the female. The appendages show the usual differences from those of the adult female; the inner margin of the second basipodite is smooth in both sexes. The *fifth pair* of legs is, as seen in text-fig. 38 k, fairly well developed.

Occurrence. The S/S Thor has in the Atlantic south of Iceland gathered this species at four stations viz:

1/9 1904	St. 285	62°49 L. N.	18°46 L. W.				2 f♀, 1 y♂ (V).
11/7 1904	St. 183	61°30 L. N.	17°08 L. W.	Yt.	1800	M. Wire	1 f♀.
24/5 1904	St. 180	62°47 L. N.	15°03 L. W.	Yt.	500	M. Wire	1 f♀, 1 y♀ (V).
28/8 1905	St. 163	63°36 L. N.	12°05 L. W.	Yt.	300	M. Wire	1 f♀.

Farther south the species was in one of five samples taken in big numbers.

15/6 1905	St. 82	51°00 L. N.	11°43 L. W.	Yt.	1200	M. Wire	1 f♂.
31/8 1905	St. 167	57°46 L. N.	9°55 L. W.	Yt.	1500	M. Wire	5 f♀.
8/6 1905	St. 72	57°52 L. N.	9°53 L. W.	Yt.	1500	M. Wire	5 f♀.
21/6 1905	St. 90	47°47 L. N.	8°00 L. W.	Yt.	300	M. Wire	5 f♀.
20/6 1905	St. 88	48°09 L. N.	8°30 L. W.	Yt.	300	M. Wire	137 f♀, 7 f♂, 27 y♀ (V), 62 y♂ (V).

Distribution. According to Farran "this species is of frequent occurrence in the N. E. Atlantic, having been taken on every station at depths of from 300 to 1000 fathoms". It has been recorded from the Færoe channel, from the Mid Atlantic and from the South Atlantic as far south as 35° L. S. It has been recorded from the Gulf of California, from the Pacific 35° L. N. 125° L. W. as well as from the Malay Archipelago.

Remarks. In spite of the small differences enumerated between my specimens and Giesbrecht's description I think the Atlantic and the Pacific forms belong to the same species. Different authors, f. inst. Pearson and A. Scott, have identified Wolfenden's *Euch. carinata* with this species; they are certainly wrong as far as the young male described in 1902 is concerned; on account of the frontal crest like that of *E. galeata,* the rounded lateral corners of the thorax and the left endopodite of the fifth pair of legs "like small stump" there is some reason to identify it with, f. inst., *Euchirella intermedia* (cf. p. 127). The position of the adult female is somewhat uncertain; Wolfenden regards it (p. 236) as a true *Euchirella* in spite of the missing spines of the second basipodite of the fourth pair of legs. It is with some reluctance that I have referred the described male to this species; at present it is impossible to tell its certain position. The descriptions of Esterly and Scott are too short for a certain identification.

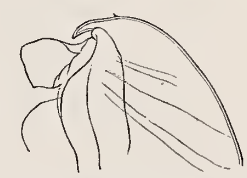
41. **Chirudina pustulifera** G. O. Sars.

(Pl. V figs 6 a—d; text-fig. 39.)

1905. Undeuchæte pustulifera n. sp. G. O. Sars, p. 14.
1908. Euchirella Wolfendenii n. sp. Farran, pp. 38—39; pl. II figs 18—19; pl. IV fig. 3.
1908. Undeuchæte pustulifera G. O. Sars. v. Bremen, p. 44.

Description. Size of female from Thor St. 183 was 6·9 mm.; anterior division 5·7 mm.; urosome 1·2 mm. Sars' specimens measured 6·9 and Farran's 7·2 mm.

The head has no frontal crest, but a strong, slightly curved rostrum (text-fig. 39). The fifth somite is well limited in front, and the lateral corners are rounded (figs 6 a—b). The genital somite has a very characteristic shape (figs. 6 a—b); on the left a low protuberance is found, and on the right side a very prominent one, consisting of a basal larger portion and a terminal regularly rounded part. The genital somite, seen from the side, has a strong, rounded, rather prominent protuberance in front, and a lower one in the middle as well as behind; observed from below the genital area (fig. 6 c) is like that of *Ch. Streetsii.* The abdomen is almost everywhere hairy, but the setae are longest and best developed dorsally along the hinder margin of somites II—IV. Dorsally in the genital somite as well as ventrally in the third and fourth ones tufts of shorter and longer hairs are observed. The caudal rami are about as long as wide, and the Si is scarcely half as long as the St., which is about as long as the abdomen.



Text-fig. 39. *Chirudina pustulifera* G. O. Sars. f♀. Head × c. 18.

The *antennulae* extend to the end of the abdomen. The *antennae* are scarcely different from Farran's fig. 18 Pl. XI, except by the presence of a fairly long terminal seta in Re 2; the Re is about 1·7 as long as Ri. The *mandibulae* are scarcely different from those of *C. abyssalis* n. sp. (cf. fig. 5 b); the third basipodite is not smooth as indicated by Farran, but has 3 setae. The *maxillulae* have 5 powerful setae in Li 2, have 4 + a conical process in Li 3, and 5 in the Basp. 3; the Ri I—III possess 4 + 5 + 7 setae as in *Ch. Streetsii.* The exopodite has 11 setae, of which the median ones are comparatively short, but not in so marked a degree as in *Undeuchæte.* The Le has 9 setae (according to Farran 8 only), of which the third and the ninth are somewhat shorter than the Set. 4—8, and the first and second are much shorter. The *maxillae* are very much like those of *Ch. abyssalis*, cf. fig. 5 c, and have the hairs on the posterior surface of the four lobes arranged in a similar way. The *maxillipeds* are very similar to those of *Ch. Streetsii,* but have no lamina along the outer margin of the second basipodite, nor the anterior process of the second basipodite; the third basipodite is 1·5 as long as the first and second, and 3·8 as long as the endopodite.

The *first pair* of legs has the articulation between Re I and II represented by a fairly distinct chitinous line, which is almost wanting posteriorly; the Se Re I extends beyond the end of Re II, and the Se Re II extends just to the end of Re III. The *second pair* of legs has indication of articular membrane between the Ri I—II, but has no accessory tooth at the base of the blunt Se Ri I; the terminal spine has 70 serrations. The Se of Ri I is pointed, but is without accessory teeth in the two last pair of legs; the second basipodite of the *fourth foot* bears on the hinder surface of a process projecting from the inner margin a transverse row of 8—11 strong, fairly long spines, of which the inner are somewhat more slender.

The lateral outline of the *labrum* is like that of *Ch. Streetsii*, with well raised, smooth, anterior elevation, and so is the oral surface of the *labrum* (fig. 6 d); the only difference of importance is found in the much longer first group, the almost wanting lateral row in the second group, and the much better developed transverse row of short hairs in front of the transverse chitinous bar. The *lamina labialis* and the area in front of it are scarcely different from those of *Ch. Streetsii*, while the arrangement of hairs upon and behind the labial lobes is like that of *Ch. abyssalis* (fig. 5 f); a tuft of about 20 long slender setae is found on the lateral surface of the labial lobe, just as in *Ch. notacantha.*

Occurrence. The S/S Thor has gathered this species at two stations.

$^{11}/_{7}$ 1904	St. 183	61°30 L. N.	17°08 L. W.	Yt.	1800 M.	Wire	17 f♀	(5 with sp.).
$^{10}/_{7}$ 1904	St. 180	61°34 L. N.	19°03 L. W.	Yt.	400 M.	Wire	1 f♀	(with sp.).

Distribution. This species has been recorded from two stations between 700 and 1000 fathoms off the west coast of Ireland; the Monaco Expedition has gathered it at three stations.

Remarks. The only difference found between my specimens and Sars' description, which is rather insufficient, is found in the comparatively shorter "antennes antérieurs dépassant la longueur de la division antérieure du corps". The Basp. II of pes IV has 6 for 11 spines. The unimportant differences from Farran's description are enumerated in the description. Farran has referred the species to *Euchirella*, probably on account of the well developed spines in the second basipodite of the fourth pair of legs, but it differs in a number of more important characters, viz: the structure of the oral surface of the labrum, the wanting glandular pore of the base of Se 1 Re III pes II—IV, the comparatively long Ri of the antennae, the position of the spines on posterior surface of lobes I—IV of maxillae, and the arrangement of the setae of the maxillulae. In all these characters it agrees with *Chirudina* as well as, though in a less degree, with *Undeuchæte.* It agrees with *Undeuchæte* in the comparatively short median setae of the Re of the maxillulae, but with *Chirudina* in the number of setae in Li 2 and

Ri of the maxillulae and the presence of a Se Re I pes I. The two genera are very nearly related, but as the five species of *Undeuchæte* form a very natural group I prefer to refer this species to *Chirudina*.

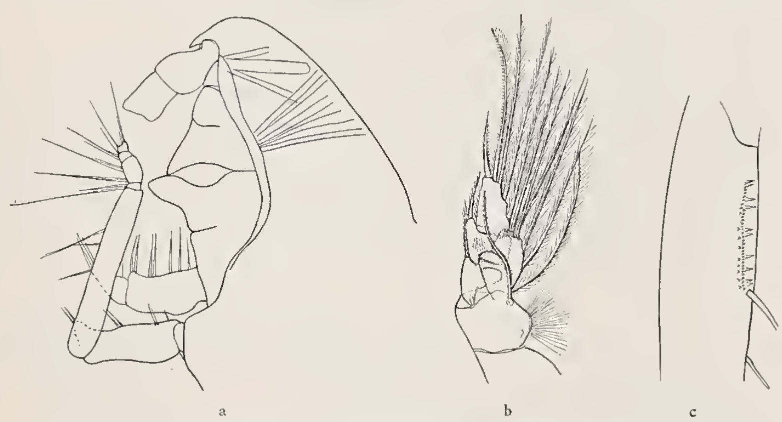
42. **Chirudina abyssalis** n. sp.

(Pl. V figs 5 a—f; text-figs 40 a—c).

Description. f♀. Size of specimen from Thor St. 183 was 5·4 mm.; anterior division 4·3 mm.; urosome 1·1 mm.

The head is gradually rounded in front, without any crest; the rostrum is rather short, but strong, directed downwards and slightly backwards (text-fig. 40 a). The cephalothorax, which is moderately slender and slightly attenuated towards the front part as well as towards the end, is about 2·5 as long as wide; the first thoracic tergite is, at least dorsally, well separated from the head; the fifth somite, which is well separated in front, is laterally not produced, and has evenly rounded corners (fig. 5 a). The anterior division is about four times as long as the abdomen.

The genital somite, which is a little wider than deep and as deep as long, is in dorsal outline almost symmetrical; the ventral surface is anteriorly rather suddenly produced and posteriorly gradually sloping; the genital area is in ventral view seen to be somewhat different from that of the preceding species. The genital somite possesses, dorsally, along hinder margin, short hairs, and ventrally tufts of longer hairs; the following somites are more and less hairy, the hairs being longest dorsally and ventrally. The caudal rami are about as long as wide; the terminal setae are distinctly shorter than the abdomen and about three times as long as the Si.



Text-fig. 40. *Chirudina abyssalis* n. sp.
a. f♀. Head × 18. b. Pes I × 33. c. Maxillipes sin. Basp. III in post. view × 87.

The *antennulae* extend to the end of the caudal rami; the measurements are very like those of the preceding species. The exopodite of the *antennae* is 1·6 as long as the endopodite; the second segment of the endopodite has 8 setae in Li and 7 in Le; the first segment of the exopodite, which is one third as long as the second, has inside a short protuberance with a short hair; the second segment has only a terminal seta. The *mandibulae* have, as shown in fig. 5 b, a rather characteristic shape, and the *maxillulae* are completely like those of *Ch. pustulifera*. The *maxillae* (fig. 5 c) are only slightly produced basally, and have the spinous areas on the hinder surface of the four proximal lobes distinctly different from those of most species of *Euchirella* (cf. fig. 9 d); in the first lobe a smooth area is found surrounded by spines. The *maxillipeds* are scarcely different from those of the preceding species; beyond the Si 3 in the third basipodite a longitudinal row of longer and shorter teeth is found (text-fig. 40 c); similar teeth were found in *Ch. pustulifera*, but not in *Ch. Streetsii*.

The *first pair of legs* (text-fig. 40 b) has the articulation between Re I and II better developed than in the preceding species, but is in other respects scarcely different; the terminal spine of the *second pair* of legs has 90 teeth, and the second basipodite of the *fourth pair* of legs has 11 knife-shaped spines (fig. 5 d).

The outline of the *labrum* is, as seen in text-fig. 40a, somewhat different from that of *Ch. Streetsii;* the oral surface of the labrum differs in the same way as that of *Ch. pustulifera* from that of *Ch. Streetsii.* The *lamina labialis* is smooth, and the area in front of it is, as shown in fig. 5 e, somewhat different from that of *Ch. Streetsii,* and so is the arrangement of hairs upon and behind the labial lobes (fig. 5 f), the main difference being that a large group of delicate hairs is found where the series III and IV start at the base of labial lobes, not where series IV and V start. In front of the oesophagus a long coecal sac is found.

Occurrence. Of this species the S/S Thor has only taken 4 adult females $^{11}/_{7}$ 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire.

Remarks. This species is very nearly related to *Ch. pustulifera*, and ought, accordingly, to be referred to the same genus. It shows some similarity to *U. obtusa* G. O. Sars (1905 p. 13; Farran 1908 p. 40), which has the antennules "dépassant à peine, en longueur, la division antérieure du corps", as well as to *U. lobata* G. O. Sars (1907, pp. 11—12), from which it seems to differ by lateral corners "assez saillants en arrière et étroitement arrondis au bout", by longer abdomen and antennulae.

43. **Chirudina notacantha** G. O. Sars.

(Pl. V figs 7 a—b; Pl. VI figs 1 a—b; text-figs 41 a—k).

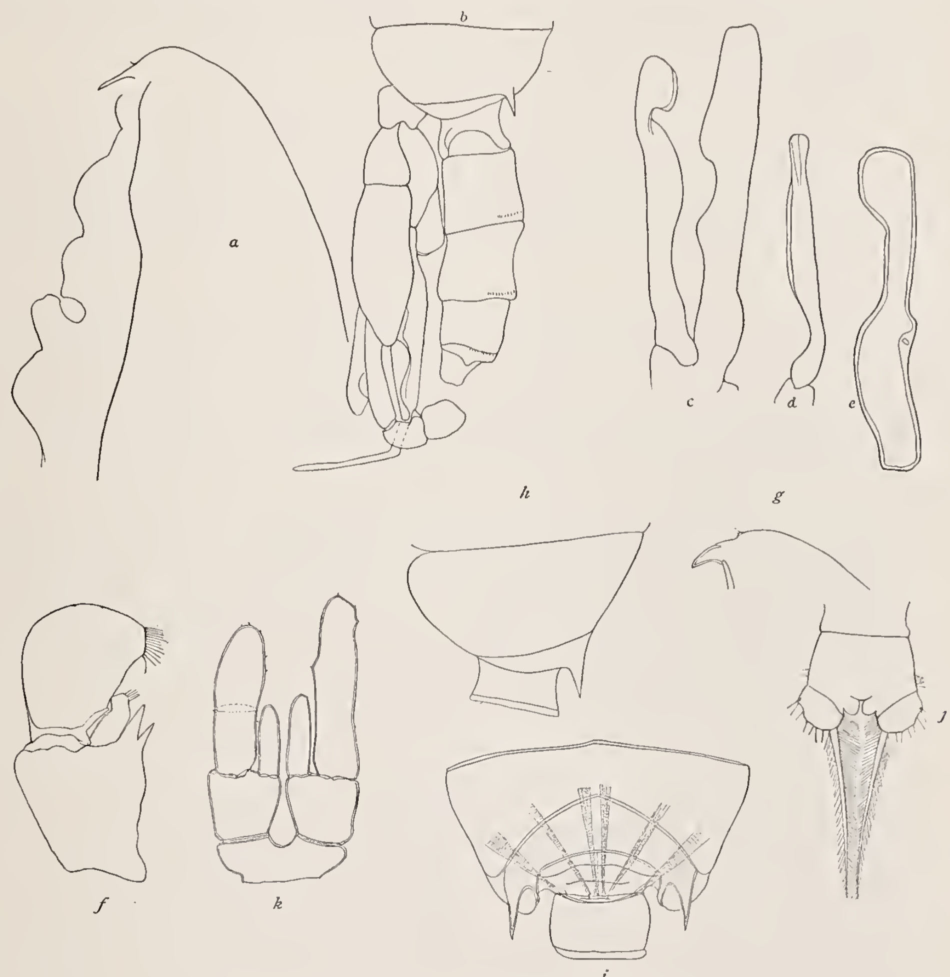
1905. Gaidius notacanthus n. sp. G. O. Sars, pp. 9—10.
1908. — — G. O. Sars. Farran, pp. 33—34, pl. III fig. 7.
1909. Nec. Gaidius notacanthus G. O. Sars. A. Scott, p. 52, pl. XXI figs 24—32.

Description. Y♂♀ (St. V). Size of a young male 5·72 mm.; anterior division 4·7 mm.; urosome 1·02 mm. Young females measured from 4·31—5·54 mm. Sars' specimen measured c. 5 mm.

The lateral outline of the head is gradually sloping towards the strong undivided rostrum, which is directed downwards and slightly backwards (text-fig. 41 g). The cephalosome, which in the middle is scarcely half as broad as it is long, is attenuated towards the front as well as towards the end. The head is well separated from the first thoracic tergite, and the fifth one is well marked out in front (text-fig. 41 i); the latter somite is, near dorsal margin, produced into a strong triangularly pointed spine, which scarcely attains the end of the first abdominal somite. The abdomen, which is scarcely one fourth as long as the anterior division, has four somites, the comparative length of which was 22, 29, 21, 17 and 15 (furcal branch); the furcal branch is distinctly wider than long. Along the hinder margins densely placed hairs are found; the terminal setae are distinctly shorter than the abdomen (text-fig. 41 j).

The *antennulae* extend almost to the middle of the abdomen; in measurement they are very much like those of *Ch. Streetsii.* The exopodite of the *antennae* is almost 1·8 as long as the endopodite, which has 7 setae in Li and 6 in Le; the first segment of the exopodite has a short process inside, bearing a delicate seta, only as long as the process itself, and the second has a terminal seta inside (cf. *Ch. abyssalis*). The *maxillulae* have in addition to the 4 Sp. on the posterior surface of Li 1 a short S 15; the Le 2 has 5 setae, the Li 3 has 4 setae and the Basp. III has 5 setae; the endopodite has 3 setae in Ri I, 5 setae in Ri II and 7 setae in Ri III. The exopodite has 10 setae of about equal length, and the Le has 2 short proximal setae and 7 long distal ones. The *maxillae* are scarcely different from those of *Ch. abyssalis* cf. Pl. V fig. 5 c, and the *maxillipeds* have the third basipodite 3·3 as long as the endopodite and 1·6 as long as the two basal segments.

The *first pair* of legs is very much like that of *Ch. abyssalis;* the articular membrane between Re I—II is completely wanting posteriorly and only slightly developed anteriorly; the Se of Re I distinctly extends beyond the end of preceding segment, and so does Se of Re II. The articulation between Ri I—II in the *second pair* of legs is wanting posteriorly, but is marked by an indistinct line anteriorly, and the Se of Ri I is slightly marked as seen in text-fig.; the articulation between Re I and II is almost wanting posteriorly; the St. has 50—60 short teeth. The Se of Ri I is well developed but without an accessory tooth in the *fourth pair* of legs, and the inner margin of the second basipodite is completely smooth. The only difference between the male and female is found in the *fifth pair* of legs in the male (text-fig. 41 k); this is distinctly different from the preceding species by the segmentation of the left exopodite and by the wanting terminal setae. The *labrum* etc. is scarcely different from that of *Ch. Streetsii* (cf. text-fig. 38 a); along the transverse ridge which limits the labrum in front about 10 rather delicate setae are found. The *oral surface* of the labrum (Pl. VI fig. 1 a) is rather characteristic, though showing most similarity to that of *Ch. Streetsii;* the supporting chitinous framework is less developed. The *first group* of the longitudinal series consists of numerous short spinules; the *second group* consists of a single longitudinal row of fairly long setae; the *third*



Text-fig. 41. *Chirudina notacantha* G. O. Sars.
a. f♂. Head $\times$ 30. b. abdomen etc. $\times$ 30. c—d. Pes V dext. Ri + Re I ∾ II from the right and partly from behind $\times$ c. 50. e. Pes V Ri sin. $\times$ 66. f. Pes V sin. Re II—III $\times$ 75. g. y♂ (St. V) rostrum. h—i. (St. V) fifth thoracic tergite from the left and from above. j. (St. V) furca $\times$ 29. k. (St. V) Pes V in ant. view $\times$ 29.

to *fifth groups* consist of an inner more or less longitudinal row of fairly long setae inwards and of more irregularly placed setae laterally; a *sixth group* of very short delicate setae is found; the transverse rows are, as seen in figs, like those of *Chirudina Streetsii*. The *lamina labialis* (Pl. VI fig. 1 b) is not quite like that of any of the examined species, as it consists, as shown in figure, of two rather independent portions. The arrangement of the setae in front of the row is like that of *Chirudina Streetsii*, but no granular area was observed. The arrangement of the series upon and behind the labial lobes is in its main feature like that of *C. abyssalis* (Pl. VI fig. 1 b; cf. Pl. V fig. 5 f). Laterally a similar tuft of hairs is found as in *Ch. pustulifera*.

f♂ (St. VI). Size of specimen from Thor St. 183 was 6·7 mm.; anterior division 5·2 mm.; urosome 1·5 mm.

The head is rounded, with fairly slender rostral spine (text-fig. 41 a). The body is more slender than in the female; the articulation between the head and the first thoracic tergite is only indistinct; the lateral spine of the thorax is placed more dorsally, is more slender and apparently starts from the fifth somite. The comparatively slender abdomen is about one third of the anterior division, and has, as seen in text-fig. 41 b, the genital opening on the left side, and has a seam of short, delicate teeth along the posterior margins of somites II—IV. The furcal rami are somewhat wider than long; the St. 2 is somewhat longer than the abdomen. The *antennulae* extend about to the end of the second abdominal somite; the segment 10 is partly fused with 8 ∾ 9, the segment 12 with 13, but the segments 21 and 22 are well separated on both sides; "Æsthetasken" are only wanting in segments 20, 23 and 24; the measurements are very similar to those of the young ones. The exopodite of the *antennae* is only 1·3 as long as the endopodite; the Re I and II are indistinctly separated, and both possess a rudimentary setigerous process, but the antennae are in other respects like the female. The *mandibula* scarcely differs from that of *Ch. Streetsii*. The *maxillulae* possess in Li 1 at least 10 soft-skinned ringed appendages as well as two short setae of usual structure, in Li II, which is fairly long, 3 soft appendages, and in Li III 5 setae of usual structure are found; the basipodite III has 5 setae, the Ri I—II have 7 setae, and the Ri III has 7 as well; the exopodite has 10 long setae and a short delicate inner one, and the Le has 2 short basal ones and 5 long distal ones. The *maxillae* are soft-skinned, but they are better developed than in most other species of this family; the Lob. I—IV are well developed, and possess 2 to 3 setae, and so does Lob. V, but its Sp. is strong and not twisted; the Re has 6 setae. The *maxillipeds* are in main feature like those of *Ch. Streetsii*; their third basipodite is 2·5 as long as Ri and 1·5 as long as the two basal segments.

The *first pair* of legs has the articulation between Re I—II better developed, and the Se Re I is quite rudimentary; the three last natatory legs are scarcely different from those of the young specimens.

The *right fifth foot* has a rather short third basipodite; the right endopodite has some similarity to that of *Ch. Streetsii*, is terminally gutter-shaped on the anterior surface, but has somewhat proximally to its end laterally a rounded incision (text-fig. 41 c); the outline of the endopodite is rather irregular, but no marginal laminae or teeth were observed in proximal half. The right exopodite has the two first segments fused, and is, observed from in front, distinctly convex towards the middle; the third segment is obtusely rounded, is rather elongate and possesses marginally a distinct lamina (text-figs 41 c—d). The third basipodite of the *left foot* is long, almost attaining the middle of Re I ∾ II; the left endopodite (text-fig. 41 e) is unsegmented, and is, as shown in fig., distinctly narrow somewhat beyond the middle.

The first segment of the left exopodite is fairly long and slender, while the second, as shown in text-fig. 41 f, is broad and widened out terminally, where a bifurcate spine is seen; the third segment (Pl. V fig. 7 a) is distinctly widened out towards the end and produced inwards, where the usual tuft of marginal setae is observed; on the posterior surface groups of delicate hairs are found. Inwards at the base of Re III, a partly independent, lobe is observed with groups of fairly long hairs posteriorly.

The outline of the *labrum* is, as seen in fig., very similar to that of the female, but the whole apparatus is soft-skinned without any setae, but adorned with an intricate systeme of chitinous ridges; two labial lobes are present with a longitudinal furrow between.

Parasites. In one specimen twisted structures like those described in *Gaidius tenuispinus* (p. 92) were attached behind both maxillae; in another specimen a similar organ was found behind the one maxilla only, but in that specimen a "sac-shaped parasite?" was found attached to the Li I of the left maxillula.

Occurrence. The Thor Expedition has $^{11}/_{7}$ 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire gathered 3 young females, 11 adult males and 9 young males.

The Monaco Expedition has taken immature females at two stations, and Farran has recorded adult males as well as immature ones from the west coast of Ireland "on four stations from depths of 600 to 1150 fathoms".

Remarks. I am pretty well convinced that the described species is identical with Sars' *Gaidius notacanthus*, in spite of a few differences from the somewhat meagre description, viz: in the antennulae, which are not "presque aussi longues que le corps". The male is probably identical with that described by Farran. The male, which Scott has referred to this species, is 5·9 mm. long and has rounded lateral corners; accordingly it is not the male of *Ch. notacantha*, and it may more naturally be regarded as the male of *Ch. pustulifera*. Sars and Farran as well as the other authors have provisionally referred this species to *Gaidius*, as the adult females are not yet known. Several structural features have, however, convinced me that this species like *Ch. parvispina*, and probably also *Gaidius validus* Farran (1908, p. 32), *G. cryptospinus* G. O. Sars (1905, p. 10), *divaricatus* G. O. Sars (p. 10) and *G. maximus* Wolf. (1906, p. 2), is nearly related to *Undeuchæte spectabilis* G. O. Sars (1900) p. 59 as well as to *Chirudina Streetsii, pustulifera* and *abyssalis*. It differs from *Gaidius tenuispinus* etc. by the three-segmented exopodite of the first pair of legs with well developed Se Re I, by the wanting setae along the inner margin of the second basipodite in the fourth pair of legs in the young specimens of the fifth stage, as well as by the structure of the oral surface of the labrum and the lamina labialis.

All the described males referred to this genus show a marked similarity to *Undeuchæte* in the structure of the fifth pair of legs, and are accordingly different from those of *Gaidius* and *Gaetanus*.

44. **Chirudina parvispina** Farran.

(Pl. V figs 8 a; text-figs 42 a-g and 43 a-h.)

1900? Undeuchæte spectabilis n. sp. G. O. Sars, pp. 59—63, pls XV—XVI.
1908. Gaidius parvispinus n. sp. Farran, pp. 34—35, pl. II figs 4—8.

Description. Y⚥ (St. V). Size of young male from Thor St. 183 was 5·1 mm.; anterior division 4·14 mm.; urosome 0·96 mm. Young female measured 4·42 mm. Farran's specimens measured 4·9 mm.

The rostrum is strong and directed downwards. The head is, in contrast to Farran's fig. 4, well separated from the first thoracic tergite. The fifth somite is well developed and bears a short, downwards directed hooked spine (text-fig. 42). The abdomen differs from that of the preceding species by being less hairy. The *antennulae* extend to the end of the chephalosome; the mouth appendages are scarcely different from those of *Ch. notacantha.* In the structure of the natatory legs scarcely any difference was observed between this and the preceding species. The *third foot* is shown in text-fig. 42 e. The only difference between male and female is found in the presence of a *fifth pair* of legs in the former sex; this pair of legs (text-fig. 42 g) is in most respects like that of the preceding species, but differs by the equal length of the two exopodites as well as in a few minor points.

In the structure of the *labrum* and its surroundings no difference of great interest was observed between this species and the preceding ones (cf. Pl. VI figs 1 a—b).

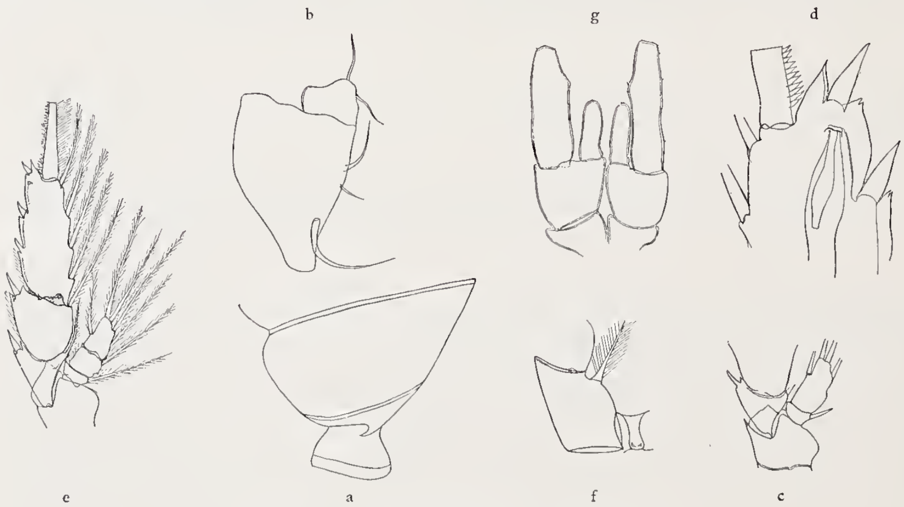


Fig. 42. *Ch. parvispina* Farr. Y♂ (St. V).
a. Left lateral corner × 29. b. Third basipodite of mandibula × 50. c. Pes II × 33. d. Pes II Re III; glandular pore × 57. e. Pes III sin. × 29. f. Second basipodite of pes IV. g. Pes V in ant. view × 33.

Y⚥ **(St. IV).** Size of male from Thor St. 183 was 3·46 mm.; anterior division 2·81 mm.; urosome 0·65 mm.

The body is more slender, and so is the rostrum; the lateral corners are somewhat more robust (text-fig. 43 f). The abdomen consists of three segments as shown in text-fig. 43 f. The mouth appendages show the usual differences. The exopodite of the *first pair* of legs shows no trace of segmentation, but has three well developed Se. The endopodite of the *second pair* of legs is unsegmented, and the two last segments of the exopodite are fused, bearing 3 Se and a single glandular pore at the base of Se 3. The inner margin of the second basipodite of the *fourth pair* of legs is smooth. The only difference between the male and female is found in the *fifth pair* of legs, which, as shown in text-fig. 43 h, is less developed than in the preceding stage.

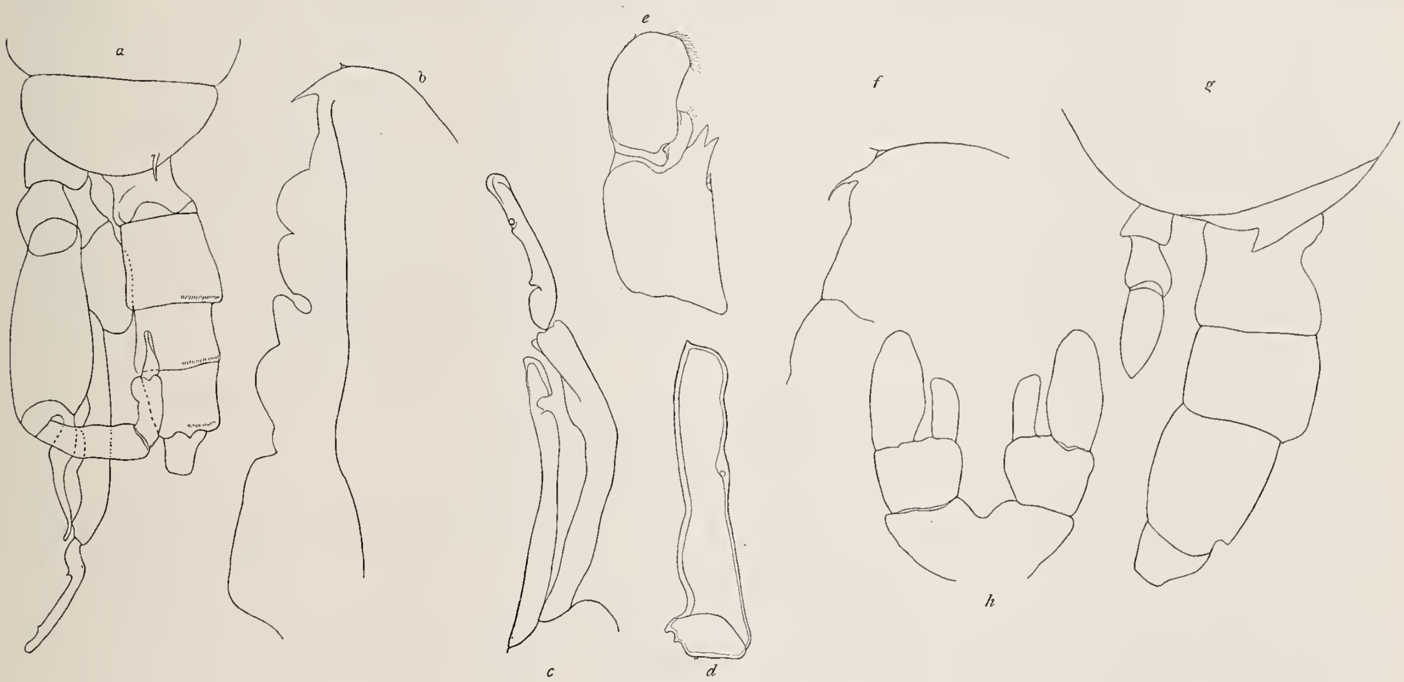
f♂. Size of male from Thor St. 183 was 5·28 mm.; anterior division 4·15 mm.; urosome 1·3 mm.

The rostrum (text-fig. 43 a) is somewhat shorter, and the lateral spines of the end of the thorax, which are placed less dorsally, are more slender and extend a little beyond the hinder margin; the fifth thoracic tergite is not distinctly marked out. The abdomen (text-fig. 43 b) is scarcely different from that of *Ch. notacantha.*

The *antennulae* extend beyond the end of first abdominal somite. The two basal segments of the exopodites are well separated in the *antennae,* and the *maxillae* have the setae of the first lobes somewhat contorted, and the Sp. of the lob. V more swollen at the base, but in other respects the mouth-limbs were like those of the male of *Ch. notacantha.*

The *first pair* of legs has the inner margin of the third basipodite less produced than in the preceding species; the Se of Re I is rather short, but strong, and the Se of Re II, which is fairly strong, extends only a little beyond the middle of Re III; the other natatory legs are scarcely different.

The *fifth pair* of legs is in main features like that of *Ch. notacantha*, but differs in several details. The right endopodite (text-fig. 43 c) has a more regular shape, and has a somewhat different shape terminally; the third segment of the right exopodite (text-fig. 43 c) has, inwards, characteristic incisions and processes. The left endopodite has a more regular shape, and is terminally produced into a short tooth (text-fig. 43 d). The second segment of the exopodite is of more equal breadth throughout, and the third segment is distinctly more slender (text-fig. 43 e); the arrangement of the series of hairs on the posterior surface of Re III shows characteristic features of specific value (fig. 8 a Pl. V).



Text-fig. 43. *Chirudina parvispina* Farr.
a. f♂. Abdomen × 22. b. Head × 22. c. Pes V dext. Ri + Re × c. 50. d. Pes V Ri sin. × 66. e. Pes V sin. Re II—III × 75. f. y♂ (Stage IV). Head × 66. g. Abdomen × 66. h. Pes V × c. 80.

Occurrence. The S/S Thor has gathered this species at two stations viz:

11/7 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 1 f♂, 2 y♂ (V), 2 y♀ (V), 1 y♀ (IV), 1 y♂ (IV).
10/7 1904 St. 180 61°34 L. N. 19°03 L. W. Yt. 1800 M. Wire 1 y♂ (V).

This species has only been recorded by Farran from the west coast of Ireland between 580 and 680 fathoms at 54°53 L. N. 10°42 L. W. in the month of November 1904, and at 54°57 L. N. 10°51 L. W. in the month of February 1905.

Remarks. The specimen (young male) described by Farran is scarcely different from my specimens. The female is perhaps identical with *Und. spectabilis* G. O. Sars (1900, p. 59), which is, however, much bigger (f♀ 8 mm.), but in other respects, except by the shorter Se of Re I pes I, is scarcely different in any features of importance. If, however, Sars' male (6 mm. long) and female really belong to the same species (they were gathered in the same sample at 84° L. N., "the tow-net having been lowered to 130 metres"), *Ch. parvispina* and *spectabilis* are scarcely identical, as Sars' male possessed a rounded lateral corner and a distinctly more elongate third segment in the exopodite of the fifth foot.

Valdiviella Steuer.

1883? Euchæte pars Brady.
1904. Valdiviella n. gen. Steuer.
1905. — Steuer. G. O. Sars.
1908. Valdiviella Steuer. Farran.
1909. — — A. Scott.
1911. — — Wolfenden.

According to G. O. Sars and Wolfenden this genus is nearly related to *Euchæte*; the structure of the maxillulae and the maxillae bear out this opinion. With some right Steuer suggests that it ought to be referred to the *Aetideidae*; the structure of the legs, of the labrum, the labium and the antennulae support this view. On account of the two egg-balls and the distinctly three-segmented basipodite of the maxillulae, I think that the form is a rather primitive one. *V. oligarthra* Steuer, *insignis* Farran and *brevicornis* G. O. Sars, as well as the curious *V. minor* Wolf. are certainly good species A. Scott has referred a young male, probably belonging to this genus, to Brady's *Euc. gigas*; he is certainly wrong; his specimens are from the Malayan Seas and Brady's from the west coast of South-America; the length of the former was 8 mm. and of the latter 5·25 mm. The lateral corner of Brady's specimens had a long lateral spine, that of Scott's species a short triangular one.

45. **Valdiviella insignis** Farran.

(Pl. VI figs 2a—e; text-figs 44a—d).

1908. Valdiviella insignis n. sp. Farran, pp. 45—46, pl. III figs 1—6, pl. IV fig. 5.
1911. Valdiviella insignis Farran. Wolfenden, pp. 247—248, Taf. XXXX figs 6—7.

Description. f♀. Size of specimen from St. 183 was 11·75 mm.; anterior division 8·5 mm.; urosome 3·25 mm. Farran's specimens measured 11·5—12·0 mm.

The anterior division, which has distinctly rounded lateral corners without tuft of hairs, is rather clumsy; the rostrum consists of two short, well separated spines; the first thoracic somite is completely fused with the head, and the fourth with the fifth. The anterior division is 2·5 as long as the abdomen, which has the proportional length as 45, 35, 25, 11, 11. The genital somite is almost symmetrical and only slightly produced below; the vulva is seen laterally as an incision between an anterior and posterior process. The somites III—IV have ventrally a tuft of long hairs; the posterior margins, not only of the III—IV tergites but also of the I∾II, are denticulated. The furcal rami and the setae are scarcely different from Farran's description; the appendicular seta seems to be longer than figured by Wolfenden.

The *antennulae*, which extend a little beyond the end of the thorax, have not the obtuse angle between the proximal and distal portion, which is found in *Euchæte*; the segments 8∾9 and 24∾25 are almost completely fused. The ringed terminal setae are less powerful than those found in *Euchæte*; no proximal setae were found in segments 10, 11 and 20—23; rather short triangularly pointed "Æsthetasken" were observed in segments 5, 9, 12, 14 and 19. The measurements are even in minor details like Farran's description and very characteristic; the segments 8 ∾ 9 are 1·3 as long as segment 7, and again 1·2 as long as 13; the segment 17, which is three times as long as the segment 14, is a little longer than the segment 19, and 1·4 as long as 24 ∾ 25. The basipodite III of the *antennae* has a single well developed seta; the Ri I has 2 fairly long setae, and the Li of Ri II has at least 7 longer and shorter setae. The exopodite is a little longer than the endopodite; its first segment is well developed without any seta, and the second has a short terminal seta. The *mandibulae* have the teeth developed in a curious way, as shown in Farran's fig. 3; the basipodite III possesses proximally a fairly long somewhat curved seta and, medially, a short one; the Ri I has at least one seta, and the Ri II 8 powerful long setae, and more medially, a fairly long slender one. The *maxillulae* have in general shape some similarity to *Euchæte*; in the Le were found only 6 well developed setae, of which the third is the longest in several specimens, and not 7 as figured by Farran (fig. 5), as the proximal was probably wanting; the Li I has only 11 setae, as S 12—14 on the posterior surface are missing; corresponding to Li II—III only a single lobe with 4 setae was found. The Basp. III has 1 seta, the Ri I 2 and the Ri II ∾ III 3 strong setae. Three basal segments are easily recognized in this species; the Basp. I is adorned with Li I, the Basp. II with Li II and Le I, and the Basp. III, which is well articulated, has the two branches. The *maxillae* are like Farran's fig. 4 Pl. III; the first basipodite has the exterior margin distinctly concave in the middle; the Lob. I—IV have posteriorly a distinct spinous area. The proportional length of the segments in the *maxillipeds* is 60, 90, 26; they are scarcely different from those of *V. oligarthra.*

The *pes I* has the Ri I—II completely fused, and the Re I is only indicated by a medial incision and a powerful Se; as shown in fig. 2 a, a glandular canal and pore was present in the exterior margin of the second and third division; the pore in the former was covered by a spine-shaped mass, and both pores were surrounded by numerous hairs. The *pes II* has the distinction between Re I—II indicated by a medial incision and a well developed lateral spine; the articular membrane is anteriorly represented by a faint line, which is not seen posteriorly. The unsegmented Ri has near the tip on the anterior surface a minute pore (text-fig. 44 b). Near the base of Se Re II and Se 3 Re III but not in Re I, wide glandular pores are found, in connection with big sacs with glandular cells, which are placed proximally to the articular membranes between the Re I—II and Re II—III respectively. The *pes III* differs from pes II by the distinct articular line between Ri II—III; a distinct glandular pore is found at the base of Se Re I; the *pes IV* is in main features like pes III, but the Basp. II has comparatively few hairs along the inner margin.

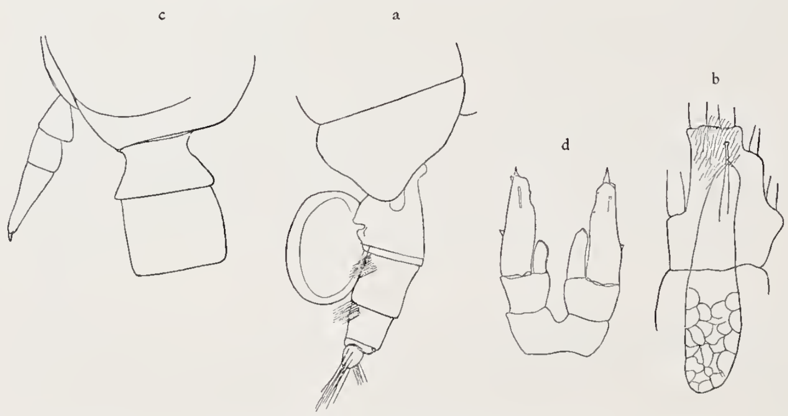
The epistoma is represented by a short protuberance, which is placed somewhat behind the insertion of the antennulae; it is steep in front, and smoothly sloping behind, and appears quite smooth. The *labrum* is rather prominent; on the anterior surface, somewhat in front of the free margin, a transverse row of fairly long stiff hairs (fig. 2 b) is observed; and more laterally, partly covered by this, an oblique row; and along the hinder margin the usual row of numerous somewhat curled hairs (fig. 2 e).

The oral surface of the *labrum* (fig. 2 c) has the group 1 placed laterally, and consisting of numerous short setae or granules; the group 2, which is well separated from this, and consists of comparatively few longer setae, is closely followed by groups 3—4; the group 5 consists of more numerous and comparatively longer setae.

The *lamina labialis* does not show any features of interest (fig. 2 d); the area in front of it is most like that of *Chiridius*; it consists of a lateral, somewhat convex, row of fairly long setae and two median, well separated, groups, as shown in fig. Behind the lamina and between the labial lobes, which were not studied in detail, no setae were observed.

Y♂ (St. V). Size of specimen from St. 183 was 9 mm.; anterior division 6·5 mm.; urosome 2·5 mm.

The shape of the body is in main respects like that of the females, but the lateral corner of the thorax has a small tooth; of the four abdominal somites the second is longer than the third, which is as long as the first. The measurements of the antennulae are somewhat different; the segments 17 and 19, which are of equal length, are 1·24 as long as 24∾25, and 2·5 as long as segment 14. The other appendages do not seem to show differences of any importance; the Re of the maxillulae possess, as usual in this stage, only 10 setae. The *pes V* of the male is somewhat like that of *Euchæte*; the Ri, which is almost twice as long on the right side as on the left side, is distally rounded without any spines; the Re, which are of almost equal length, are continued into a rather strong spine (St), and have on each side one or two Se, as well as 2 or 3 Si. The structure of the pes V is distinctly different from Scott's fig. 26 of the corresponding pair of legs in *V. gigas*, as well as from Brady's fig. 5 of *Euchæte gigas*.



Text-fig. 44. *Valdiviella insignis* Farr.
a. f♀. Abdomen × 8. b. f♀. Pes III Ri III in anterior view with gland × 59. c. Y♂ (St. V). Left lateral corner × 16. d. Y♂ (St. V). Pes V in ant. view × 18.

Y (St. III). Specimen from Thor St. 183: 5·58 mm.; anterior division 4·5; urosome 1·08.

The rostrum and the frontal parts are like those of the adult females; the lateral corners are neither produced nor pointed; the first as well as the fifth thoracic tergites are well marked out. The abdomen consists of two somites, of which the terminal one is almost twice as long as the basal one.

The *antennulae* extend almost to the end of the abdomen; the "Æsthetasken" are as in the adults, but the Spr. was only observed in segment 19. The measurements are distinctly different, as the distal segments are comparatively longer; the segment 19 is 1·3 as long as 17, and scarcely 1·1 as long as 24∾25, which is 1·2 as long as 17. The mouth appendages, except the *maxillulae*, are practically like those of the adult; the Le had in the single specimen examined a single proximal long seta and 3 very delicate hairs distally; the Li I has only 10 setae, and the Re as usually 8.

The *pes I* differs distinctly from that of the adult by the more slender form especially of Ri; both branches are undivided; the 3 Se are well developed, and a glandular pore is found in the third division. The *pes II* has both branches unsegmented; the Re I—III has 6 Si and 4 Se; only at the base of Se 3 Re III is a glandular pore found. The *pes IV* is comparatively more slender than pes II; the Re I∾III have 3 Si and 3 Se, and a single glandular pore; the Ri I∾III have 6 setae altogether. In lateral view the labrum and labial appendages are scarcely different from those of the adult.

Occurrence etc. The S/S Thor has twice gathered a few specimens of this interesting species, viz:

$^{11}/_{7}$ 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 3 f♀ (one with 2, the others with single egg-sac), 2 y♂ (V), 1 y (III).

$^{10}/_{7}$ 1904 St. 180 61°34 L. N. 19°05 L. W. Yt. 1800 M. Wire 4 f♀ (one with 2 egg-sacs), 1 y♂ (V).

On the west coast of Ireland "three specimens of this species were taken at depths of 700, 730 and 1150 fathoms. By Wolfenden it has been recorded at about 20° L. S. and 20° L. W. On account of the longer antennulae and well developed Se Re I pes II I think with Farran, in contrast to Wolfenden, that this species is well distinguished from *V. oligarthra* Steuer from the South Atlantic.

Euchætidae.

Euchæte Philippi 1843.

A. Scott has established a new genus (1911 p. 64) *Pareuchæte* with *E. norvegica* as a type in contrast to the true *Euchæte* with *E. marina* as type species; the latter is characterized by the fifth pair of the legs in the male, which has the Re III of the left foot elongated and pointed, and in the females "two of the six apical spines on the first maxilliped, in addition to being furnished with rows of very short spinules have also a number of moderately long and conspicuous spinules". The latter characteristic is very interesting, but probably not important enough for the establishment of a new genus, especially as a single apical seta of the mentioned structure was found in *E. hebes*, in which pes V of the male is of the *E. norvegica* type; in *E. acuta* only a single seta of this structure was found.

In spite of specific variations the structure of the epistoma, and the anterior and posterior surface of the labrum show, as seen by comparing the figures on Pl. VI and the descriptions, common features; the arrangement of the hairs in front of the lamina labialis is fairly characteristic.

The arrangement of the glandular pores in the legs does not show specific difference of great value. In the outer margin of Re III pes I, somewhat beyond the middle, a glandular pore was found, alike, but less distinctly developed than the corresponding pore in *Valdiviella insignis* Farr. (Pl. VI fig. 2 a). In the second pair of legs a pore is found at the base of Se Re II and Se 3 Re III as well as one minute one near the tip of Ri III; in the third and fourth pair, in addition to these, a pore is found at the base of Se Re I.

In this genus the adult females show the most characteristic systematic features, especially in the structure of the genital somite; it must be remembered, however, that the usual inspection of the genital area from the side and from below is not quite satisfactory for a full estimation of the characters. A full dissection is often necessary to understand the complicated structures of the vulva; unfortunately, I have not had the opportunity of doing so at the present. The characters found in the number of setae in the maxillulae, as well as in the relative length of the spines in the exopodite of the second pair of legs are of value, but often show some variations. To refer the copepodites as well as the adult males to the right species is often impossible.

As a good deal of confusion exists as regards the determination of several species, I think the following synoptic key of the adult females may be useful.

1. One of the apical setae of the maxillae with numerous short spinules and a few long ones. Lateral corner rounded.
2. The genital somite on the left side with a conical process. 4 mm. *E. acuta.*
2. The genital somite on the left side dorsally a hairy process. On the right side of the vulva a laminous process. 3·5 mm. *E. hebes.*
1. All the apical setae of the maxillae of the usual structure.
3. Si of the furca distinctly shorter and thinner than St. 2. Lateral corner rounded. The posterior process of the vulva longer than the anterior. 10 mm. *E. glacialis.*
3. Si of the furca distinctly longer than St. 2.
4. Lateral corner pointed.
5. Lateral corner triangularly pointed without tuft of hairs 6·6 mm. *E. tonsa.*
5. Lateral corner with a well defined pointed process; distinct tuft of hairs. On each side of vulva a median process. 8·8 mm. *E. norvegica.*
4. Lateral corner rounded.
6. 3 distinct processes on each side of the rather low genital protuberance. 5·6 mm. *E. bisinuata.*
6. Without 3 distinct processes on the same level.
7. Genital protuberance very deep, almost squarely truncate with a small median process on each side of the vulva. 6·7 mm. *E. gracilis.*
7. Genital protuberance not very deep. On each side of the vulva in front of the posterior edge a laminous process.
8. Dorsally and behind on the protuberance small process. Le maxillulae with 9 setae. Se Re I pes I long and slender. 8·9 mm. *E. Hansenu.*
8. No such process observed.
9. On the left side of the genital somite a conical process found
10. The Se 2 Re III pes II does not extend to end of segment 11 mm. *E. Farrani.*
10. The Se 2 Re III pes II extends beyond end of segment 8 mm. *E. barbata.*
9. On the left side of the genital somite no conical process found. Se Re I pes I small or wanting.
11. The genital protuberance is prominent with short anterior frange. 8·2 mm. *E. Brady.*
11. The genital protuberance not very prominent
12. Shape of body clumsy. 6 mm. *E. Scotti.*
12. Shape of body rather slender. 9·5 mm. *E. Sarsi.*

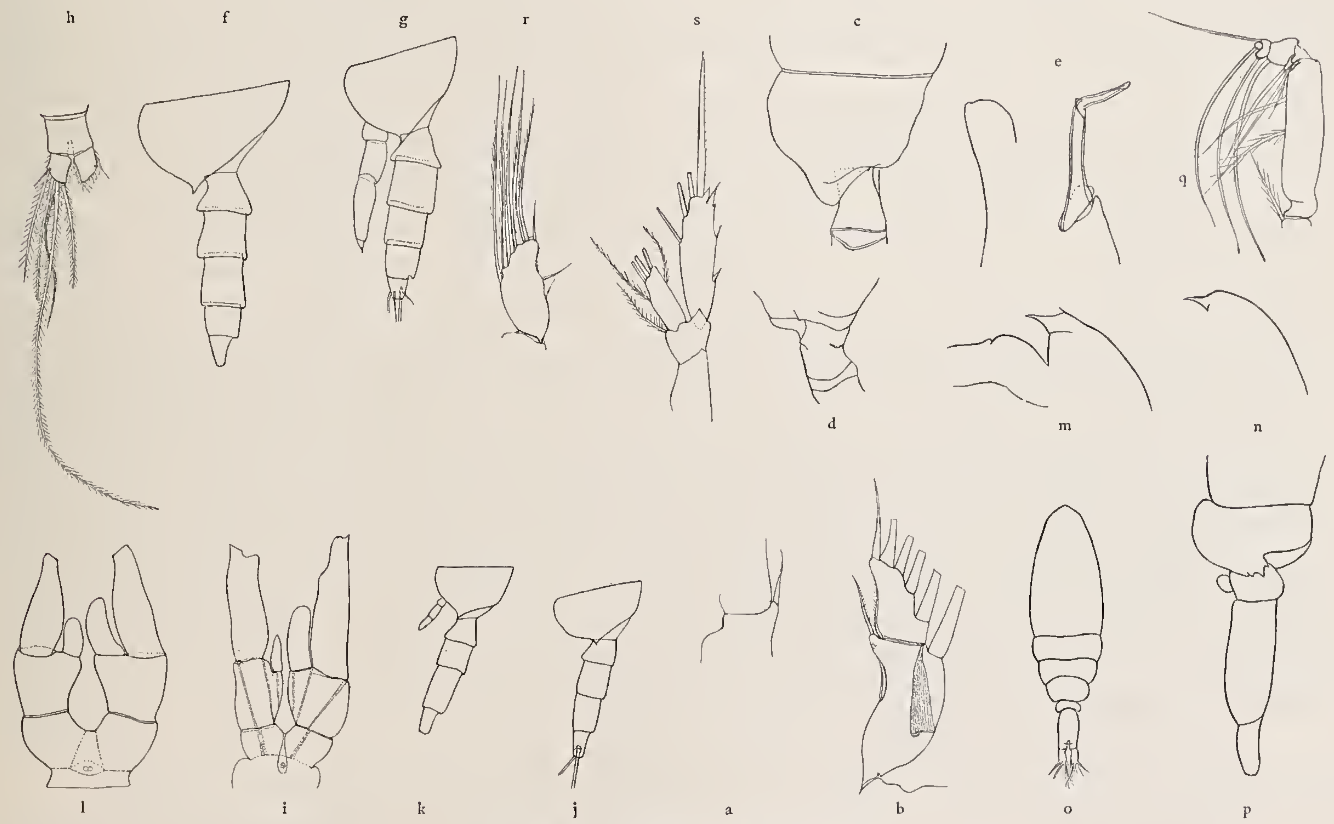
46. **Euchæte norvegica** Boeck.

(Pl. VI figs 3 a—f; text-figs 45 a—s.)

1864? Euchæte pestandreae Philippi. Boeck, p. 12.
1872. — norvegica n. sp. Boeck, p. 40.
1873. — carinata n. sp. Möbius, p. 271, tab. VII.
1885 pars. Euchæte norvegica Boeck. G. O. Sars, p. 234, t. 19.
1892. — — — Giesbrecht, p. 246, taf. 15, 16 and 37.

1898 pars. Euchæte norvegica Boeck. Giesbrecht & Schmeil, p. 40.
1898. — — — Aurivillius, pp. 89—90.
1899. — — — Th Scott, pp. 248—249.
1900 pars. — — — G. O. Sars, p. 58. pl. XIV.
1902? — — — Mràzek, p. 515.
1903. — — — G. O. Sars, pp. 38—39, pl. XIV—XVI.
1903. — — — Norman, p. 137.
1903. — — — Jensen, Johansen, Levinsen, p. 86, tabel II.
1904. Euchæte norvegica Boeck. Wolfenden, p. 133.
1905. — — — G. O. Sars, p. 5.
1905. — — — Farran, p. 35.
1907. — — — Damas & Koefoed, p. 396, 407.
1906 pars. — — — Pearson, p. 16.
1908. — — — v. Bremen, p. 52—53 fig. 59.
1908. — — — Farran, p. 40.
1911. — — — Farran, pp. 95—96.
1913. — — — Stephensen, p. 320.

Description. f♀. Size: One of the largest specimens (Thor St. 183) anterior division (2·76 + 3·68); posterior division 2·42; total length 8·86 mm. Sars' females measured 8 mm. and Giesbrecht's 8·5.



Text-fig. 45. *Euchæte norvegica* Boeck.

a. f♀. Pes I in anterior view × 57. b. In posterior view × 57. c. f♂. Lateral corner of the thorax from the left × 18. d. From the right × 18. e. Pes V Ri sin. in internal view. f—g. Y♀ and y♂ (Stage V). Abdomen × 12. h. Y♂ (St. V). Furca × 18. i. Pes V × 28. j—k. Y♀—♂ (St. IV). Abdomen × 16. l. Y♂ (St. IV). Pes V × 65. m. Y (St. III). Rostrum × 59. n. Y (St. II). Rostrum × 59. o. Y (St. II). Animal in dorsal view × 18. p. Y (St. II). Abdomen in lateral view × 59. q. Y (St. II). Maxillipes sin. in posterior view × 59. r. Y (St. II). Pes I sin. in post. view × 57. s. Y (St. II). Pes III sin. in post. view × 57.

The last thoracic somite has laterally a minute tooth as figured by Sars; in one specimen it was wanting on the right side. The genital somite has in front of the prominent ventral protuberance, which possesses a small tooth on each side of the vulva, a characteristic small tubercle.

The *first pair* of legs (text-figs 45 a—b) has the articular line between Re I and II rather complete posteriorly; anteriorly it is wanting, except inwards, where a chitinous line is observed, to which a muscle is attached. The glandular pores are rather indistinct; in the *pes II* they were only observed at the base of Se Re II and Se 3 Re III and terminally in the middle of Ri; in the two following pairs pores, even if indistinct, were observed besides at base of Se Re I.

Between the insertion of the antennae, (Pl. VI figs 3 a—c.) an *epistoma*, directed forwards and terminally covered with long, stiff bristles is found; between this and the well developed labrum, which is gradually sloping anteriorly, a rather shallow portion is found; anteriorly the *labrum* is marked off by a chitinous transverse convex list, where the longitudinal muscles are fastened, which move the marginal fringe of setae. The labrum bears in the middle two rather irregular rows of more or less slender bristles. The marginal fringe consists in the middle on the well developed lobes of a right and left group of fairly long hairs; more laterally a group of shorter hairs is found; orally an indistinct transverse row is found (cf. Pl. VI fig. 3 a). The chitinous framework which supports the oral surface of the labrum is in the main like, but less developed than, that of *Euchirella messinensis* (cf. Pl. IV fig. 2 a). In addition to the usual four central spots, 6 spots are present on each side. Just behind the spots Nr. 4 a transverse group of short spines is found. The first lateral group of the longitudinal series of delicate hairs is placed transversely, and fairly well separated from the more longitudinally placed group 2; this again is well separated from the more or less fused groups 3—5, as seen in fig. 3 a.

The *lamina labialis* (fig. 3 b) is divided into a median and, on each side, two lateral serrations, which are connected with a chitinous skeleton. The area in front has, as shown in fig. 3 b, a rather complicated structure; on each side, in the middle, a granular area converging in front, is found, and more laterally several slightly convex longitudinal series of delicate hairs as well as a square spinous area just in front of the serrula 6-dentata; the latter is, as seen in fig. 3 b, placed on a well developed chitinous system. Behind and between the branches of the lamina labialis about 5 oblique rows of delicate hairs are found on each side. Möbius has given a fairly good description of the oral surface of the labrum and the lamina labialis. The *labial lobes* (fig. 3 c), which are well developed and rather prominent, possess about 5 somewhat irregular longitudinal series of comparatively short hairs, which, posteriorly, are fused into fairly big median groups. The region behind the area labialis proper does not possess any group of delicate hairs, but somewhat medially to the articular cavities of the maxillae is found a group of 15—20 long, stiff setae, directed inwards and almost attaining the middle; in the middle, more posteriorly, a group of 10 shorter setae, directed forwards, is found.

f♂. Size: In one of the largest specimens (Thor St. 183) the total length was 6·34; anterior division (2·53 + 1·95) 4·48; urosome 1·86 mm. Sars' males measured 7 mm. and Giesbrecht's 5·45.

The lateral corner of the fifth thoracic somite (text-figs 45 c—d) is distinctly more produced on the left side than on the right; dorsally, a small marginal tooth is found, more developed on the left side. The first abdominal somite has the genital pore on the left side, and is somewhat produced on the right side; on the same side laterally and dorsally near the base of the somite a triangular tooth is found. The segments 12—13 of the *antennulae* are well separated on the left side, but have on the right side the articular membrane indistinct, posteriorly. The measurements are practically like those in the adult females. The Ri of the *antennae* has on the interior lobe 5 plumous setae, even longer than in the female, in addition to two short ones. The *mandibulae* possess, in contrast to Sars' and Giesbrecht's description, a well developed, but soft-skinned, manducatory part with 4 short marginal teeth (Pl. VI fig. 3 e). The *maxillulae* are better developed than described by Sars and Giesbrecht, though they are probably without value for mastigation. The Le has 5 strong setae; the Li 1 possesses at least three delicate bristles, the Li 2 a single short one and the Li 3 a single somewhat longer; the Basp. 2 has 4, and the Ri at least 5 setae. The Re has 10 + 1 setae. The *maxillae* are quite rudimentary soft-skinned, somewhat twisted organs possessing the usual number of lobes, which bear soft appendages, on the distal lobes most like setae. The *maxillipeds* are less powerful than those of the female, the Li I of the basipodite 1 ∾ 2 has one hair, Li 2 one short hair, Li 3 two hairs and Li 4 a single hair in addition to a hooked organ surrounded by fine hairs like that of *E. bisinuata* Farran (Pl. VI fig. 11 c).

The *second pair* of legs differs distinctly from that of the female by the short Se Re II, which only reaches the end of the segment, far removed from the base of Se 1 Re III.

The Re II—III sin. of the *fifth pair* of legs (Pl. VI fig. 3 d) are in the main like Giesbrecht's fig. 24 (Taf. 16), differing from Sars' by two not one, rows of serrations, between which the segment is distinctly more hollowed than in the two following species. The left endopodite consists of two segments (text-fig. 45 e).

The epistoma and labrum are in lateral outline seen to be distinctly lower than those of the females; by further examination (Pl. VI fig. 3 e) it was found to be poorly developed, without labial lamina and distinct labial lobes; the complicated system of hairs found in the females seems to be completely wanting.

Y⚥ **(St. V).** Size of specimen from Thor St. 183: the total length 5·57 mm.; anterior division (2·46 + 1·79) 4·25; urosome 1·42.

The shape of the anterior portion differs from that of the f♀ by triangularly pointed lateral corners (text-figs 45 f—g). The abdominal somites show the usual differences; in constrast to the f♀, the Si of the furca is distinctly shorter than the St. 2 (text-fig. 45 h). The *antennulae* are comparatively shorter, but the arrangement of the appendages is completely like that of the f♀; the measurements are, however, slightly different; the segments 24 ∾ 25 are at least as long as the segment 19, not 1·2 shorter, as the segment 23 is 1·1 as long as, not 1·1 as short as, the segment 16. The Re of the *maxillulae* possess only 10 setae. The Re I—II of the first pair of legs are completely fused without trace of segmentation.

The male of this stage is easily distinguished from the female by the presence of a fairly well developed two-branched fifth pair of legs (text-figs 45 g and i).

Y⚥ **(St. IV).** Size of a big specimen from St. 183 was 3·6 mm.; anterior division (1·7 + 1·0) = 2·7; urosome 0·90 mm.

This stage differs from the preceding one by the urosome, which consists of three somites only (text-figs 45 j—k), of which the last is the longest, the first the shortest; the subapical seta is, as in the preceding stage, shorter than St. 2. The *antennulae* have the appendages like the adult females, and the measurements show corresponding differences; the segments 24 ∾ 25, f. inst., are distinctly 1·2 as long as the segment 19. The Re of the *maxillulae* possess only 9 setae, as usual in this stage. The exopodite of the first pair of legs is alone unsegmented, as not only Re I—II are fused but also Re II—III. The Re II—III of pes II—III are fused with 3 Se, of which Se 1 Re II ∾ III pes II is comparatively long, probably corresponding to Se Re II. The Ri II—III are fused in pes III—IV.

The male of this stage differs from the female by the fairly well developed fifth pair of legs (text-fig. 45 l).

St. III. Size of specimen from Ingolf St. 19 was 2·65 mm. long; anterior division (1·26 + 0·63) = 1·89; urosome 0·76 mm.

The rostrum is less prominent (text-fig. 45 m), and the lateral corners are regularly rounded; the abdomen consists of two somites only; the subapical seta is, as in f♀, much longer than St. 2. The *antennulae* extend almost to the end of the furca; the usual long setae, which are more powerful in the segment 7, are found, but the number of the short setae is much smaller, as the fused segments (4 ∾ 5) (2 ∾ 3) have only a single seta, as the segment 6—10 do not posses any, and as Spr. is only found in segment 19. No "Æsthetasken" were found in segment 12, but, as usual, in segments 5, 9, 14 and 18. The measurements are distinctly different as the segments 19—24 are comparatively longer than in the preceding stages; the segments 24 ∾ 25 are 1·3 as long as segment 19. The mouth appendages are in the main like those of the adult females, but the number of the setae is as a whole a little smaller, f. inst., the Re of the maxillulae has only 8 setae. The two first pairs of legs are scarcely different from stage IV; the pes III has in Re II ∾ III only 2 Se and 4 Si, and the Ri is undivided; the pes IV has Re I—III fused with a basal Se well separated from two distal ones.

St. II. Size of specimen from Ingolf St. 19 was 1·79 mm. long; anterior division (0·92 + 0·41) = 1·33; urosome 0·46.

The lateral corner of the anterior division is not regularly rounded, and the rudimentary fourth pair of legs is found as a wing-like expansion (text-figs 45 n—p). The subapical seta (Si) is thicker and longer than the St. The *antennulae,* which almost extend to the end of the urosome, have several of the proximal segments (1—18) more or less fused. A long distal seta is found in segments 3 ∾ 4, 6 ∾ 7, 14 and 18. No "Æsthetasken" were found. Beyond the segment 18 the segments become suddenly longer; the 19 is almost twice as long as the 18; the segments 19—23 are of almost equal length; the segments 24 ∾ 25 are 1·3 as long as 19. The mouth appendages show similar differences as in the preceding stages; the *maxillulae* have only 7 setae in Re; the *maxillae* are less powerfully developed, as seen in fig. 3 f. The *maxillipeds* have only 2 setae in the middle of basipodite 3, as the median one is wanting. The Ri possesses only 5 setae.

The *pes I* is comparatively more clumsy; 3 Se are present, as in the preceding stages. The *pes II* has the Re I indicated with well developed Se; in addition, 2 Se and 4 Si were found. The *pes III* is like the *pes IV* of the preceding stage, with 3 Se and 3 Si (text-figs 45 r—s).

Occurrence. Davis Strait. The Danish Ingolf Expedition has in the southern part of the Davis Strait as far north as 65° L. N. from 25/6—28/7 1895 taken 9 samples containing *Euch. norvegica;* in the following 5 a fairly big number was found. In the table (p. 163) a few stations south and south east of Greenland are dealt with.

As the species was found neither in any surface sample nor more north than 65°, there is reason to suppose that the form does not belong to the fauna of the surface, but belongs to the northern prolongation of the Atlantic fauna. Propagation has been found to take place at the mentioned season in this region.

1895.	Ingolf	L. N.	L. W.	Depth in fathoms and net.	Temp. at surface.	VI		V		IV		III	II	I	Number of specimens examined.
						♂	♀	♂	♀	♂	♀				
1/7	St. 28	65°17	55°42	V.I 100—0	1·15° C.	..	10[1]	10	16	1	..	..	..	..	..
—	St. 27	64°54	55°10	V.I 200—0	3·9° C.	..	4[1]	4	7	2	3	1	..	..	..
25/6	St. 25	63°30	54°25	V.I 200—0	2·9° C.	2 %	24 %[1]	5 %	7 %	14 %	15 %	30 %	3 %	..	115
25/6	St. 24	63°06	56°00	V.I 200—0	4·2° C.	7 %	34 %[1]	20 %	30 %	5 %	3 %	1 %	..	..	163
28/7	St. 36	61°50	56°21	Trawl.	..	..	1[1]	..	..	..	..	..	..	..	..
—	—	..	..	V.I 100—0	8·5° C.	..	..	34 %	31 %	15 %	15 %	5 %	..	..	120
30/7	St. 38	59°12	51°05	V.I 100—0	10° C.	..	..	11	8	5	2	6	..	..	..
22/6	St. 22	58°10	48°25	V.I 200—0	5·35° C.	..	..	4	3	3	1	1	..	..	..
20/6	St. 20	58°20	40°48	V.I 200—0	6·1° C.	..	6	10	18	6	6	19	1	..	..
18/6	St. 19	60°29	34°14	V.I 300—0	9° C.	..	8 %[1]	20 %	33 %	20 %	9 %	9 %	1 %	..	151
17/6	St. 18	61°44	30°29	V.I 200—0	10° C.	5 %	24 %	22 %	26 %	9 %	9 %	5 %	..	..	163

[1] Means that spermatophores were found attached to the genital somite of the females or to pes V of the males.
[2] — egg-sacs — — — —

Denmark Strait. The Ingolf Expedition has in Denmark Strait ($^{20-28}/_6$ 96) taken 5 samples containing *E. norv.*, but only few specimens (stage V most numerous; a single f♂ was found); in 1895 a single sample (St. 11) with a fairly big number of specimens was found. The S/S Thor has at four stations from $^{18-20}/_6$ 1904 taken numerous specimens with the young-fish trawl, among which were several adult males with spermatophores attached to the fifth pair of legs, as well as females with eggs and spermatophores. The table shows the relation between the different stages.

		L. N.	L. W.	Depth and net.	Temp. at surface	VI		V		IV		III	II	I	Number of specimens examined.
						♂	♀	♂	♀	♂	♀				
Ingolf 21/5 95	St. 11	64°34	31°12	V.I 200—0 fm.	8·2° C.	..	33[1]	1	27	5	6	..	..	..	..
Thor 18/6 04	St. 150	65°50	26°53	Yt. 400 M.Wire	..	..	12[1]	5	15	11	3	..	..	..	..
18/6 04	St. 152	65°00	28°10	Yt. 800 M.Wire	..	20 %[1]	16 %[1,2]	7·5 %	7 %	22·5 %	27 %	..	..	..	365
19/6 04	—	..	..	Yt. 1000 M.Wire	..	15[1]	22[1,2]	1	..	2	5	..	..	..	..
20/6 04	St. 153	65°27	27°12	Yt. 800 M.Wire	..	24[1]	21[1,2]	..	..	25	25	..	..	..	..
21/6 04	St. 154	65°27	27°10	Yt. 800 M.Wire	..	..	27 %[1,2]	4 %	5 %	36 %	27 %	1 %	..	..	110

South of Iceland. South-west of Iceland the Ingolf has taken a few, mostly young, specimens in 5 samples; a single sample from the deep sea contained an adult female with spermatophore, in the others from surface-hauls copepodites of stages V—IV, were found, but no adult.

In the Atlantic, south of Iceland, the Ingolf Expedition has ($^{3-6}/_6$ 96 and $^9/_8$ 95) taken 4 surface samples with a few young specimens of stages IV—V; and in addition to these 7 samples from lower layers, of which 5 contained adult specimens. The S/S Thor has in this region taken 11 samples ($^{24}/_5$ 1904, $^2/_7$—$^{14}/_7$ 1903—04 and $^1/_9$ 1904), which all contained adult specimens.

		L. N.	L. W.	net.	Temp. at surface.	VI		V		IV		III	II	I	Number of specimens examined.
						♂	♀	♂	♀	♂	♀				
Ingolf 3/6 96	St. 68	62°06	22°30	V.[1] 100—0 fm.	8·8° C.	1	9^{1}	15	36	2	1	1	..	..	..
3/6 96	St. 69	62°40	22°17	V.[1] 100—0 fm.	7·3° C.	..	$5\%^{1}$	12 %	75 %	5 %	3 %	..	..	..	100
1/6 96	St. 63	62°40	19°05	V.[1] 100—0 fm.	8·3° C.	1 %	$4\%^{1}$	22 %	63 %	6 %	4 %	..	..	..	174
9/8 95	St. 40	62°00	21°36	V.[1] 100—0 fm.	13·5° C.	..	25^{1}	5	4	..	..	..	..	..	..
13/5 96	St. 49	62°07	15°08	V.[1] 100—0 fm.	9·3° C.	..	..	1	20	2	1	1	..	..	..
12/5 96	St. 47	61°42	13°14	V.[1] 100—0 fm.	10·6° C.	4	21^{1}	2	8	1	..	..	..	..	..
Thor 9/7 04	St. 178	63°11	21°30	Yt. 780 M. Wire	..	6 %	33 %	20 %	23 %	12 %	6 %	..	..	..	163
10/7 04	St. 180	61°34	19°03	Yt. 400 M. Wire	..	1	20^{1}	22	10	16	12	..	..	..	..
—	—	..	..	Yt. 1800 M. Wire	..	..	1	1	..	..	..	..	..	..	..
1/9 04	St. 285	62°49	18°46	Yt. 500 M. Wire	..	1 %	$35\%^{1}$	21 %	11 %	17 %	15 %	..	..	..	170
11/7 04	St. 183	61°30	17°08	Yt. 1800 M. Wire	..	$10\%^{1}$	$19\%^{1\cdot2}$	32 %	24 %	8 %	7 %	..	..	..	1235
24/5 04	St. 104	62°47	15°03	Yt. 1500 M. Wire	..	$51\%^{1}$	$39\%^{1\cdot2}$	1·5 %	1·5 %	2 %	5 %	..	..	..	217

The presence of adult males and the presence of females with spermatophores and egg-sacs certainly indicate that propagation takes place or has taken place; at St. 183, where among 230 f♀ 60 had spermatophores and had 3 egg-balls, but especially at St. 104, where 30 of 110 f♂ had spermatophores attached to the fifth pair of legs, and 50 of 85 f♀ wore spermatophores and 15 wore egg-balls, a great number of specimens certainly are active in propagating the species.

Iceland-Færoe Channel. The Ingolf Expedition has not found any adult specimens in two samples taken near the surface from the Iceland-Færoe channel, but in those (four) from the deeper

		L. N.	L. W.	Depth and net.	Temp. at surface.	VI		V		IV		III	II	I	Number of specimens examined.
						♂	♀	♂	♀	♂	♀				
Ingolf 15/5 96	St. 52	63°57	13°32	V.[1] 200—0 fm.	8·3° C.	..	4^{1}	1	7	3	11	..	..	..	..
20/5 96	St. 57	63°37	13°02	V. 100—0 fm.	8·2° C.	..	4	1	35	3	14	4	2	..	..
11/5 96	—	61°32	10°47	Cyl. 14	..	..	..	1	11	7	6	..	..	..	..
11/5 96	St. 45	61°31	9°43	V.[2] 100—0 fm.	9·1° C.	$9\%^{1}$	$12\%^{1}$	5 %	46 %	8 %	6 %	11 %	3 %	..	100
Thor 23/5 04	St. 102	61°41	13°31	Yt. 15 M. Wire	..	..	2^{1}	3	17	3	6	..	..	..	..
28/8 05	St. 163	62°36	12°05	Yt. 300 M. Wire	..	1	24	19	6	4	2	..	..	..	..
22/5 04	St. 99	61°15	9°35	Trawl. 900 M.	..	28	22^{1-2}	1	..	..	..	..	..	..	..
—	—	..	..	Yt. 1000 M. Wire	..	$12\%^{1}$	$55\%^{1}$	2 %	11 %	5 %	12 %	3 %	..	..	100
—	—	..	..	Yt. 1700 M. Wire	..	9	37^{1-2}	1	7	1	8	..	..	..	..
5/5 04	St. 63	64°05	9°38	—	..	5^{1}	36^{1-2}	6	..	1	1	..	..	..	..
12/5 04	St. 78	61°08	9°20	—	..	15	13^{1}	..	..	..	..	..	..	..	..
9/5 04	St. 70	63°33	6°20	Yt. 100 M. Wire	..	..	$96\%^{1-2}$	1·5 %	2°·5 %	..	..	..	..	..	156
33/7 05	St. 124	61°04	4°33	Yt. 1000 M. Wire	..	1	11^{2}	..	2	..	..	..	..	..	..

layers had always found adult females. The S/S Thor has taken samples at 15 stations; adult specimens were found at all except two. Adult males have been found from the month of May till August.

North of Iceland. North and north-east of Iceland the Ingolf Expedition has at 4 stations taken a few young specimens, and at one adult females. The S/S Thor has at a single station taken a fairly large number of adult specimens.

Ingolf 2/8 96	St. 128 66°50 L. N. 20°02 L. W. Trawl.		1 ♂ (V), 1 ♀ (V).
10/7 96	St. 102 66°23 L. N. 10°26 L. W. V.² 100—0 fm.	Temp. at surface 0·3° C.	2 f♀, 1 (III).
23/7 96	St. 117 69°13 L. N. 8°13 L. W. V.² 100—0 fm.	— 4·1° C.	1 (III), 2 (II).
24/7 96 12.30 a. m.	St. 118 68°27 L. N. 8°20 L. W. Closing net 1030 fm.	—	1 ♀ (V), 1 ♀ (IV).
Thor 22/7 04	St. 214 67°19 L. N. 17°55 L. W. Yt. 800 M. Wire		11 f♂, 35 ♀ (eggs sperm.), 2 ♀ (V), 2 ♂ (IV).

South of the Færoes. The S/S Thor has in the Atlantic, south-west of the Færoes, at six stations taken adult males and females; in the samples enumerated below the number of specimens was fairly big; at 5 of 6 stations south-east of the Færoes adult females were found.

1905	Thor.	L. N.	L. W.	Depth and net.	VI		V		IV		III	II	I	Number of specimens examined.
					♂	♀	♂	♀	♂	♀				
31/8	St. 167	57°46	9°55 W.	Yt. 300 M. Wire	1	10	3	3	..	2	..	..	..	..
—	—	..	..	Yt. 1500 M. Wire	12	$\overset{1-2}{46}$	14	7	5	5	..	..	..	.
8/6	St. 72	57°52	9°53 W.	Yt. 1500 M. Wire	$\overset{1}{43}$ %	$\overset{1-2}{32}$ %	8 %	11 %	2·5 %	2·5 %	1 %	..	..	311
20/6	St. 88	48°09	8°30 W.	Yt. 300 M. Wire	$\overset{1}{38}$	$\overset{1}{36}$	20	9	..	..	..	..	..	..
21/6	St. 90	47°33	7°40 W.	Yt. 300 M. Wire	10	$\overset{1}{18}$	5	4	..	1	..	..	..	..
—	—	—	—	Yt. 500 M. Wire	..	$\overset{1}{1}$	..	..	1	..	..	..	..	..
6/9	St. 172	57°33	4°26 E.	Yt. 300 M. Wire	35	$\overset{1-2}{30}$	5	7	5	5	4	..	..	..
6/9	St. 173	57°52	8°01 E.	Yt. 800 and 300 M. Wire	$\overset{1}{3}$	7	1	8	1	..	..	..	..	..

East-Greenland Expedit. That scarcely any specimens were taken in the numerous surface hauls during the crossing of the Danish East-Greenland Expedition 1900 (June—September), in the Norwegian Sea, in the ocean east of Greenland, in Denmark Strait and the Atlantic south of Iceland, seems to indicate that the species is extremely scarce at the surface.

In vertical samples from near the coast of Greenland a few specimens were found. As so few specimens have been taken, I think a full account of the stations may be useful.

25/6 1900	Jan Mayen.		Closing net	60—50 fathoms	1 y (III).
4/7 3 p. m.	73°32 N.	3°30 W.	Vertical.	300—0 m.	1 f♀.
8/7 2 p. m.	74°28 N.	15°36 W.	—	400—0 m.	1 f♂, 5 f♀, 1 ♂ (V), 1 ♀ (V).
10/7 6 a. m.	74°28 N.	15°36 W.	—	100—0 m.	1 ♂ (V), 1 ♀ (V).
— —	—	—	Closing net	110—40 fath.	1 ♂ (IV).

3/9	12 p. m.	68°22 N. 17°15 W.	F. 300	1 ♀ (V).
18/9	12 p. m.	Kap Dan	F. 347	1 ♂ (V).
24/9	10 p. m.	61°06 N. 16°26 W.	F. 391	1 ♂ (V); 1 ♂ (IV).
	12 p. m.		F. 392	1 ♀ (IV).

Distribution. *Euchæte norvegica* is recorded from the Atlantic at least as far south as 51° L. N. from the west coast of Greenland at little Karajak-Fjord (Vanhöffen), and north of Iceland (Paulsen). It has been found abundantly in the Færoe channels, and in the Norwegian Sea, but only in the northern part of the North Sea. It is, according to Sars, frequent in deeper layers along the whole coast of Norway, and so it is in the Skager Rak. It is recorded as common in the Barents Sea. The most common species of *Euchæte* found in the Polar basin crossed by Nansen was *E. glacialis*, not *norvegica* as originally proposed by Sars, but the latter species was nevertheless (Sars 1903 p. 39) found occasionally in two different places. As Mràzek says that his specimens attain a length of about 10 mm., he has probably confounded the two species.

Euchæte norvegica has been taken by the Duc d'Orléans (from 7/7—1/8 1905) at most stations between c. 10° Long. East and the east coast of Greenland as far north as 80° Lat. North, but was never common. The species was never common between c. 300—100 meters, where adult females with ovisacs or spermatophores and males (sometimes with spermatophores attached to pes V) were often found; between 0—100 met. mature specimens were never found, but now and then a few young ones (1907 p. 407). Wolfenden has found the same to be the case in the Atlantic and writes (p. 133) "Young and undeveloped specimens are not uncommon near the surface, but the adult animal appears to prefer the deep water down to 500—600 fathoms". My material, as far as it goes, tells the same story.

Though the species has a wide distribution in the northern seas, and though it is occasionally found propagating here, I think we are right in regarding it as a species which belongs to the North Atlantic, and by the Atlantic currents are carried to the polar regions; it seems in any case to be distinctly more common in the Færoe channels and the west of Iceland than in the ocean between Norway, Greenland and Spitsbergen.

47. **Euchæte tonsa** Giesbrecht.

(Pl. VI figs 4 a—b; text-figs 46 a—g).

1895. Euchæte tonsa n. sp. Giesbrecht, p. 251, pl. IV figs 9—10.
1898. — — Giesbr. Giesbrecht & Schmeil, p. 40.
1904. — — — Cleve, p. 190.
1905. — — — G. O. Sars, p. 5.
1905. — — — Farran, p. 35.
1906. — — — Pearson, p. 17.
1906. Euchæte tonsa Giesbr. Esterly, p. 64, pls 9—10.
1908. — — — v. Bremen, p. 55, fig. 62.
1908. — — — Farran, p. 40.
1909. — — — A. Scott, p. 72, pl. XIV figs 8—15.
1911. — — — Wolfenden, p. 298, text-figs 50 a-d.

Description. ♀. Size of specimen from St. 72 Thor 1905 was 6·4 mm.; head + first thoracic tergite 2·8, four posterior thoracic somites 1·8; urosome 1·8 mm.

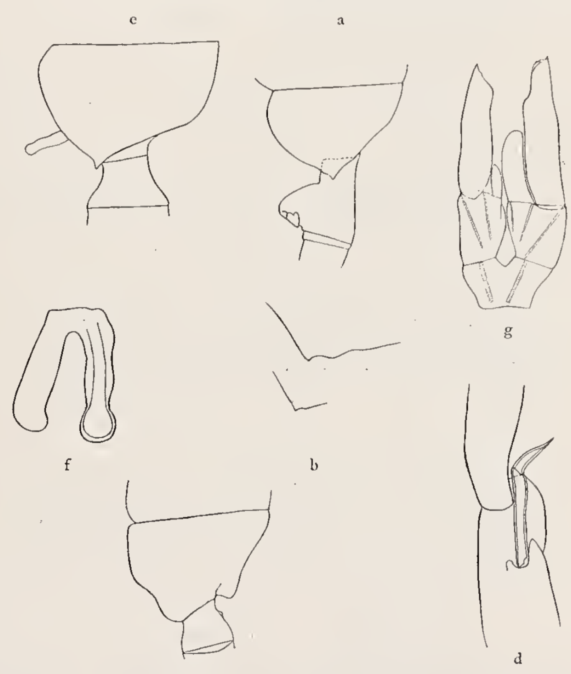
The lateral corner is like Wolfenden's figure, and more pointed than figured by Scott and Esterly for Pacific species; the point is, as shown in text-figs 46 a—b, more prominent on the left than on the right side; no lateral tuft of hairs is found.

The genital somite is, as seen in fig. 46 a, distinctly produced below, but the outline is not quite like any of the published drawings. The structure of the vulva seems to be a good deal more complicated than figured by Wolfenden. The subapical seta is more slender, but longer than St. 2.

The *antennulae* are like Scott's fig. 11; the segments 24 ∾ 25 are distinctly shorter than segment 19, and 23 than 16. The mouth-appendages are scarcely different from those of *E. norvegica*.

The *pes I* is in main features like *E. n.*, but distinctly different from Scott's fig. 13; the articular membrane between Re I—II is fairly developed anteriorly, but posteriorly is wanting, except medially; the Se Re I is fairly developed. The *pes II* is like Wolfenden's fig. 50 c, but in details is different from Scott's figure; the Se Re II scarcely reaches the base of Se 1 Re III, and Se 2 almost reaches the base of short Se 3. On the posterior surface of the second basipodite in the fourth pair of legs a number of delicate hairs are found in the middle.

The epistoma and outer surface of the labrum are in the main like those of *Euch. glacialis* (cf. p. 169) and slightly different from *E. norv.* The oral surface of the *labrum* is like *E. norv.*, except the two first groups of hairs, which are placed as shown in fig. 4 a. The area in front of the lamina labialis is like that of *E. norv.*, but inwards delicate spines are found instead of granules; the most lateral group of hairs is almost as wide as long. The *lobus labialis* possesses in similarity with *Euc. glacialis* a posterior lateral group of hairs.



Text-fig. 46. *Euchæte tonsa* Giesbr.
a. f♀. Genital somite × 16. b. f♀. Lateral corner from the right × 16 and × 52. c. f♂. Lateral corner from the right × 18. d. Pes V Ri sin. from the right (in situ) × 59. e. Y♂(?) (St. V) with abnormal pes V × 16. f. Y♂(?) (St. V). Abnormal pes V × 39. g. y♂ (St. V). Pes V in anterior view × 33.

♂. Size: 5·89 mm.; anterior division (2·56 + 1·6); urosome 1·73.

Shape of the body is scarcely different from *E. norv.* The rostrum is a little more obtuse and somewhat shorter. The lateral corners are rounded and somewhat less produced, but more produced on the left than on the right side; the difference is, however, less marked than in *E. norv.* (text-fig. 46 c).

The *antennulae* reach somewhat beyond the end of the thorax and are scarcely different from those of *E. norv.*

The *pes I* has a well developed articular membrane between Re I—II, and the Se Re I is very short, scarcely three times as long as wide. The *pes II* differs from ♀ by the slightly different shape of the Se Re II—III, and by the Se 2, which does not reach the base of Se 3; the base of the process, possessing the Se 2 Re III, is, in *E. norv.*, placed almost as near the end as the base, but is here placed distinctly nearer the base than the tip.

The *fifth pair* of legs differs from that of *Euc. norv.* by the different shape and serration of the process of Re II sin, which is distinctly longer, not shorter, than the ringed appendage (fig. 4 b), and by the slightly different shape of the left endopodite (text-fig. 46 d).

Y♂♀ (St. V). Size of specimen from Thor St. 82 1904 was 4·42 mm.; anterior division (2·07 + 1·23) = 3·3; urosome 1·12 mm.

The body is somewhat more slender; the first abdominal somite is in some specimens rather prominent ventrally; the lower surfaces of two last abdominal somites possess tufts of the fairly long hairs sometimes represented in *E. norv.* The lateral corner of the thorax is less acutely pointed than in *E. norv.* (text-fig. 46 e). The pes I has no articular membrane between Re I—II, and the Se I is extremely short; the pes II is scarcely different from the adult females. The male only differs from the female by the presence of a well developed fifth pair of legs; the Re sin. is rather obtusely truncate (text-fig. 46 g).

Y♂♀ (St. IV). Size of ♂—♀ from St. 88 Thor 1905 was 3·34 mm.; anterior division (1·56 + 0·90) = 2·46; urosome 0·88 mm.; male from St. 82 3·28 mm. and female 3·54 mm.

The body is more slender than in corresponding stage in *E. norvegica*, and the lateral corners are less distinctly pointed. The Se 2 of Re II ∾ III in the pes II almost reaches the base of Se 3 in contrast to *E. norvegica*. The pes V of the male is scarcely different from that of the other species.

Variation. A young male (St. 82) (text-figs 46 e—f) had, as shown in fig., the fifth pair of legs developed in a rather curious way; in another specimen the left lateral corner was evenly rounded, but the right one pointed in the usual way.

Occurrence. The Thor Expedition has taken the species from the following stations in the Atlantic south of Iceland (one west of Iceland), all in fairly deep layers.

11/7 1904	St. 183	61°30 L. N.	17°08 L. W.	Yt. 1800 M. Wire	1 f♂, 4 f♀ (egg-balls + sperm.).
21/6 1904	St. 154	67°27 L. N.	27°10 L. W.		1 f♀.
15/6 1905	St. 82	51°00 L. N.	11°43 L. W.	Yt. 1200 M. Wire	11 f♀ (2 with sperm.), 2 ♀ (V), 6 ♂ (V), 2 ♀ (IV), 4 ♂ (IV).
31/8 1905	St. 167	57°46 L. N.	9°55 L. W.	Yt. 1500 M. Wire	1 f♀ (sperm.), 1 ♂ (IV).
8/6 1905	St. 72	57°52 L. N.	9°53 L. W.	Yt. 1500 M. Wire	4 f♀.
20/6 1905	St. 88	48°09 L. N.	8°30 L. W.	Yt. 300 M. Wire	2 f♀, 1 ♀ (V), 1 ♂ (V), 1 ♀ (IV), 1 ♂ (IV).

Distribution. This species, or a nearly related, somewhat larger one, was recorded from the Pacific by Giesbrecht and Esterly between 150 and 300 fathoms (1912, p. 321); it was gathered at several stations in Malay waters by the Siboga Expedition. The Gauss Expedition has gathered the species at two stations in the South Atlantic (c. 35° L. S. c. 10° L. W.), and at two stations in the Mid Atlantic. On the west coast of Ireland it is, according to Farran, "a rather characteristic species in deep water tow-nettings ranging from 400—1000 fathoms".

Remarks. That the described female is identical with that mentioned by Farran and Wolfenden is scarcely doubtful. Farran's specimens measured 4·95—5·25 mm., Wolfenden's specimens measured 5—5·3 mm. The specimens from the Pacific are a good deal larger (Giesbrecht's 6·1, Esterly's 6·1 and Scott's 7 mm.), but as my adult females from the North-Atlantic measured up to 6·4 mm., the character found in size is scarcely of great importance. The only character in which my specimens seem to differ from Scott's etc. is the more pointed lateral corners and the structure of pes I—II, especially the long Se 2 of Re III pes II. At present I do not deem these characters important enough to establish two species.

That the copepodites of the stages V—IV belong to the same species as the adult females is especially borne out by the curious structure of the Re III pes II. That the described male, which as realised from the above remarks is rather difficult to distinguish from *E. norvegica,* is really the hitherto undescribed male, is not quite certain; but, as *E. tonsa* also in other respects (e. g. structure of the labrum, of the young specimens) shows greater similarity to *E. norvegica* than to any other species, I prefer for the present to refer the males and females to the same species.

48. Euchæte glacialis H. J. Hansen.

(Pl. VI figs 5 a—d; text-figs 47 a—n.)

1886. Euchæte glacialis n sp. H. J. Hansen, p. 74, pl. XXIII figs 5—5 k, pl. XXIV figs 1—1 d.
1900 pars. — norvegica Boeck. G. O. Sars, p. 58, pl. XIV.
1902 pars. — — — Mràzek, p. 515.
1903. — glacialis Hansen. G. O. Sars, pp. 40—41, pl. XXVII.
1904. Euchæte glacialis Hansen. Wolfenden, pp. 134—135, figs 1, 2, 7.
1905. — — — Th. Scott, pp. 222—223.
1907. — — — Damas & Koefoed, p. 408.
1908. — — — v. Bremen, p. 54 fig. 60.
1913. — — — Stephensen pp. 319—320.

Description. Size of specimen from Thor St. 154 1904 was 10·4 mm.; anterior division (4 + 3·5) = 7·5; urosome 2·9 mm. Sars' specimens measured 10 mm.

The lateral corner of the thorax is somewhat triangular, and possesses in most specimens a minute rounded process, which is not figured by Wolfenden and Sars (text-figs 47 a—c). The genital protuberance is very prominent, and has on each side of the vulva, the ventral surface of which has been figured by Wolfenden (p. 134), two distally rounded, lamelliform processes, of which the hindmost is the longer. The subapical seta is distinctly shorter than the St. 2. The *antennulae* and *mouth-limbs* do not differ from those of *Euch. norvegica* in any features of importance.

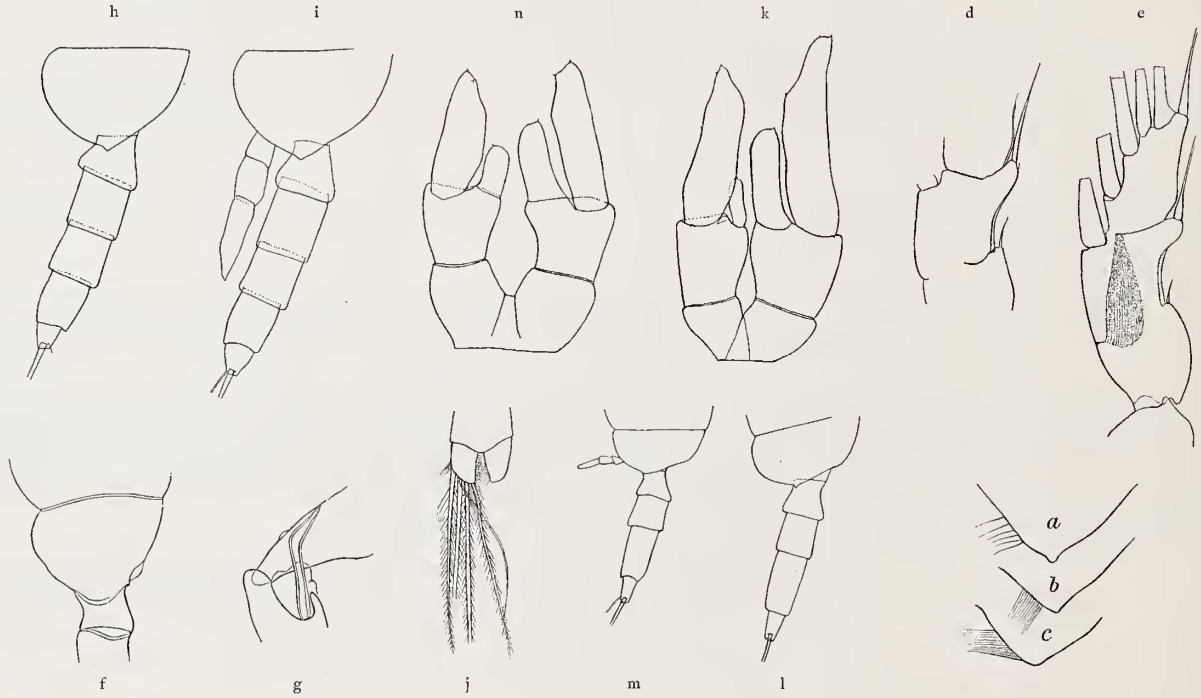
The articular line between Re I and II pes I (text-figs 47 d—e) is anteriorly wanting in the middle, and that between Re II and III is only slightly developed, especially anteriorly. The Se 1 is scarcely shorter than in *E. norvegica* (cf. Wolfenden p. 134); the Se Re II is perhaps somewhat longer than the corresponding Se in *E. n.;* but the difference is not so marked that any character can be found in this feature.

The structure of the *labrum* is in the main like that of *E. norvegica;* the arrangement of the hairs on the oral surface differs in minor details; the lateral anterior group is placed transversely, and consists of about 20 rather stiff, short hairs; a sixth group, fairly well separated from the fifth, is found. The *lamina labialis* and the serrula 6-dentata are scarcely different, but the hairs in front of the lamina are distinctly different, as seen in fig. 5 a Pl. VI, especially the lateral group, which consists of 3—4 longitudinal rows. The arrangement of the hairs on the labial lobes is somewhat different, as seen by comparing figs 5 b and 3 c; especially the lateral basal group is better developed.

f♂. Size of specimen from Thor St. 214 was 6·21 mm.; anterior division (2·65 + 1·95) = 4·6; urosome 1·61 mm. Hansen's specimens measured 7·7 and Sars' 8 mm.

The lateral corners (text-fig. 47 f) are, in contrast to those of *E. norvegica*, almost symmetrical and only slightly produced, as on the right side in the species mentioned; the dorsal marginal tooth is only indicated, or is very short. The first abdominal somite does not on the right side possess any dorsal lateral process.

The *antennulae* extend about to the middle of the abdomen; the segments 12—13 are posteriorly fused, not only on the right but also on the left side. "Æsthetasken" are found in all segments except 23, even in the segment 20, in which they are wanting in *E. norvegica*. The measurements are only in minor details different from those of the female. The interior lobe of the Ri of the *antennae* has medially, in addition to the 5 + 2 setae, an extremely delicate one. The *mandibulae* and *maxillae* scarcely differ from those of *E. norvegica*. The *maxillulae* are, as seen in fig. 5 c Pl. VI, better developed than in other species; the Li 1 has, f. inst., 9 fairly long setae, and so has the Ri. The *maxillipeds* are like those of *E. norvegica*, but the usual hooked process of lob. IV Basp. II seems to be represented by a rather slender, straight, conical process.



Text-fig. 47. *Euchæte glacialis* H. J. Hansen.

a—c. f♀. Left lateral corner in three specimens; most setae missing × 18. d—e. f♀. Pes I dext. in anterior and posterior view × 57. f. f♂. Left lateral corner × 18. g. f♂. Pes V Ri sin. in internal view. h—i. Y♂—♀ (stage V). Abdomen × 16. j. Y♂ (st. V). Furca × 18. k. Y♂ (st. V). Pes V × 33. l—m. Y♂—♀ (st. IV). Abdomen × 16. n. Y♂ (st. V). Pes V × 89.

Pes I has the articulation between the Re I—II better developed than in the female, but the Se of Re I is wanting; the *pes II* shows a similar sexual difference.

Pes V dext. has, about in the middle, an almost complete articular line between Re I and II; proximally to this a short tooth is found exteriorly, which is indicated in *E. norvegica;* the Re III is terminally somewhat hollowed, and less widened. The Re II—III pes V sin. are distinctly shorter; the ringed appendage is comparatively short, and the serrated process is moderately hollowed between the two rows of teeth; the left endopodite has only one single segment (text-fig. 47 g).

Y$\substack{♂\\♀}$ (St. V). Size of specimen from Thor 1904 St. 154 was 7·71 mm.; anterior division (3·51 + 2·3) = 5·81; urosome 1·9 mm. Hansen's specimen measured 7 mm.

This stage is easily distinguished from the corresponding stage of *E. norvegica* by the more obtusely pointed lateral corner of the fifth thoracic somite (text-figs 47 h—j). The differences in the measurements of the terminal segments of the antennulae are like those of *E. norvegica* though less marked; the articular membrane between Re I—II of pes I is not completely lost.

The fifth pair of legs in the male shows minute differences, as realised by comparing figures (text-fig. 47 k).

Y♂♀ (St. IV). Size of specimen from Thor St. 154 was 5·02 mm.; anterior division (2·3 + 1·43) = 3·73; urosomn 1·29 mm.

This stage differs from the corresponding stage of *E. norvegica* by the more rounded lateral corner of the thorax. The appendages show differences similar to those of *E. norvegica* (text-figs 47 l—n).

Occurrence. The Ingolf Expedition has taken the species at three stations only, viz:

$^{26}/_{6}$ 1896	St. 94	64°56 L. N.	36°19 L. W.	P.	100—0	Temp. at surface	2·5° C.	4♀ (V), 1 y♂ (V), 1 y♂ (IV).
$^{25}/_{7}$ 1896	St. 121	66°59 L. N.	13°11 L. W.	V.[1]	100—0	—	4·8° C.	1 f♀, 4 y♀ (V), 2 y♂ (V) 1 y (III).
$^{27}/_{7}$ 1896	St. 117	69°13 L. N.	8°23 L. W.	V.[2]	100—0	—	4·1° C.	1 y (V).

The Danish East Greenland Expedition 1900 has taken it at three stations.

$^{4}/_{7}$ 3 p. m.	73°32 L. N.	3°30 L. W.	300—0 meters		1 f♀ (with sperm.), 1 y♀ (V), 1 y♀ (IV).
$^{8}/_{7}$ 2 p. m.	74°09 L. N.	11°31 L. W.	400—0	—	1 f♀, 3 y♀ (V), 1 y♂ (V).
$^{10}/_{7}$ 6 p. m.	74°28 L. N.	15°36 L. W.	400—0	—	1 f♂, 2 y♀ (V), 3 y♂ (V), 1 y♀ (IV), 1 y♂ (IV).

The S/S Thor has taken the species at 8 stations.

$^{20}/_{6}$ 04	St. 153	65°20 L. N.	27°12·5 L. W.	Yt. 800 M. Wire	1 y♀ (V), 6 y♂ (V).
$^{21}/_{6}$ 04	St. 154	65°27 L. N.	27°10 L. W.	Yt. ?	16 f♀ (2 with sperm.), 2 y♀ (V), 2 y♂ (V), 2 y♀ (IV), 4 y♂ (IV).
				Yt. 800 M. Wire	12 f♀, 2 f♂, 4 y♀ (V), 4 y♂ (V).
$^{22}/_{7}$ 04	St. 210	66°43 L. N.	18°10 L. W.	Yt. 400 M. Wire	1 f♀, 3 y♀ (V), 1 y♀ (IV).
$^{22}/_{7}$ 04	St. 214	67°19 L. N.	17°55 L. W.	Yt. 800 M. Wire	19 f♀ (3 with egg-balls), 3 f♂, 1 y♂ (V), 1 y♂ (IV).
$^{5}/_{5}$ 04	St. 63	64°05 L. N.	9°38 L. W.	Yt. 300 M. Wire	8 f♀, 6 y♀ (V), 6 y♂ (V).
$^{4}/_{8}$ 04	St. 230	63°10 L. N.	7°31 L. W.		2 f♀.
$^{9}/_{5}$ 04	St. 70	63°33 L. N.	6°20 L. W.	Yt. 100 M. Wire	27 f♀ (2 with sperm.), 5 f♂, 5 y♀ (V), 3 y♂ (V), 3 y♀ (IV), 1 y♂ (IV).
$^{23}/_{7}$ 05	St. 124	61°04 L. N.	4°33 L. W.	Yt. 1000 M. Wire	1 f♀.

Distribution. The species is very common in the Polar basin crossed by Nansen, "from 300 metres to the very surface of the sea". By the Duc d'Orléans it was taken at 15 stations in the sea between Spitzbergen and Greenland between 79°56 L. N. 1°29 L. E. and 71°22 L. N. 18°58 L. W. ($^{11}/_{7}$—$^{15}/_{8}$ 1905). Adult males and females partly with eggs and spermatophores were found at 5 stations between 200 and 500 metres; the young specimens were sometimes found in higher layers, but scarcely at the surface; in the lower layers between 500—1000 metres young ones only have been found. In the Norwegian Sea it has, according to Sars, been taken a few times between 200—1000 metres. Damas & Koefoed write (p. 408) without mentioning the source: "Dans la mer de Norvège: jamais à la surface; principalement au delà de 600 mètres". According to Wolfenden (1904, p. 133) "it is of rare occurrence in the Færoe channel, and only once it occurred in the warm Atlantic area", and according to Damas & Koefoed "entre les Færöer et l'Islande: pas au dessus de 400 mètres" (p. 408).

My own records show that the species was fairly common in the ocean north of Iceland, and in Denmark Strait; it has been found a few times in the Iceland—Færoe channel and a single time south-east of the Færoes. It is rather odd that it has not been taken in Davis Strait, but as comparatively few deep sea samples have been examined from this region it is too early to exclude the species from the fauna of this region. As it never occurred in any of the numerous samples brought home by Thor and the Ingolf Exp. from the Atlantic south of Iceland, we are probably right in excluding it from the ordinary fauna of this region.

49. **Euchæte Farrani** n. sp.

(Pl. VI fig. 6 a; text-figs 48 a—d.)

1883. nec. Euchæte barbata n. sp. Brady, p. 66, pl. 22 figs 6—12.
1892. nec. — — Brady. Giesbrecht, p. 246.
1894. nec. — — — Th. Scott, p. 58, pl. VI fig. 17.
1898. nec. — — — Giesbrecht & Schmeil, p. 40.
1900. pars. — norvegica Boeck. G. O. Sars, p. 234, pl. 19.
1903. — barbata Brady. G. O. Sars, p. 41, pl. XXVIII.
1904. pars. — — — Wolfenden, p. 135.
1906. nec. Euchæte barbata Brady. Pearson, p. 17.
1907. — — — Damas & Koefoed, p. 409.
1907. nec. — — — G. O. Sars, p. 3.
1908. pars. — — — v. Bremen, pp. 54—55.
1909. nec. Pareuchæte barbata Brady. A. Scott, p. 70, pl. XVIII figs 1—8.
1909. nec. — Sarsi Farran. A. Scott, pp. 75—76, pl. XXI figs 9—15.

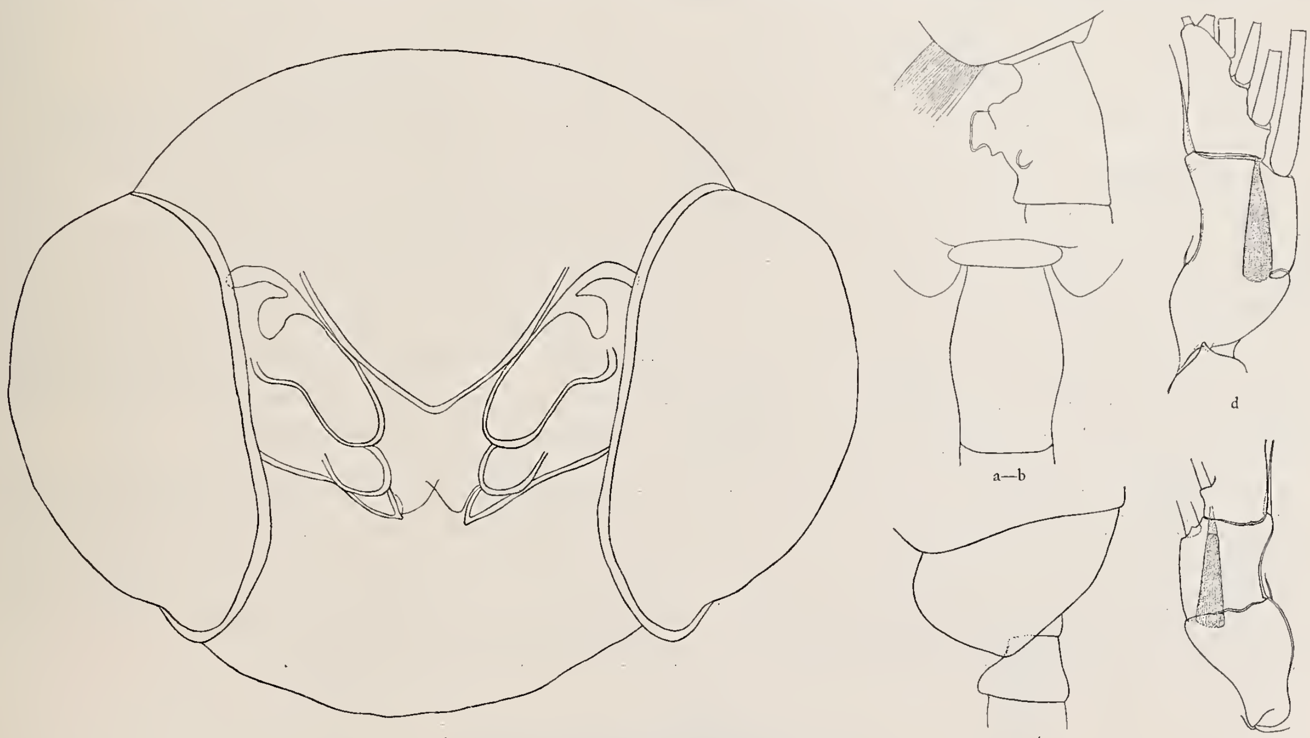
Description. f♀. Size of specimen from Thor St. 230 was 10·75 mm.; anterior division 8 mm.; urosome 2·75 mm. Sars' specimens measured 12 mm.

The shape of the body is scarcely different from Sars' figure; the anterior division, which has a rounded lateral corner with a tuft of long hairs, is 2·5 as long as the urosome. On the ventral surface of the third to fifth abdominal somites tufts of powerful hairs are found. The comparative length between the 3 first somites is as 50, 30, 25.

The *genital somite* (text-figs 48 a—c), which is 1·2 as long as wide and 1·1 as long as deep, is almost as long as the following two combined; the ventral surface has a big protuberance for the vulva, placed almost in the middle of the somite. In lateral view the ventral outline is anteriorly rounded, in the middle almost straight, and posteriorly produced into a somewhat triangular process, which by an incision is well separated from a "posterior process", which really is the posterior limitation of the vulva; this posterior process is basally marked by an incision. Somewhat more posteriorly and dorsally than the base of the genital protuberance on the left side a small rounded process is found; this process has been found in all the examined specimens, and is best seen when the somite is examined in not quite lateral view. In ventral view the vulva is seen to be limited by a slightly prominent edge behind; laterally it is partly covered by a wing-like expansion, which is rounded in front, and produced behind. In the middle of the vulva a chitinous "plate" is found, which in the posterior margin has a median incision, laterally is partly fused and covered by a somewhat trilobated process, and in front is in the middle covered by a posteriorly triangularly pointed plate. The St. 2 of the furca is almost twice as long as the St. 1—4, but much shorter than the distinctly geniculate Si.

The *antennulae,* antennae, mandibulae, maxillae and maxillipeds do not show any feature of interest. The Le of the *maxillulae* show, however, some variation. In one specimen a single very short hairy seta, a longer one and 5 very long ones were present on each side; in another specimen 1 fairly long + 5 very long were found on the left side, but 2 short + 5 long on the right side; in 3 specimens 2 short + 5 long setae were found on each side, and in one, on the left side, in addition to the 5 long ones, one fairly long and one very short seta. The basipodite has 5 setae, the Ri I 3, Ri II 4 (one very delicate), and the Ri III 3 setae.

The *pes I* has the articular membrane between Re I—II fairly well developed anteriorly (text-figs 48 b—c), and the Se Re I is fairly well developed. The Se Re II scarcely extends to the end of the short Se 1 Re III, and the Se 2 Re III extends somewhat beyond the middle of the third division (cf. Wolfenden's fig. 9, p. 134). The epistoma, anterior surface of the labrum, and the labial lobes



Text-fig. 48. *Euchæte Farrani* n. sp.
a—b. f♀. Abdomen in dorsal and lateral view × 18. c. f♀. Vulva from below × 180. d. f♀. Pes I dext. in post. view × 57. e. Pes I dext. in ant. view × 50. f. Y♀. Lateral corner × 18.

seem in main features to be like *E. norvegica;* the oral surface of the labrum is somewhat different from *E. norvegica*, as seen by comparing figs 6 a and 3 a; the lateral anterior group has about 60 rather strong short spines, the groups 1—6 are more regularly placed. The area in front of the lamina labialis differs by the less square, more rounded, lateral group of short hairs.

Y♀ (St. V). Size 8·3 mm.; anterior division 6 mm.; urosome 2·3 mm.

The lateral corners of the thorax are regularly rounded; in other respects, except the usual ones, this stage is scarcely different from the adult females (text-fig. 48 f).

Occurrence. This species was gathered at the following stations by the Ingolf Expedition.

$^{1}/_{7}$	1896	St. 104	66°23 L. N.	7°25 L. W.	P. 100—0 fathoms	Temp. at surf.	6·3° C.	5 f♀.
$^{11}/_{7}$	1896	St. 105	65°34 L. N.	7°31 L. W.		—	5·8° C.	1 f♀.

$^{24}/_{7}$ 1896	St. 117	69°13 L. N.	8°23 L. W.	V² 100—0 fathoms	Temp. at surf.	4·1° C.	1 f♀.
$^{25}/_{7}$ 1896	St. 118	68°27 L. N.	8°20 L. W.		—	4·9° C.	2 f♀ (eggs + sperm.), 1 y♀ (V).
$^{25}/_{7}$ 1896	St. 120	67°29 L. N.	11°32 L. W.		—	5·1° C.	1 f♀.
$^{10}/_{8}$ 1896	St. 138	63°26 L. N.	7°56 L. W.				1 f♀ (eggs).

Deichmann has taken 2 f♀ (with egg-balls) 70°32 L. N. 8°10 L. W. Depth 470 fathoms.

The S/S Thor has taken a single specimen south of Iceland at a typical Atlantic station as well as from a few stations in the Iceland--Færoe channel.

$^{11}/_{7}$ 04	St. 183	61°30 L. N.	17°08 L. W.	Yt. 1800 M. Wire	1 f♀.
$^{13}/_{7}$ 03	St. 164	62°10 L. N.	19°36 L. W.	Trawl.	1 f♀.
$^{23}/_{7}$ 05	St. 124	61°04 L. N.	4°33 L. W.	Yt. 1000 M. Wire	1 f♀.
$^{9}/_{5}$ 04	St. 71	63°06 L. N.	6°20 L. W.	Yt. 1500 M. Wire	7 f♀ (1 egg-ball), 1 y♀.
$^{4}/_{8}$ 04	St. 230	63°10 L. N.	7°31 L. W.	Trawl. 1090 M. D.	27 f♀ (2 with sperm., 4 with egg-balls).

Distribution. This species, according to Sars, has been taken several times in the Norwegian Sea "by the aid of trawl" "and always in great depth down to 2000 fathoms". By the Duc d'Orléans it was taken $^{12}/_{7}$ 1200—1800 metres 79°34 L. N. 2°40 L. E., and $^{16}/_{7}$ 800—1350 metres 78°05 L. N. 5°21 L. W. The species seems most often to have been taken with the trawl; the few observations indicate that the species belongs to the northern deep sea plankton, with its main distribution in the seas lying between Iceland, Norway, Greenland and Spitsbergen, but it is sometimes found south of Iceland. Curiously enough it has not yet been found either in Denmark nor in Davis Strait.

Remarks. Though the lateral tubercle of the left side of the genital somite is distinctly shown neither in Sars' nor in Wolfenden's figures, I do not doubt that the described species is identical with that described by the two authors. On account of the structure of the pes II, Farran regards Wolfenden's species as identical with his *E. Sarsi;* the size 10—11 mm. and the structure of the vulva (fig. 5) make it necessary to refer at least some of the specimens to *E. Farrani.*

50. **Euchæte barbata** Brady.

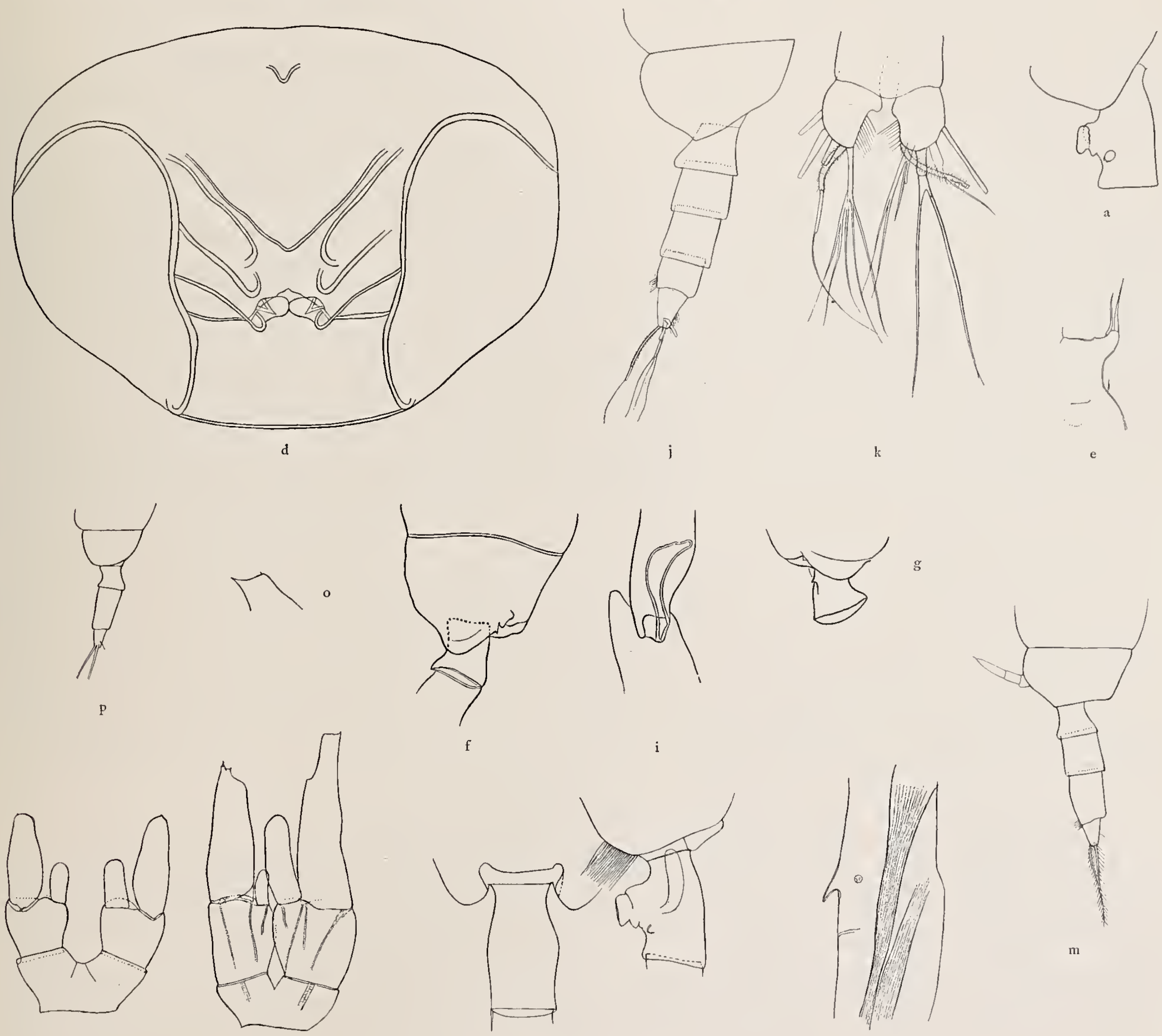
(Pl. VI figs 8 a—b; text-figs 49 a—p.)

1883.? Euchæte barbata n. sp. Brady, p. 66, pl. XXII figs 6—12.
1892. — — Brady. Giesbrecht, p. 246.
1894. nec. — — — Th. Scott, p. 58.
1898. — — — Giesbrecht & Schmeil, p. 40.
1903.? — — — Thompson & A. Scott, p. 244.
1903. nec. — — — G. O. Sars, p. 41, pl. XXVIII.
1904.? — — — Wolfenden, p. 135.
1905.? — porrecta n. sp. G. O. Sars, p. 16.
1906. Euchæte barbata Brady. Pearson, p. 17.
1907. nec. — — — Damas & Koefoed, p. 409.
1907.? — — — G. O. Sars, p. 3.
1908. pars. — — — v. Bremen, pp. 54—55 fig. 61.
1908. — — — Farran, pp. 40—41, pl. III figs 13—14.
1909.? Pareuchæte barbata Brady. A. Scott, p. 70, pl. XVIII figs 1—8.

Description. f♀. Size of specimen from St. 183 was 7·87 mm.; anterior division 5·75 mm.; urosome 2·12 mm. Another specimen measured 8·3 mm. Farran's specimens measured 8·1—8·8 mm.

The shape of the body is practically like that of the preceding species; the ventral surface of the abdominal somites are less heavily hirsute. The comparative length between the 3 first abdominal somites is as 42, 24, 24; the *genital somite* is 1·3 as long as wide and scarcely 1·3 as long as deep;

the ventral protuberance is in lateral view scarcely different from *E. Farrani;* the anterior process is comparatively shorter, but the posterior margin and the dorsal lateral process are scarcely different. In the transverse chitinous plate no median incision was found posteriorly; covered by this plate a chitinous system was found with a median incision (text-figs 49 a—d).



Text-fig. 49. *Euchæte barbata* Brady.
a—b. f♀. Genital somite of two specimens in lateral view × 16. c. f♀. Genital somite × 16. d. Vulva × 180. e. f♀. Pes I dext. ant. view × 53. f—g. f♂. Lateral corner from the left and right × 18. h. f♂. Pes V dext. Re × 57. i. Pes V Ri sin. from inner side × 59. j. Y♀ (St. V). Abdomen × 18. k. Furca of same specimen × 33. l. Y♂ (St. V). Pes V × 33. m. Y♂ (St. IV). Abdomen × 16. n. Y♂ (St. IV). Pes V × 57. o—p. Y (St. III). Rostrum and abdomen × 16.

The measurements of the *antennulae* show in the examined specimens a slight difference from *E. Farrani;* the segments 24 ∾ 25 are slightly longer than, (not =) segment 19 and the segment 21 is almost 1·1 as long as 17 (not as long as). The Le of the *maxillulae* possesses in the examined specimens, in addition to the usual 5 long setae, 2 shorter ones, showing from fairly long to very short variations.

The *pes I* (text-fig. 49 e) is scarcely different. The *pes II* differs distinctly by the Se Re II, which almost extends to the end of the fairly long Se 1 Re III, and by the long Se 2, which extends to the tip of the segment and to the base of the Se 3.

The anterior surface of the *labrum* shows an arrangement of the hairs most like that of *E. Sarsi* (fig. 7 a). The oral surface is like that of *E. Farrani;* the lateral group consists of about 40 hairs, placed inwards in two rows, and outwards in one; about the difference in the arrangement of the other groups I refer to fig. 8 a. In the arrangement of the hairs on labial lobes etc. no features of great interest were found.

♂. Size of specimen from St. 183 was 7·37 mm.; anterior division 5·3 mm.; urosome 2·07 mm.

The shape of the body is practically like that of *E. norvegica;* the rounded lateral corner is more produced on the left side than on the right; the dorsal lateral process is more distinct on the right side than on the left. The first abdominal somite has the dorsal process near the anterior border prominent on the right side, and just indicated on the left (text-figs 49 f—g). The *antennulae* reach just beyond the end of the cephalothorax; the segments 12—13 being without any articular membrane posteriorly on the left side, but with a fairly distinct articular membrane on the right side in some specimens. No "Æsthetasken" were found in segment 20. The segments 24 ∾ 25 are 1·1 as long as segment 15. The *antennae,* mandibulae and maxillae scarcely show features of interest; the *maxillulae* have 8 setae in Ri, but do not differ from *E. norv.* in other respects. The *maxillipeds* do not possess any hooked process in the lob. IV of basipodite II, but 2 setae, of which the one is thicker. The Se of Re I *pes I* is extremely short and delicate. The *pes II* differs by the short Se Re II, which does not reach the middle of the third division. The *pes V* dext. is scarcely different from *E. norv.*; it has a well developed Se Re I, and trace of articular membrane between Re I and II. The *pes V* sin. has the Re II—III comparatively shorter than *E. norv.*, and has the serrated process fairly pointed, rather shallow, and with a few distal teeth, comparatively strong, as shown in figure 8 b. The left endopodite is rather clumsy and has only a single segment (text-fig. 49 i).

Y⚥ (St. V). Size: 6·14 mm.; anterior division 4·6 mm.; urosome 1·54 mm.

The lateral corner of the fifth thoracic somite, which is fairly well marked, is produced into a rather blunt point. The first of the 4 abdominal somites is distinctly produced below in the females, not in the single male. The appendages do not show features of great interest; the pes II is scarcely different from that of the adult female. The *pes V* (text-fig. 49 l) is like that figured in *E. tonsa,* but the St. are more developed. In a single female several of the furcal setae were more or less bifurcate (text-figs 49 j—k). The two last abdominal somites bear ventrally groups of rather short hairs.

Y⚥ (St. IV). Size: 4·49 mm.; anterior division 3·39 mm.; urosome 1·10 mm.

The lateral corners are slightly more pointed than in the preceding stage (text-fig. 49 m); the first of the 3 abdominal somites is barely produced below; only a single tuft of hairs is observed near the hinder border of the last abdominal somite ventrally. The appendages show differences similar to those described in *E. norv.,* f. inst., the segments 24 ∾ 24 of the antennulae are 1·3 as long as the segment 19 (text-fig. 49 n).

Y (St. III). Size: 3·06 mm.; anterior division 2·37 mm.; urosome 0·69 mm.

Apart from the bigger size and more straight rostrum, the stage is scarcely different from that of *E. norvegica* (text-figs 49 o—p).

Occurrence. The S/S Thor has $^{11}/_{7}$ 04 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire taken 9 f♀, 2 f♂, 4 y♀ (V), 1 y♂ (V), 2 y♀ (IV), 1 y♂ (IV), 1 y (III) and $^{10}/_{7}$ 09 St. 180 61°34 L. N. 19°03 L. W. Yt. 1800 M. Wire 1 f♀.

Distribution. Remarks. About the distribution of this species only very little is known, as will be understood from the following remarks. By Farran it has been recorded as occurring "in small numbers on five stations of from 700 to 1000 fathoms" off the west coast of Ireland. As neither Sars nor Scott says anything about the characteristic tubercle on the left side of the genital somite, and as their descriptions are not very perfect, I do not think that we should be right in including the Mid Atlantic and the Indian Ocean within the range of this species. Farran, with some reluctance, refers his species to Brady's old species from 36° L. S. 46° L.W., on account of the corresponding size and similar structure of pes II; Brady's figure of the genital protuberance and the smooth ventral surface of the abdominal somites III—IV seems to me to speak against the correctness of this view. The same opinion is shared by Wolfenden, who regards *E. barbata* as more related to *E. Wofendenii* than to any other (cf. 1911, p. 300); as, however, the name is now applied to a well defined species, and as there is no reason to hope for a sure identification, I prefer to follow Farran in this respect.

51. **Euchæte Sarsi** Farran.

(Pl. VI figs 7 a—b; text-figs 50 a—f.)

1908. Euchæte Sarsi n. sp. Farran, p. 41, pl. III figs 15—16.
1909. ? — — Farr. A. Scott pp. 75—76, pl. XXI figs 9—15.

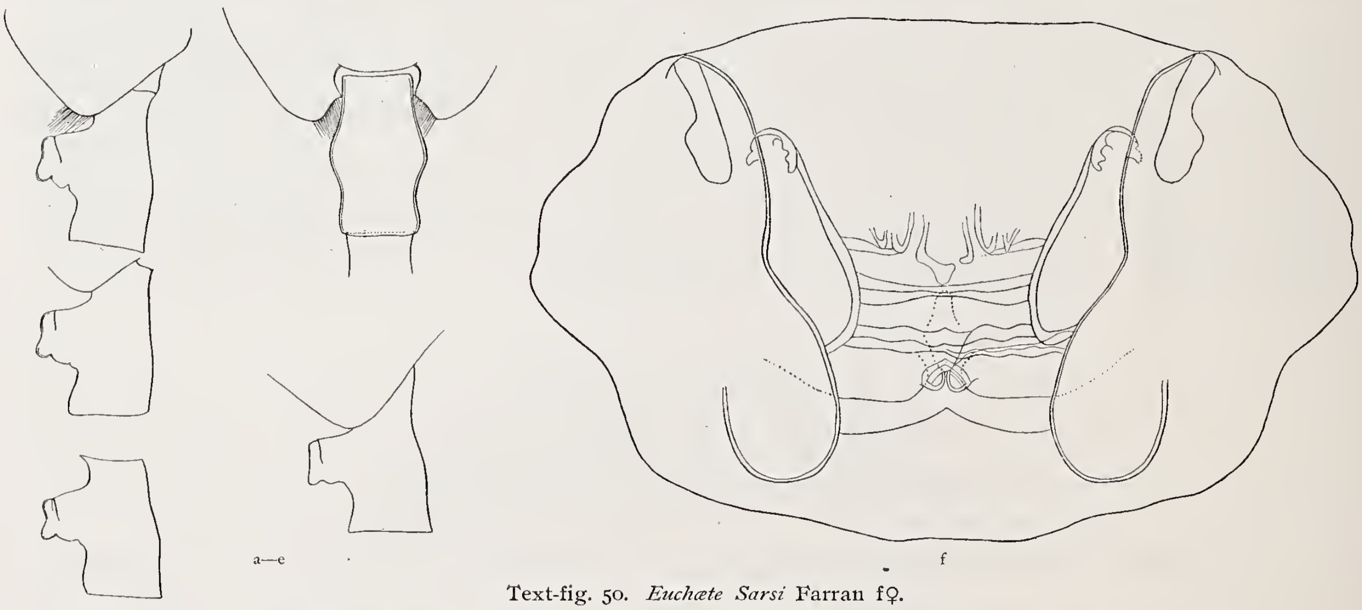
Description. ♀. Size of specimen from St. 183 was 10 mm.; anterior division 7·3 mm.; urosome 2·7 mm. Farran's specimens measured 9·8—10·2 mm.

The shape of the body etc. scarcely show features of interest. The anterior division is 2·7 as long as the urosome; the proportional length of the abdominal segments is 45, 27, 27. The genital somite has not on the left side the characteristic tubercle found in *E. Farrani,* and the ventral protuberance has the anterior process slightly concave in the middle, and the posterior process less prominent than in the other species (text-figs 50 a—e). The vulva is in the ventral surface quite different from that of *E. Farrani* and *barbata.* The median chitinous plate has posteriorly a median incision, but the area in front is irregularly wrinkled, and the triangular plate is only indicated; the trilobate process is very indistinct (text-fig. 50 f). The segment 19 of the antennulae is 1·1 as long as 24 ∾ 25. The Le of the *maxillulae* possess 2 extremely short and one longer seta proximally, and in addition to these the usual long ones distally. The *pes I* has a very short Se Re I. The Se of Re II extends to the end of Se 1 Re III, and the Se 2 Re III extends somewhat beyond the middle of the third division.

The anterior surface of the *labrum* is distinctly different from that of *E. norv.* and *Farrani,* as realised by comparing fig. 7 a and the description of *E. norv.* The oral surface of the labrum is very much like that of *E. norv.* The lateral group consists of 30—40 short spines; the groups 1—2 are placed near to each other; the 3—5 are fairly well separated. The arrangement of hairs in front of *lamina* *labialis* is most similar to that of *E. Scotti* (fig. 10 b); the large lateral group is almost completely fused with the median, which, however, has longer hairs.

♂. Size: 8·3 mm.; anterior division 5·5 mm.; urosome 2·8 mm.

The rostrum is directed more forwards than in *E. barbata* Brady; the lateral dorsal teeth of the last thoracic tergite are only slightly developed. The *antennulae* extend distinctly beyond the end of the cephalo-thorax; the segment 20 has a well developed "Æsthetask"; in other respects these organs are scarcely different from those of *E. barbata.* The *maxillipeds* have in the lobe IV of Basp. II a well developed, rather slender, hairy conical process, which terminally is produced into a delicate lash. The Se of Re I *pes I* is wanting. The *pes II* is practically like that of *E. barbata.* The *pes V dext.* is scarcely different from that of *E. barbata:* the pes V sin. is in most respects like that of the other species;



Text-fig. 50. *Euchæte Sarsi* Farran f♀.
a—e. Abdomen of different specimens × 16. f. Vulva in ventral view × 180.

the differences are best realised by comparing figs 7 b and 8 b; the best character is found in the serrated process which is more slender, and has a less regular serration.

Occurrence. The S/S Thor has taken this species at the following deep sea stations.

11/7	1904	St. 183	61°30 L. N.	17°08 L. W.	Yt.	1800 M.	Wire	3 f♀.
10/7	1904	St. 180	61°34 L. N.	19°03 L. W.	Yt.	1800 M.	Wire	1 f♀.
31/8	1905	St. 167	57°46 L. N.	9°55 L. W.	Yt.	1500 M.	Wire	1 f♂.

Farran has recorded this species from three deep sea stations off the west coast of Ireland.

Remarks. That the described females are identical with *E. Sarsi* Farran, I regard as quite evident; in contrast to Farran I do not regard it as identical with Wolfenden's *E. barbata* (cf. p. 174). The described male is certainly different from that which has been referred to *E. barbata,* and belongs certainly to *E. Sarsi* or another species of similar size nearly related to it. I do not think that the male, which A. Scott refers to *E. Sarsi* is identical with the described one, on account of the well developed lateral dorsal teeth of the fifth thoracic tergite and the different shape of the serrated process.

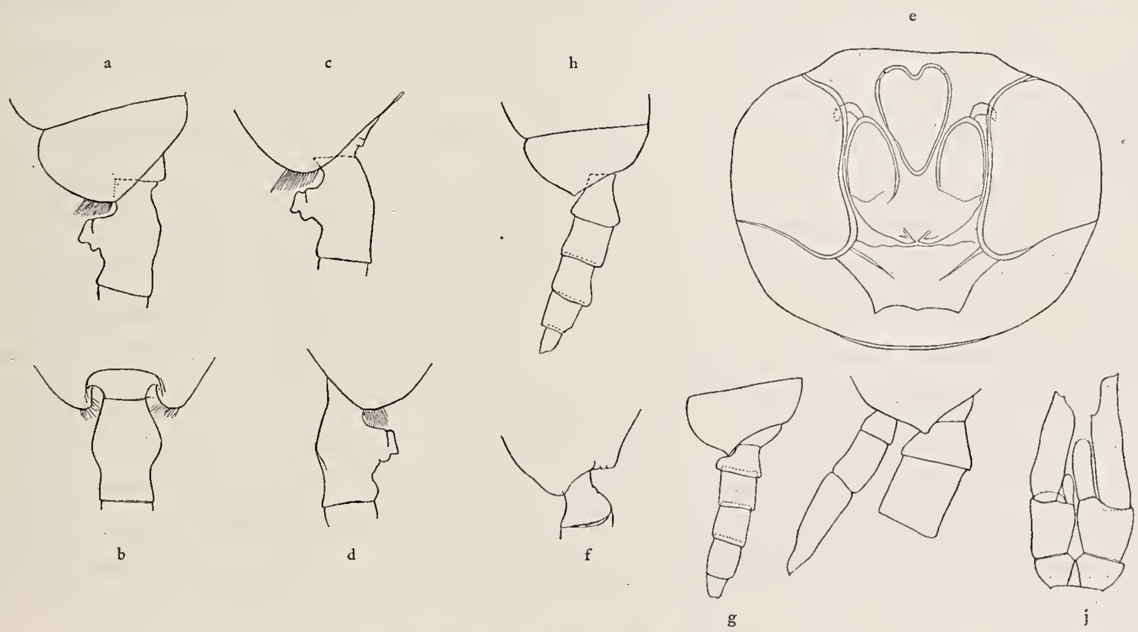
52. Euchæte Scotti Farran.

(Pl. VI figs 10 a—c; text-figs 51 a—j.)

1908. Euchæte Scotti n. sp. Farran, p. 42, pl. III figs 11—13.
1911.? — — Farr. Wolfenden, pp. 301—302, pl. XXXV fig. 2, text-figs 53 a—c.

Description. f♀. Size of specimen from St. 183 was 5·99 mm.; anterior division 4·26 mm.; urosome 1·73 mm. Farran's specimens measured 5·7—6·3 mm., Wolfenden's specimens measured 4·2—4·85 mm.

The shape of the body is more robust than in the preceding species, as the anterior part is only c. 2·3 as long as wide, and as wide as the urosome is long. The lateral corner of the cephalothorax is not quite regularly rounded, but somewhat triangularly produced; the anterior division is 2·5 as long as the urosome, which shows the following proportion between the three first somites (15, 8·5,



Text-fig. 51. *Euchæte Scotti* Farran.
a—d. f♀. Genital somite × 18. e. f♀. Vulva from below × 180. f. f♂. Left corner × 18. g—h. Y♀—♂ (St. V). Abdomen from the left × 24. i. Y♂ (St. V). Lateral corner × 15. j. Y♂ (St. V). Pes V × 15.

8·5). The *genital somite,* which is 1·3 as long as wide and 1·2 as long as deep, is in dorsal view slightly asymmetrical, and has the lateral margins strongly convex, somewhat in front of the middle. The *genital protuberance* has in lateral view a wing-like anterior process, sometimes slightly concave in the middle, and a more dorsal and posterior process, separated from the former by a distinct incision (text-figs 51 a—e). In ventral view the vulva shows some similarity to Wolfenden's figure 53 a, which is, however, too incomplete for a detailed comparison, and is distinctly different from the mentioned species of this group. The posterior incision in the median plate is not observed; the anterior triangular point, of which an oval plate is found, is just indicated.

The *antennulae* extend just beyond the end of the third thoracic tergite, but not to the end of the cephalo-thorax; the segments 24 ∾ 25 are as long as the segment 19; the appendages scarcely show differences from those of *E. norvegica.* The mouth-limbs are scarcely different from those of *E. barbata;*

the Le of the *maxillulae* possess 5 long + 2 shorter setae. This is in contrast to Wolfenden, who has only found 5 setae in his specimens. The articular membrane between Re I—II of *pes I* is barely indicated, and the Se is, as pointed out by Wolfenden and Farran, extremely minute. The *pes II* is like Farran's description; the Se Re II almost extends to the end of Se 1 Re III, and the Se 2 Re III extends a little beyond the middle of the third division; in most of Wolfenden's specimens the Se 2 reaches the end of the segment.

The anterior surface of the *labrum* is in the arrangement of the setae scarcely different from *E. Sarsi* (fig. 7 a); the oral surface is most like that of *E. norvegica* (fig. 10 a); the lateral group consists of about 10 fairly long, densely placed, setae. The first group of the longitudinal series, which is somewhat convex in front, is connected with group 2, which possesses fairly long setae, by delicate hairs scattered inwards and outwards; groups 3—6 are fairly well separated, without difference between outer and inner portion. The arrangement of the hairs on the area in front of the *lamina labialis* (fig. 10 b) is in the main like that of *E. norvegica,* but shows, however, as realised by comparing figures, distinct difference; the lateral group, f. inst., is almost completely fused with the median.

♂. Size of specimen from St. 183 was 5·56 mm.; anterior division 3·93 mm.; urosome 1·63 mm.

The shape of the body is more clumsy than in *E. norvegica;* the anterior division is only 2·5 as long as wide, and 2·4 as long as the abdomen, the first somite of which is about 1·1 as long as broad. The left side of the thorax is distinctly produced, and the dorsal lateral spine is represented by a minute rounded eminence; on the right side no lateral spine is found (text-fig. 51 f). The dorsal lateral process of the first abdominal somite is, as usually, best developed on the right side, but is not very prominent. The *antennulae* extend distinctly beyond the end of the cephalo-thorax; segments 12—13 have no articular membrane posteriorly; the segment 19 is 1·9 as long as 24 ∾ 25; no "Æsthetask" was found in segment 20. The lob. IV of the Basp. II of the maxillipeds has in addition to a fairly long slender seta a moderately long hairy process and a rather small conical protuberance; the other mouth-limbs are scarcely different from those of the type-species. The *pes I* has an extremely short Se in Re I; the pes II is like that of *E. barbata.*

The *pes V* is shorter and more clumsy than in the mentioned species; the Re I—II pes V sin. are most like the corresponding segments in *E. barbata* (fig. 10 c); the serrated process is narrow with regular marginal serration.

Y⚥ (St. V). Size of ♀ from St. 183 was 4·83 mm.; anterior division 3·63; urosome 1·2 mm. ♂ (St. 183) measured 4·54 mm.

The shape of the body is, as in the adult specimens, more clumsy than the corresponding stages of the related species. The lateral corner is, as shown in figure, triangularly, but obtusely, pointed. The Se of the Re I *pes I* is comparatively long and slender. The females examined are distinctly different from the male by the produced lower margin of the first somite; the pes V does not show characters of great interest (text-figs 51 g—j).

Y♀ (St. IV). Size of specimen from St. 183 was 3·34 mm.; anterior division 2·48 mm.; urosome 0·86 mm.

This stage differs from corresponding stage in related species by an obtusely pointed lateral corner.

Occurrence. The Thor Expedition has gathered this species at two stations only viz:

11/7 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 37 f♀ (3 with egg-balls, 2 with sperm.), 8 f♂, 8 y♀ (V), 4 y♂ (V), 1 y♀ (IV).

24/5 1904 St. 104 62°47 L. N. 15°03 L. W. Yt. 1500 M. Wire 4 f♀.

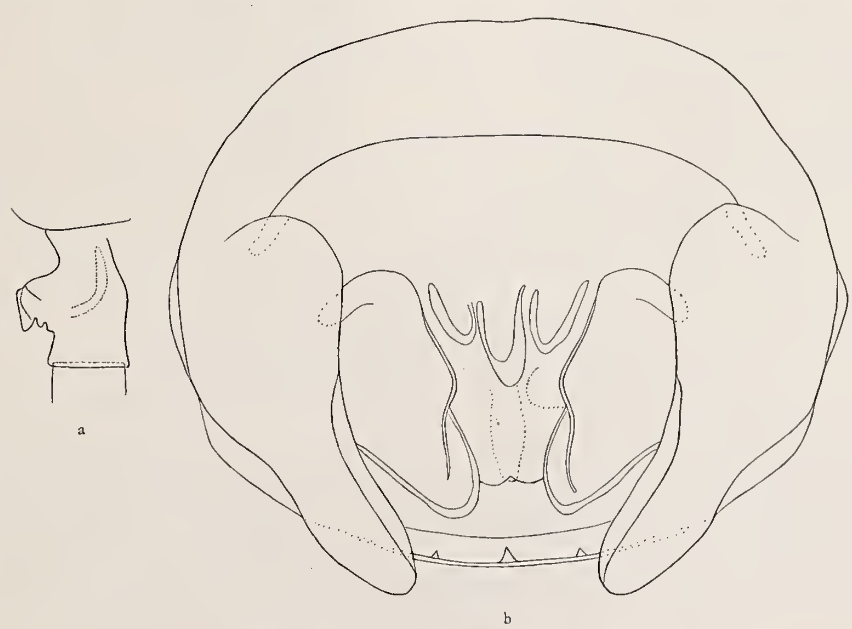
This species has previously been gathered off the west coast of Ireland "at depths of from 700 to 1000 fathoms" at five stations "but very few specimens were found on each occasion". Wolfenden's specimens, which on account of the different shape of the genital somite (Pl. XXXV fig. 3) cannot with security be referred to the same species, were gathered under the equator ca. 20° L. W. (depth 3000 m.)

53. Euchæte Hansenii n. sp.

(Text-figs 52 a—b.)

Description. Size: 8·9 mm.; anterior division 6·5 mm.; urosome 2·4 mm.

The shape of the body is like that of *E. norvegica*. The anterior division is 2·7 as long as the urosome, which is only a little longer than the width of the thorax. The proportional length of the abdominal somites is 45, 26, 25. The *genital somite* is, laterally, more suddenly convex than in *E. Sarsi*, and, as in this, the greatest width lies in the proximal part; the genital somite is 1·3 as long as wide, but only 1·1 as long as deep. The lateral conical process which characterises *E. barbata* and *Farrani*, is wanting. In lateral view the genital protuberance differs distinctly from that of *E. Sarsi* by the straight, not concave, anterior process, and by a fairly distinct process behind and above the second one, sometimes indicated in *E. Sarsi*, which, as usually, represents the posterior border of the vulva. The ventral surface is quite different; the triangular plate in front is divided into three processes; the transverse plate has posteriorly a median incision, on each side of which are two lobes (text-figs 52 a—b). — The *antennulae* scarcely extend to the end of the cephalo-thorax; the appendages are scarcely different from those of *E. norvegica;* the segment 19 is 1·1 as long as the segments 24 ∾ 25. The *maxillulae* possess in Le 1 two basal, fairly long and slender, setae, followed by 6 powerful seta and one terminal somewhat shorter one; the Basip. has 5, the Ri I 3, Ri II 4 and the Ri III 3 setae. The articular membrane between Re I—II is barely indicated, and the Se is long and slender. The Se of Re I is fairly long, and extends almost to the base of Se 1 Re III, and the Se 2 Re III extends to the base of Se 3.



Text-fig. 52. *Euchæte Hansenii* n. sp.
a. f♀. Abdomen × 16. b. Vulva in ventral view × 180.

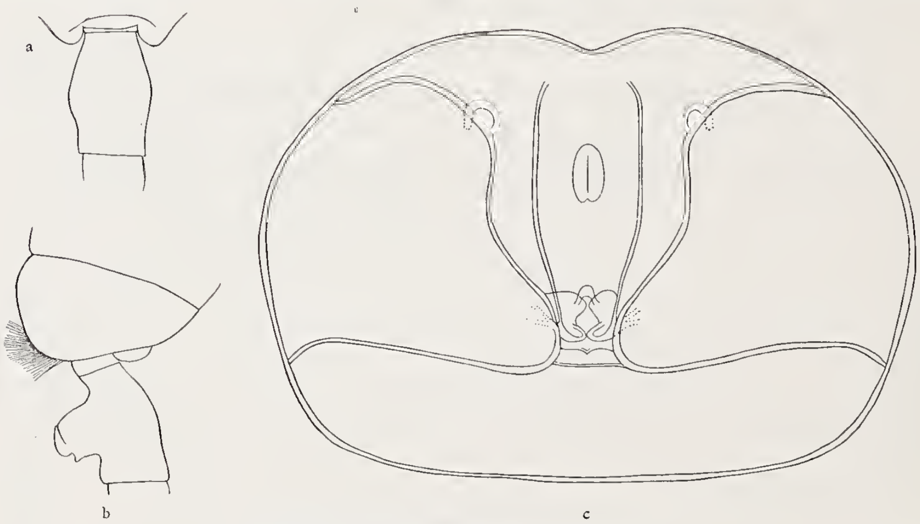
Remarks etc. Of this species the S/S Thor has $^{29}/_{8}$ 1905 St. 165 60°00 L. N. 10°35 L. W. taken a single mutilated female. This species is nearly related to *E. Sarsi*, but it easily distinguished by the smaller size, by the structure of the genital somite, by the 9 setae in the Le of the maxillulae, and by the well developed Se Re I pes I.

54. Euchæte Bradyi n. sp.

(Pl. VI fig. 9 a; text-figs 53 a—b).

Description. Size: 8·0 mm.; anterior division 5·5 mm.; urosome 2·5 mm.

The anterior division is about 2·2 as long as the urosome, which is about as long as the abdomen is wide. The lateral corner is rounded, with a heavy tuft of hairs. The proportional length between the abdominal somites is 40, 25, 25. The ventral surface of the three last abdominal somites possesses a number of short delicate hairs. The *genital somite* is 1·6 as long as wide, but, on account of the high ventral protuberance, only 1·1 as long as deep; no posterior process is found on the left side. The subapical seta is broken, but is probably longer than St. 2. The anterior flange on the side of the vulva is rather short, with a somewhat convex outline, when observed in lateral view; the posterior margin is rather prominent. The vulva is covered by the lateral flanges, in any case in front, to a greater extent than in the other species; the triangular plate in front is indistinctly developed; posteriorly a median incision is found, on each side of which a complicated chitinous framework is found (text-figs 53 a—c).



Text-fig. 53. *Euchæte Bradyi* n. sp. f♀.
a—b. Abdomen × 16. c. Vulva from below × 180.

The *antennulae* extend somewhat beyond the end of the abdomen; the appendages are like those of *E. norvegica;* the segments $24 \backsim 25$ are 1·1 as long as segment 19. The Le of the maxillulae possess two short and 5 long setae; the basipodite has 5, and the Ri $3 + 4 + 3$ setae. The other mouthlimbs do not show features of any interest.

The articular line between Re I—II *pes I* is indistinctly marked; the Se Re I is wanting, and the concavity distal to its usual insertion is only moderate. The exterior outline of the Re III, which in most species is more or less straight, is moderately convex towards the middle, and the usual glandular pore is not seen. The Se Re II of the *pes II* extends almost to the tip of the Se 1 Re III, and the Se 2 of this segment extends somewhat beyond the middle of the third division, but not to the end of the segment.

The anterior surface of the *labrum* has on each side, posteriorly, an area covered with fairly long hairs; this group is almost fused with a transverse row of rather short hairs, which, without interruption, is continued from right to left. The oral surface has in the lateral group 40—50 short spine-like hairs placed in a curved row; in the middle two distinct transverse rows, as seen in fig. 9 a. The groups I—II, in the longitudinal series, meet as in *Euc. norv.* under an angle; the groups III—IV have a smooth area in the middle, while the groups V—VI are compact. The groups of hairs in front of the lamina labialis are in most respects like fig. 3 b, but the lateral posterior group is more elongate, and consists of fewer hairs.

Remarks etc. Of this species I have only examined a single female, taken $^{24}/_{7}$ 1896 St. 118 68°27 L. N. 8°20 L. W. Closing net 1030 fathoms by the Ingolf Expedition; it is probably nearly related to *E. barbata,* but differs distinctly from it by the deep genital protuberance.

55. Euchæte bisinuata G. O. Sars.

(Pl. VI figs 11 a—e; text-figs 54 a—j).

1907. Euchæte bisinuata n. sp. G. O. Sars, p. 12.
1908. — — G. O. Sars. Farran, p. 45, pl. III figs 17—19, pl. IV fig. 4.
1909. Euchæte bisinuata G. O. Sars. A. Scott, pp. 70—71, pl. XVI figs 10—17.

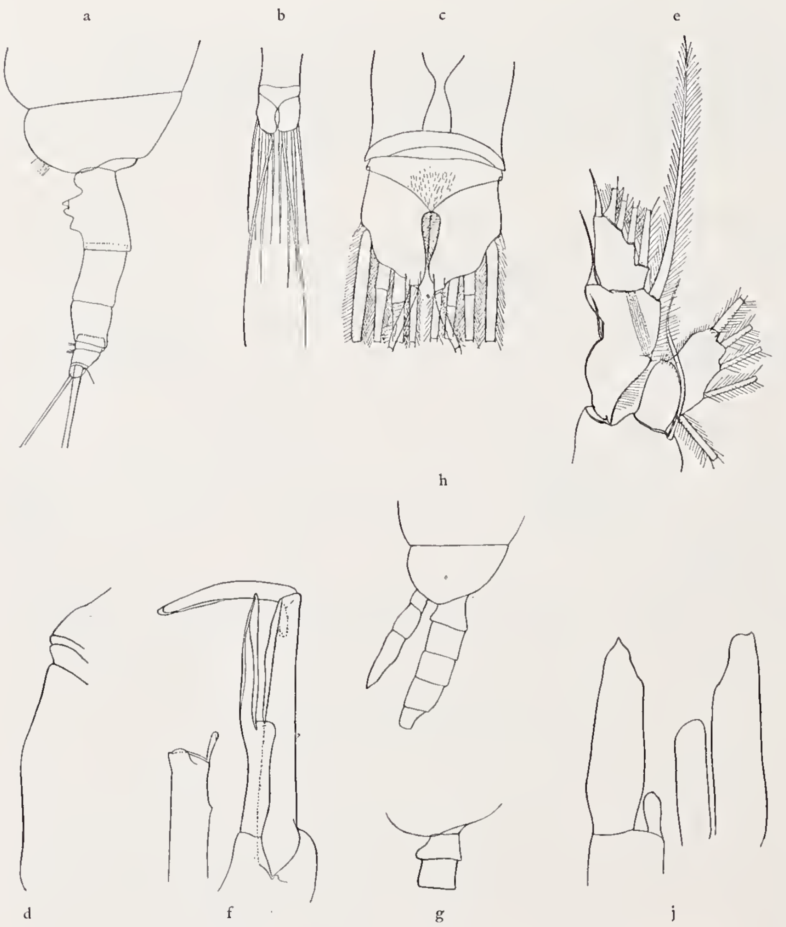
Description. f♀. Size: 5·62 mm.; anterior division (2·58 + 1·59) = 4·17; urosome 1·45 mm. Sars' specimens measured 5·2 mm.; Scott's 5 mm.

The anterior division, which is distinctly twice as long as the urosome, is rather short and clumsy with the lateral corners regularly rounded.

The genital somite is, seen from above, slightly asymmetrical with a well marked convexity in front, somewhat behind the base of the somite (text-figs 53 a—c). The ventral outline shows 3 characteristic lobes, as figured by Farran and Scott. The posterior border of the vulva is formed by a transverse, somewhat hollowed, ridge, which is gradually sloping forwards. In front of this, and on each side are a median and an anterior laminous process, of which the latter is the longer and thinner; the processes on the left side are comparatively shorter, and are placed more posteriorly; in ventral view they are seen to be turned towards the middle, thus partly covering the vulva. The third and fourth somites are almost smooth, and without any hairs below, in contrast to the fifth somite, which has ventrally a tuft of hairs; it is dorsally almost completely covered by the preceding tergite. The subapical seta is thinner but not very much longer than the St. 2, and it is not geniculated.

The *antennulae* extend almost to the tip of the anterior part; they are in the main like *E. norv.,* but the segments 24 ∾ 25 are just as long as segment 20, and 23 is a little longer than 16, which is as long as 17. The antennae and mandibulae do not show any features of interest. The Le 1 of the *maxillulae* bears 6 bristles of almost equal width basally, but the distal bristle is much shorter than the others, which are much longer than the breadth of the maxillulae. The Li 1 has the usual 10 hairs anteriorly, but only two posteriorly; the Li II as well as Li III is well developed, and each bears a long seta. The basipodite III has 3 setae with short hairs, of which the distal is the longest. The Ri I has 2 rather slender and a single powerful seta, while the Ri II ∾ III have 4 powerful ones. The convexity of the exterior margin in the basal segment of the *maxillae* is just indicated (text-fig. 54 d). The *pes I* has only the limitation between Re I—II indicated, where the muscle is fastened inwards; the articulation between the Re II and III is well marked anteriorly, but only indistinctly so posteriorly (text-fig. 54 e). The exterior border has a well marked concavity (as shown in Farran's fig. 18 in contrast to Scott's fig. 15) and a long and slender Se 1, almost reaching the base of Se 2. The *pes II* is like the figures of the two authors; the Se Re II scarcely reaches the end of the Se 1 Re III, and Se 2 Re III scarcely reaches the end of Se 3.

The epistoma and the anterior surface of the *labrum* are scarcely different from those of *E. norv.* The oral surface of the *labrum* (fig. 11 a) shows a distinct difference from that of *E. norv.*, as is realised by comparing figures; the most characteristic feature is the lateral position of the first group, in front of which, behind the marginal fringe, a granular area is found. The usual spinous area behind the median spot Nr. 4 is wanting. The *lamina labialis* is, as seen in fig. 11 b, somewhat different from *E. norv.*, but more interesting is the large lateral group of hairs almost completely fused with the median group, situated in front of the lamina. The lobus labialis has the posterior lateral group well developed.



Text-fig. 54. *Euchæte bisinuata* G. O. Sars.

a. f♀. Abdomen × 18. b—c. f♀. Furca × 18 and 57. d. f♀. Maxilla dext. from behind × 57. e. f♀. Pes I × 57. f. f♂. Pes V in anterior view × 75. g—h. y♀—♂ (St. V). Abdomen × 16. j. y♂ (St. V). Pes V × 57.

♂. Size: 4·8 mm.; anterior division (2·2 + 1·4) = 3·6 mm.; urosome 1·2 mm.

The body is rather clumsy, and about 3 times as long as the urosome; no difference was found between the lateral corners on the right and left side, and no tooth was observed. The genital somite is distinctly asymmetrical, as it is produced behind on the right side. The subapical seta is as usual in the male short and thin.

The *maxillulae* are as a whole less developed than in the male of *E. norv.*, and differ in minor points. The Le I has, in addition to the 5 long setae, a delicate basal one, and the Basp. has only a single seta. The Basp. II of the *maxillipeds* has in the lob IV only a single hair in addition to a hooked clumsy organ surrounded by delicate hairs (fig. 11 c).

The *pes I* has no Se in the first segment, which is well separated from the second by a complete articular membrane; the Se 2, which is short and strong, is placed on the somewhat produced exterior corner of Re II. The *pes II* has, in contrast to the female, the Se Re II very short and the Se 2 Re III does not reach the end of the segment. The pes V (fig. 54 f) resembles in most respects that of *E. norv.* The Ri dext. is long and slender, consisting of a single segment, but divided into two, about equal, divisions (of which the posterior is the more slender) by an exterior rounded eminence, which is indicated in *E. glacialis.* The Re I ∾ II of the right leg, which is 1·5 as long as the Re III, shows by an indistinct incision indication of subdivision into a basal and a terminal segment; a small Se Re I is found. The Ri sin., which is short and club-shaped, shows trace of segmentation only towards the tip, and has terminally a very minute spine. The tip of the left exopodite is, as seen by comparing the figures (Pl. VI figs 11 d—e), like that of *E. norv.*, but differs distinctly by the short and clumsy form of the serrated interior lobe with two distal rows of larger and smaller teeth converging towards the end, and by the comparatively long hairy appendage (text-fig. 54 f).

Y♂♀ (St. V). Size: ♀ 4·11 mm.; anterior division (2·09 + 1·01) = 3·1; urosome 1·01 mm.

In two female specimens the first abdominal somite is distinctly produced below, in a single male scarcely so (text-figs 54 g—h). The measurements of the *antennulae* and the structure of pes I—II are scarcely different from those of adult females. The pes V ♂ does not provide features of great interest (text-fig. 54 j).

Y♀ (St. IV). Size: 3·36 mm.; anterior division 2·5 mm.; posterior 0·86 mm. A single female, which ought perhaps to be referred to this species, was examined.

Occurrence. The S/S Thor has taken $^{11}/_{7}$ 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 9 f♀, 4 f♂, 2 y♀ (V), 1 y♂ (V), 1 y♀ (IV).

It has previously been recorded by Sars from several stations, from the Monaco Expedition, by Farran "in small numbers at three stations" off the west coast of Ireland as far north as 55° N. (10°45 W.) "at depths between 700 and and 1150 fathoms", and by Scott, taken by the Siboga Exp., from 5 stations (1—2 specimens) in considerable depths.

Remarks. As the described males and females were found together, as they corresponded fairly well to each other in size, and as I did not find any species to which the males are more naturally referred, I have referred them to the same species, in spite of a rather curious difference found in the structure of pes I. The young specimens, on account of rounded lateral corners, size and similar structure of pes I—II, were referred to the same species.

In spite of minor differences from Sars' and Scott's descriptions, scarcely any doubt can exist, that the specimens examined by the different authors belong to the same species.

56. Euchæte gracilis G. O. Sars.

(Text-fig. 55.)

1894. Euchæte barbata Brady. Th. Scott, p. 58, pl. VI fig. 17.
1905. — gracilis n. sp. G. O. Sars, p. 16.
1908. — quadrata n. sp. Farran, p. 43, pl. III figs 20—21.
1911. Euchæte quadrata Farran. Wolfenden, pp. 297—298, fig. 39, Taf. XXXV fig. 1.

Description. f♀. Size of specimen from St. 88 was 6·74 mm.; anterior division (2·76 + 1·96) = 4·72 mm.; urosome 2·02 mm. Sars' specimens measured 6·6, Farran's 6·9, Wolfenden's 5·85—6 mm.

The shape of the body is practically like that of *E. norvegica.* The lateral corners are not regularly rounded as stated by the authors, but somewhat squarely truncate (text-fig. 55). The genital somite, which is distinctly shorter than the following two, but 1·5 as long as the second, has a very prominent and characteristic genital protuberance. The vulva is surrounded by a chitinous system distinctly more complicated than figured by Wolfenden; more exteriorly, along the lower margin, is found on each side a chitinous plate pointing forwards, which, somewhat in front of the middle, possesses a short, rounded process (cf. Wolfenden). As stated by Wolfenden, in contrast to Sars and Farran, hairs were found on the ventral surface in the third and fourth abdominal somites in most specimens.

The *antennulae* extend scarcely to the end of the thorax; the appendages are scarcely different from those of *E. norv.*, and the measurements are not very characteristic; the segment 20 is as long as the segment 24∾25, and the 23 as long as the 16. The antennae and mandibulae are scarcely different from those of *E. norv.* while the *maxillulae*, as pointed out by Farran, possess, in the Le 9 bristles, of which the 2 proximal are moderately short; the Basp. III has four setae and the three segments of Ri have three setae each. The maxillae and maxillipeds are like those of *E. norv.*, but the latter differ by the more slender spines of Ri.

The articulation between the Re I and II of *pes I* is anteriorly indicated outwards, and posteriorly inwards; the Se Re I is represented by a small protuberance. The Se Re II *pes II* extends almost to the tip of Se Re III, and the Se 2 extends just to the base of Se 3.

Text-fig. 55. *Euchæte gracilis* G. O. Sars. Abdomen × 16.

The shape of the epistoma is scarcely different from that of *E. norv.* The anterior surface of the *labrum* has the hairs somewhat differently placed; anteriorly, in the middle, a transverse row of short hairs is found, in addition to a more lateral group of rather long setae; laterally and more posteriorly an area covered with densely placed short spines is observed. The oral surface of the *labrum* and the labial lobes are scarcely different from *E. norv.*, and the area in front of the *lamina labialis* only differs by less regular lateral groups of hairs.

Occurrence. The Ingolf Expedition has not taken this species, but it has been gathered by the Thor at the following stations.

11/7	1904	St. 183	61°30 L. N.	17°08 L. W.	Yt.	1800 M.	Wire	1 f♀.
15/6	1905	St. 82	51°00 L. N.	11°43 L. W.	Yt.	1200 M.	Wire	3 f♀.
8/6	1905	St. 72	57°52 L. N.	9°53 L. W.	Yt.	1500 M.	Wire	1 f♀.
20/6	1905	St. 88	48°09 L. N.	8°30 L. W.	Yt.	300 M.	Wire	5 f♀ (2 with sperm).
21/6	1905	St. 90	47°47 L. N.	8°00 L. W.	Yt.	300 M.	Wire	2 f♀.

This species "was taken in small numbers on five stations at from 350 to 700 fathoms" off the west coast of Ireland. It has also been gathered by the Prince of Monaco and the Gauss at several stations in the Mid-Atlantic.

Remarks. This species is probably identical with Sars' *E. gracilis*, as no difference was found between my specimens and Sars' rather incomplete description. From A. Scott's description it differs by the shorter antennulae and the hairy ventral surface of the abdominal somites III—IV. From Wolfenden's description of most of his specimens it differs by 9 instead of 7 setae in Le of the maxillulae, and by the comparatively shorter Se 2 Re III pes II; as, however, one of Wolfenden's specimens had comparatively long antennulae and comparatively short Se 2 there is reason to suggest that the value of these characters ought not to be exaggerated.

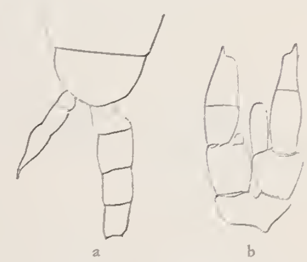
57. Euchæte acuta Giesbrecht.

(Pl. VI figs 12 a—c; text-figs 56 a—b.)

1892. Euchæte acuta n. sp. Giesbrecht, p. 246, Taf. 16 and 37.
1898. — — Giesbr. Giesbrecht & Schmeil, p. 38.
1903. — — — J. C. Thompson, p. 18.
1903. — — — J. C. Thompson & A. Scott, p. 244.
1904. — — — Wolfenden, p. 111.
1904. — — — Cleve, p. 190.
1905. — — — G. O. Sars, p. 4.
1905. — — — Farran, p. 35.
1905. Euchæte acuta Giesbr. Esterly, p. 157 fig. 23.
1906. — — — Pearson, p. 17.
1908. — — — Farran, p. 40.
1908. — — — v. Bremen, p. 51, fig. 56.
1909. — — — A. Scott, p. 65, pl. XX figs 1—9.
1909. — — — Pesta, p. 23.
1911. — — — Wolfenden, p. 299.
1912. — — — Pesta, p. 22.

Description. f♀. Size: 4·02 mm.; anterior division (1·7 + 0·97) = 2·67 mm.; urosome 1·35 mm. Giesbrecht's specimen measured 4·1 mm., Farran's 4·4 mm. and Scott's 4·2 mm.

The genital area has on each side of the vulva a lamina-shaped process, somewhat larger on the right side; the outline is, as shown in fig. 12 a, somewhat different from Giesbrecht's fig. 47 (Taf. 37). Scott's fig. 4 of the abdomen in dorsal view differs distinctly by the presence of a right lateral process (may possibly be the process on the right side of the vulva, which is visible when the animal is not examined in complete dorsal view). The subapical seta is much longer than the St. 2.



Text-fig. 56. *Euchæte acuta* Giesbr. Y♂ (St. V).
a. Abdomen ⨉ 18. b. Pes V in anterior view ⨉ 33.

The *antennulae,* mouth-limbs and natatory limbs are scarcely different from Giesbrecht's description.

The epistoma and the anterior surface of the *labrum* do not show any features of interest. The hairs on the oral surface of the labrum show a rather simple arrangement. The group 1 is, as usual, placed somewhat laterally, but is not distinctly separated from the group 2; the groups 3—4 are small and well marked out; the group 5 is fairly big. The transverse row behind the median spot Nr. 3 is short and narrow. No lateral group was observed (cf. fig. 12 b). The lateral group in front of the *lamina labialis* (fig. 12 c) consists of small granules, and is well separated from the median groups; these consist, as shown in fig., of fairly long hairs; the inner group of granules anteriorly was not observed.

Y♂ (St. V). Size: 3·72 mm.; anterior division 2·68 mm.; urosome 1·04 mm.

The lateral corners are rounded. The subapical setae are, as in the adult females, stronger as well as much longer than the St. 2. The *antennulae* extend scarcely to the end of the anterior division. The appendages are scarcely different. The structure of the *fifth foot* is seen in text-figs 56 a—b.

Occurrence. The species was not gathered by the Ingolf Exp.; but, as it was found by the Thor at the following 3 stations, I have included it here.

$^{15}/_{6}$ 1905 St. 82 51°32 L. N. 11°43 L. W. Yt. 1200 M. Wire 1 f♀.
$^{20}/_{6}$ 1905 St. 88 48°09 L. N. 8°30 L. W. Yt. 300 M. Wire 15 f♀ + 1 y♂.
$^{21}/_{6}$ 1905 St. 90 47°47 L. N. 8°00 L. W. Yt. 300 M. Wire 1 f♀.

Distribution. This species has been taken off the west coast of Ireland, in the Mediterranean, in the South Atlantic as far south as 25° L. S., in the Indian ocean, and in the Pacific.

58. **Euchæte hebes** Giesbrecht.

(Pl. VI figs 13 a—b; text-fig. 57.)

1888.	Euchæte hebes n. sp.	Giesbrecht, p. 337.	1905.	Euchæte hebes Giesbr.	G. O. Sars, p. 4.
1892.	— — Giesbr.	Giesbrecht, p. 246, Taf. 15 and 37 figs 15—16.	1906.	— — —	Norman & Scott, p. 128.
1894. ?	— — —	Th. Scott, p. 59, pl. VI figs 18—19.	1908.	— — —	v. Bremen, pp. 51—52 fig. 57.
1898.	— — —	Giesbrecht & Schmeil, p. 39.	1909.	— — —	Pesta, p. 24.
1903.	— — —	Lo Bianco.	1910.	— — —	Steuer, p. 24.
1905.	— — —	Gough, p. 336, figs 4—7.	1911.	— — —	Farran, pp. 94—95.
			1912.	— — —	Pesta, p. 22.

Description. f♀. Size: 3·54 mm.; anterior division (1·56 + 0·99) = 2·55 mm.; urosome 0·99 mm. Giesbrecht's specimens measured 2·85—2·95 mm.

Near the lateral margin of the last thoracic somite is found, dorsally, a membranous fringe bearing short hairs; it is not equally prominent in all specimens, but generally more so than shown in fig. 13 a. The abdominal somite I ∾ II has, dorsally, a characteristic process, and, on each side of the vulva lamelli-form processes more developed, on the right side. One of the 6 apical setae of the maxillae shows the structure characteristic of *Pareuchæte* with several short teeth and a few larger branches. The number of glandular pores in the legs scarcely differs from those of *E. norv.*, except by the absence of any pore at the base of Se 1 Re III.

Text-fig. 57. *Euchæte hebes* Gbt. Y♂ (St. V). Pes V × 39.

The epistoma and the outer surface of the *labrum* are in main features like those of *E. norv.* The oral surface has the two first groups placed rather longitudinally, and the three following ones fairly well separated. The area in front of the *lamina labialis* is, as shown in fig. 13 b, rather characteristic, especially by the lateral group of hairs, which is a longitudinal series in continuation of the serrula 6-dentata.

♂. Size: 3·03 mm.; anterior division (1·35 + 0·78) = 2·13 mm.; urosome 0·9 mm. Giesbrecht's specimens measured 2·75 mm.

Lateral corners are rounded and somewhat more produced on the right than on the left side; on both sides is, dorsally, the usual fairly well developed tooth. The first abdominal somite has on each side, dorsally, a similar tooth as in *E. norv.* The *antennulae* reach distinctly beyond the end of the cephalo-thorax; the segments 12—13 are, posteriorly, indistinctly separated, and more so on the left side.

The Re I of *pes V* has a fairly well developed Se.

♂ **(St. V).** Size: 2·68 mm.; anterior division (1·19 + 0·75) = 1·94; urosome 0·74 mm.

The lateral corners of the thorax are regularly rounded without the mentioned hairy fringe. The subapical seta of the furca is only a little longer than the St. 2. Pes V differs from *E. norv.* by a more rounded Ri sin.; the outlines of the exopodites are, as realised by comparing text-figs 47 i and 57, somewhat different.

Occurrence. Within the area explored by the Ingolf Exp. this species has not been taken; but, as it has been gathered by the S/S Thor 21/6 05 St. 90 47°47 L. N. 8°00 L. W. (viz: 23 f♀ (2 with egg-sacs), 2 f♂, 1 y♂ (V)), I have included it here. As the species has only been found in the Mediterranean and the East Atlantic, especially with moderate frequency off the mouth of the English Channel, and as it has not been recorded by Farran from the west coast of Ireland, Farran is probably right in regarding it as a member of the Mediterranean fauna in its wider sense (cf. p. 95).

Scolecithricidae.

59. Scaphocalanus magnus Th. Scott.

(Pl. VII figs 8 a—d; Pl. VIII figs 6 a—g; text-figs 58 a—k.)

1893. Amallophora magna n. sp. Th. Scott, p. 55, pl. VI figs 5—9.
1894. Scolecithrix cristata n. sp. Giesbrecht, pp. 252, Taf. II—III.
1898. — — Giesbr., Giesbrecht & Schmeil, p. 48.
1900. Scaphocalanus acrocephalus n. sp., G. O. Sars, p. 36, pls VII—IX.
1903. Amallophora magna Scott. G. O. Sars, pp. 51—53, pls XXXIV—XXXV.
1903. ♀ nec. ♂ Scolecithrix cristata Giesbr., J. C. Thompson, p. 21.
1904. Amallophora magna Scott. Wolfenden, p. 111.
1905. Amallophora magna Scott. G. O. Sars, p. 5.
1905. Scolecithrix cristata Giesbr. Farran, p. 36.
1906. — magna Scott. Esterly, p. 66, pls 9, 11—13.
1906. Amallophora — — Pearson, p. 17.
1907. — — — Koefoed & Damas, p. 410.
1908. Scolecithrix — — Farran, pp. 51—52.
1908. — — — v. Bremen, p. 76 fig. 89.
1909. Scaphocalanus magnus Th. Scott. A. Scott, p. 97.
1911. Amallophora magna Scott. Wolfenden, p. 262.
1913. — — — Stephensen, pp. 313—314.

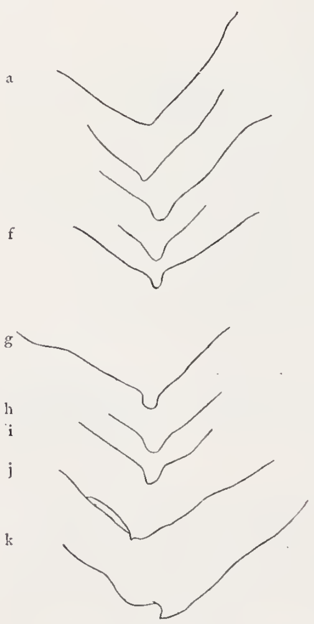
Description. f♀. Size of specimen from Thor St. 183 was 5·23 mm.; anterior division 4·08 mm.; urosome 1·15 mm. Sars' specimens measured 5 mm., Giesbrect's and Scott's 4·5 and Wolfenden's 3·7 to 4·25 mm.

The lateral corners of the thorax are triangularly produced and more or less rounded; but the shape is, however, as seen in text-figs 58 a—i, rather variable, and in some specimens rather suddenly produced. The third basipodite of the *mandibulae* is less elongate than figured by Sars, and has two, not one, setae interiorly; the first inner segment has two terminal setae, and the second has nine. The *maxillulae* are scarcely different from Sars' figure; the third basipodite has five setae as shown in Giesbrecht's fig. 1 Pl. III, not 4 as mentioned in the text. The Li 1 bears 10 setae anteriorly and 3 posteriorly. The *maxillae* and *maxillipeds* scarcely differ from Sars' figures.

The *second pair* of legs shows a few features not mentioned in Sars' description. On the anterior surface of the three outer as well as of the three inner segments groups of short teeth are observed; the first inner segment has, as seen in fig. 8 b, a small outer tooth, which was, however, wanting in another specimen. The first outer segment shows also a few spines on the posterior surface. The anterior surface of the third as well as the fourth foot is, as mentioned by Giesbrecht, covered all over with small teeth. The marginal setae of the second basipodite in the fourth pair of legs are poorly developed or wanting. Glandular pores were not observed, except one in the outer margin of the third outer segment of the first pair of legs. The *fifth pair* of legs is in most specimens like that figured by Sars, but it is often rather asymmetrical, and the outer seta extends sometimes beyond the end of the segment, and is sometimes much shorter.

The elevation in front of the labrum, corresponding to the antennal segment, is slightly raised (Pl. VII fig. 8 a); the labrum proper, which is produced in front as a rounded protuberance; is by an anteriorly convex line divided into an anterior and a posterior smaller part; the labrum proper is beset with a number of shorter and longer bristles, the somewhat complicated arrangement of which is most easily understood by studying fig. 8 c.

The oral surface of the *labrum* (Pl. VII fig. 8 d) shows a rather characteristic structure; the longitudinal series on each side consists anteriorly of an oblique group of fairly long and strong spines; behind this two or three groups of comparatively long and slender setae are found, followed by a more medially placed, almost square, area of short spines; behind the last mentioned group, which is only separated from the corresponding one of the other side by a narrow smooth area, an oblique one covered with delicate hairs is found. The *lamina labialis* seems to be represented by a very short transverse plate; in front of it and the serrula 6-dentata a medial short row of fairly long setae and a longer curved lateral one of shorter setae are found. Behind the lamina labialis and between the serrulae is found on each side a short group of strong spines, almost fused with the corresponding one of the other side, as well as a more posterior and lateral group. The arrangement of the delicate hairs behind, as well as upon, the labial lobes consists, as in *S. ovatus* (fig. 14 b) of a median and, on each side, a lateral group, in addition to more laterally placed scattered setae.



Text-fig. 58.
Scaphocalanus magnus T. Scott.
a—i. Left lateral corner in 8 different adult females × 59.
j—k. Same of two young males (St. V) × 59.

f♂. Size of specimen from Thor St. 214 was 4·74 mm.; anterior division 3·14 mm.; urosome 1·6 mm. Sars' specimens measured 4·5 mm.

The fifth thoracic somite is well marked out, and its lateral corner is rounded. The comparative length of the abdominal somites and the furcal rami is 15, 83, 47, 52, 10 and 20.

The *antennulae* extend somewhat beyond the end of the thorax, and are distinctly attenuated towards the end; they are proximally to segment 14 slightly curved, and the proximal portion forms an obtuse angle with the more attenuated distal portion. The segments 8 ∾ 9 are completely fused with segments 10—12; the segment 13 is well separated, and the segments 21—21 generally so. "Æsthetasken" are beyond segments 8 ∾ 9 only observed in segments 12, 14, 15, 16 and 25. The *antennae* have comparatively long setae, and the second outer segment is distinctly restricted in the middle. The manducatory part of the *mandibulae* is more soft-skinned than in the female, and has less powerful teeth; the third basipodite is much wider than in the female, almost as wide as long, and has the inner setae short and delicate. The *maxillulae* are more elongated, and their setae are less powerful than in the female; the Li II has only a single seta, the Basp. III has only 4, and the Ri I has 2 for 3. The *maxillae* are in general shape like those of the females, but their appendages are less developed. The *maxillipeds* are as figured by Sars, but are more slender and delicate.

The natatory legs are scarcely different from those of the female.

The *fifth pair* of legs is scarcely different from Sars' figure; the terminal attenuated part of the right endopodite is articulated, and corresponds to the third segment.

Y♂♀ (St. V). Size of male from Thor St. 183 was 3·94 mm.; anterior division 3·04 mm.; urosome 0·90 mm. Another specimen measured 4·12 mm.

The shape of the body is in the main like that of the adult females, but the articular line between the head and the first thoracic tergite is fairly distinct; the fifth thoracic somite is well marked in front with produced pointed lateral corners directed somewhat downwards (text-figs 58 j—k; Pl. VIII fig. 6 f).

The *antennulae* almost reach the end of the body; the other appendages are scarcely different from those of the adult female; the spinulation of the anterior surface of the natatory legs is well developed.

The only difference between the sexes is found in the fifth pair of legs, which in the male has 2 fairly elongated basal segments and a two-segmented exopodite in addition to a somewhat shorter endopodite (Pl. VIII fig. 6 g).

Variation. In an adult female from Thor St. 183, which had the lateral corner of the thorax produced as in text-fig. 58 g, but in no other respects differed from the described specimens, the fifth pair of legs was distinctly asymmetrical with a rudimentary endopodite (Pl. VIII fig. 6 c); in another female (Nr. 2) with the same shape of the lateral corner, the pes V was symmetrical and like the right leg in Nr. 1, but with strong inner seta and rudimentary outer one; in a third specimen, like the others from St. 183 (Nr. 3), a fairly well developed endopodite was found, and two Se were present in the exopodite; in a fourth specimen from Thor St. 152 (Nr. 4) with the lateral corner like text-fig. 58 b, the third outer segment has two terminal setae, but no endopodite was found. The pes IV in an abnormal specimen is seen in fig. 6 b (Pl. VII).

Occurrence. The Ingolf Expedition has not gathered any specimen of this species, probably because it prefers the deeper strata, at least in the northern regions; by the Thor it has been gathered at a good many localities. It is rather curious, that the young males of the penultimate stage are much more common than the young females; of the examined 34 young specimens only 5 were females.

In Denmark Strait:

19/6	1904	St. 152	65°00 L. N.	28°10 L. W.	Yt. M. Wire	18 f♀, 3 y♂ (V).
					Yt.?	2 y♂ (V).
21/6	1904	St. 154	65°27 L. N.	27°10 L. W.	Yt.?	1 f♂.
20/6	1904	St. 150	65°50 L. N.	20°53 L. W.	Yt.?	12 f♀ (1 sp.), 1 y♂.

South of Iceland the species was taken at 3 stations viz:

1/9 1904 St. 285 62°49 L. N. 18°46 L. W. Yt. 500 M. Wire 6 f♀, 2 y♀, 6 y♂.

11/7 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 28 f♀ with rounded lateral corner, 15 f♀ with lateral corner more or less produced and 3 f♀ with Ri pes V, 1 f♂, 2 y♀ (V), 11 y♂ (V).

24/5 1904 St. 104 62°47 L. N. 15°03 L. W. Yt. 1500 M. Wire 25 f♀, 1 y♂.

In the Iceland—Færoe channel it was taken at 4 stations viz:

29/8	1905	St. 165	60°00 L. N.	10°35 L. W.	Yt. 1000 M. Wire	1 f♀.
1/9	1905	St. 167	57°47 L. N.	11°33 L. W.	Yt. 1500 M. Wire	27 f♀, 1 y♀, 2 y♂.
9/5	1904	St. 70	63°32 L. N.	6°20 L. W.	Yt. 100 M. Wire	1 f♀.
23/7	1905	St. 124	61°04 L. N.	4°33 L. W.	Yt. 1000 M. Wire	2 f♀.

North-east of Iceland:

$^{22}/_7$ 1904 St. 214 67°19 L. N. 17°55 L. W. Yt. 800 M. Wire 19 f♀, 1 f♂, 1 y♂ (V).

Outside the Ingolf area the species was captured:

$^{15}/_6$ 1905 St. 82 51°00 L. N. 11°43 L. W. Yt. 800 M. Wire 1 f♀, 1 y♂ (V).
Yt. 1200 M. Wire 4 f♀, 4 y♂ (V).
$^{8}/_6$ 1905 St. 72 57°47 L. N. 11°33 L. W. Yt. 1500 M. Wire 35 f♀, 1 f♂, 2 y♀, 10 y♂.
$^{20}/_6$ 1905 St. 88 48°09 L. N. 8°30 L. W. Yt. 300 M. Wire 1 f♀.

Distribution. This species seems to have a world-wide distribution; it has been found, though rather scarce, generally in considerable depths in the Antarctic seas (65° S. 85° E.), in the Atlantic, south as well as north, even at the Equator (c. 30° L. W.), in the Arctic seas, in the Malay Archipelago, in the Gulf of California between 50 and 300 fathoms (Esterly 1912, p. 321) and in the Pacific (35° L. N. 125° L. W. 0—300 m.). According to Farran (p. 52) it is "a very common and noticeable species in deep water" off the west coast of Ireland, "it occurred on every station and in almost every tow-netting between 280 and 1150 fathoms". The species was sometimes found in the Norwegian Sea between 200 and 1000 metres as well as in the deep Norwegian fjords. By the Duc d'Orléans it was taken at eleven stations (in about 15 samples) in the ocean east of Greenland between about 200 and 1800 metres; it is rather curious that it was never found farther east than 9°00 L. W. at 75°55 L. N.; it was found near the coast of Greenland and as far north as 78°13 L. N. It was found as far south as 71°22 L. N. (18°58 L. W.); only in a single sample St. 43 $^1/_8$ 1905 78°13 L. N. 16°31 between 310—475 meters was it found fairly common, males as well as females. By the Nansen's Expedition it was found fairly, abundant, sometimes up to the very surface of the sea as far north as 84° L. N. between 134 and 76 Long. E. These different facts indicate, as pointed out by Sars, that this form has its main area of distribution in the Polar basin, though it is found in small numbers in the deeper layers of the different seas.

Remarks. As the variations in the lateral corners, as well as in the fifth pair of legs in the females, are rather common, I did not find any reason to establish a new species for the three mentioned specimens with a well developed endopodite. The features which distinguish my specimens from Giesbrecht's *Sc. cristata* are enumerated above, and are too unimportant for establishing two species. Wolfenden's specimens from the Atlantic measured 3·7, and those from the Antarctic seas 4·25 mm., but he could not find any other characters, except in the comparative length of the spines of the fifth pair of legs, which, as shown above, are very variable.

60. Scaphocalanus brevicornis G. O. Sars.

(Pl. VII figs 7 a—b; textfigs 59 a—b).

1900. Scolecithrix brevicornis n. sp. G. O. Sars, pp. 46—47, pl. X.
1902? — — G. O. Sars. Th. Scott, p. 452, pl. XXV figs 1—2.
1903. Amallophora brevicornis G. O. Sars. G. O. Sars, pp. 53—54, pl. XXXVI.
1904? — — — Wolfenden, p. 137.
1907. Amallophora brevicornis G. O. Sars. Damas & Koefoed, p. 410.
1908. Scolecithrix gracilipes n. sp. Farran, pp. 52—53, pl. VI figs 1—4.
1908. — brevicornis G. O. Sars. v. Bremen, p. 78, fig. 90.
1913. Amallophora brevicornis G. O. Sars. Stephensen, p. 314.

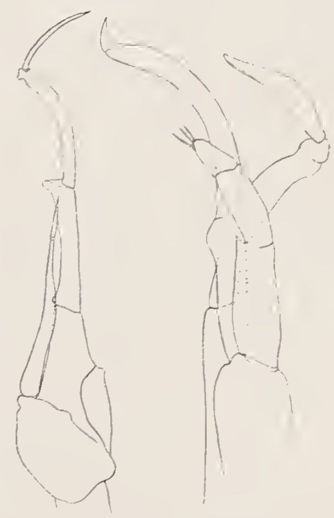
Description. f♀. Size of specimens from Ingolf St. 105 was 2·23 mm; anterior division 1·66 mm.; urosome 0·57 mm. Sars' specimen measured scarcely 2 mm.; Farran's 2·3—2·5 mm.

The shape of the body is scarcely different from Sars' figures; the appendages, as far as they were examined in the single mutilated specimen, were scarcely different; posteriorly, near the end of the second outer segment of the first pair of legs, a transverse row of short spines was found. The *fifth* pair of legs has on the left side the Se standing opposite the Si, as in Sars' figure, but on the right side it stands somewhat more distally.

f♂. Size of specimen from St. 82 Thor was 2·5 mm.; anterior division 1·65 mm.; urosome 0·85 mm. A male from St. 183 measured 3·3 mm.

The shape of the body is rather slender, very much like that of *S. magnus*. The distinction between the head and first tergite is indicated dorsally, and the fifth thoracic tergite, which is rounded, is well marked out. The *rostrum* consists of a basal bifurcate part, which is prolonged into a thin rather stiff filament on each side; the outline is, above the rostrum, at least in the single, somewhat mutilated specimen, somewhat concave. The abdomen (fig. 7 a) is distinctly half as long as the anterior division, and the comparative length of the somites is 7, 43, 27, 30, 4, and 10 for the furca, which is about 1·3 as long as wide.

The *antennulae*, which were broken, have the proximal segments like those of *S. magnus*. The *antennae* are scarcely different from those of the female. The manducatory part of the *mandibulae* is rather slender; the third basipodite is very short and robust; it possesses, somewhat beyond the middle, a single short hair and, more terminally, at least one quite rudimentary one. The *maxillulae* are well developed and in most respects like those of the female. The long well developed Li I has 10 short setae at least, the Li II has one, the Li III has 3 at least, and the third basipodite has 5; the Ri I has 2, and the Ri III ∼ II have 5 setae; the exopodite has 7 well developed setae. The *maxillae* and *maxillipeds* are in most respects like those of the preceding species.



a b

Text-fig. 59. *Scaphocalanus brevicornis* G. O. Sars. f♂.
a. Pes V dext × c. 150. b. Pes V in situ from the left; terminal segments × c. 250.

The *natatory* legs were scarcely different from those of the female; on the posterior surface of the third outer segment in the first pair of legs no spines were observed. The fifth pair of legs (fig. 7 b and text-fig. 59 b) is in the main like those of the preceding species, but differs, however, in a few respects. The inner terminal process of the first outer segment of the right foot is somewhat pointed, not rounded; the right endopodite has the two first segments somewhat convex with a small inner terminal process, which was not observed in the bigger specimen; the terminal segment is better articulated. The left right leg is scarcely different from that of the preceding species except in minor details, as seen when comparing figures (text-fig. 59 b); the left Re III has 3 fairly long setae.

Occurrence. The Ingolf Expedition has gathered a single mutilated female with closing net 700 fathoms 11/7 1896 St. 105 65°34 L. N. 7°31 L. W.

The S S Thor has gathered a single male:

$^{11}/_{7}$ 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire.
$^{15}/_{6}$ 1905 St. 82 51°00 L. N. 11°43 L. W. Yt. 1200 M. Wire.

Distribution. This species has been found at a single station in the Polar basin at about 84° L. N. and 90° L. E. In the sea between Spitzbergen and Greenland the Duc d'Orléans has between $^{12}/_{7}$ and $^{5}/_{8}$ gathered it at 4 stations, and sometimes in considerable numbers, males as well as young ones, f. inst. at St. 43 78°13 L. N. 16°31 L. W. 310—475 meters depth; the three other localities were at 79°39 L. N. 2°40 L. E. 1200—1800 Meters depth, at 78°05 L. N. 5°21 L. W. 500—1350 M. depth, and 71°22 L. N. 18°58 L. W. It has once been recorded from the Norwegian Sea in a depth of about 400 M., and from the west coast of Ireland at a depth lying between 280 and 680 fathoms, and always rather scarce.

Remarks. Though the males and the female were found at widely separated localities, I am fairly convinced that they belong to the same species, and without doubt to *S. brevicornis*. As the male described by Scott is only 1·5 mm., and as the fifth pair of legs seems to differ in several respects, I am not convinced that it ought to be referred to this species.

I am fairly convinced that Farran's species *S. gracilipes*, which was established with due reservation especially on account of "the more distal position occupied by the outer-edge tooth of the second joint of the fifth foot," is identical with this. Farran has (p. 53) found a rudimentary endopodite, like that observed in specimens of *S. magnus* (cf. p. 191) in a specimen of his *Scolecithrix gracilipes* as well as of his *S. valida*, which he regards as an anormality. In this, as well as in his opinion of Giesbrecht's genus *Racovitzanus*, I agree with him (cf. Wolfenden 1911 p. 259).

61. Scaphocalanus obtusifrons G. O. Sars.

(Pl. VII figs 9 a—d; Pl. VIII figs 8 a—e; text-figs 60 a—c and 61 a—d).

1905. Amallophora obtusifrons n. sp. G. O. Sars, p. 22.
1905. Scolecithrix emarginata n. sp. Farran, pp. 36—37, pl. VII figs 6—17.
1906. Amallophora obtusifrons G. O. Sars. Pearson, p. 17.
1906? Scolecithrix inornata n. sp. Esterly, p. 67, pls 9, 11 and 13.
1908. Scolecithrix obtusifrons G. O. Sars. Farran, p. 54.
1908. Scolecithrix obtusifrons G. O. Sars. v. Bremen, p. 25, fig. 87.
1909. Scolecithricella obtusifrons G. O. Sars. A. Scott, p. 92, pl. XXXI figs 1—9.
1911? Scolecithrix æqualis n. sp. Wolfenden, pp. 255—256, text-fig. 33.

Description. f♀. Size of specimen from Thor St. 72 was 4·4 mm.; anterior division 3·55; urosome 0·85 mm. Sars' specimens measured 5·6 mm., Farran's 4·3 mm. and Scott's 4·5 mm.

The shape of the body etc. is scarcely different from Farran's description; each filament of the rostrum is as stated by Sars and Scott terminally bifurcate (text-fig. 59 a). The genital somite is slightly produced below, and has a well developed curved receptaculum (Pl. VIII fig. 8 a).

The *antennules*, which extend a little beyond the end of the furca, are in measurement almost exactly like Farran's figures; the segments 24 and 25 are fairly well separated, the proximal seta is wanting in segm. 10 as well as in 17, and the Sp. of segment 24, which is placed near the tip, extends only slightly beyond the end of segment 25. The exopodite is distinctly longer than the endopodite of the *antennae*, and this has 7 setae in the Li of the second segment and 5 setae in the Le. The *mandibulae* are scarcely different from those of *S. magnus*. The *maxillulae* are like Farran's figure, with 8 setae in the exopodite and 7 long setae and a shorter more delicate one in Le. The *maxillae* have the exterior margin distinctly produced, and have, in addition to powerful vermiform sensory appendages, at least 5 amalliform or brush-shaped ones. The *maxillipeds* are like those of *S. magnus*, and have, in contrast to Farran's, a sensory seta in the middle of the second basipodite.

The *first pair of legs* has, as stated by Farran (fig. 14 Pl. VII), a well developed Se in Re I, attaining the middle of Re II. The *second pair of legs* is in main features like Farran's fig. 15 (cf. text-fig. 60 b), but the outer marginal tooth of the second basipodite is well developed, and the inner margin is near the tip produced into a short curved tooth; the arrangement of the spines on the posterior surface differs only in minor details, f. inst. by the presence of spines in Re I, but in addition to the spines areas of short teeth were found on the posterior surface of the exopodite; the anterior surface seems to be smooth; the first inner segment has a well developed Se; the St of the third outer segment has about 70 partly fused teeth (fig. 9 a) without the characteristic basal fenestra. Glandular pores seem to be present in Re II and III. The *third pair of legs* has the inner margin of the second basipodite, a little proximally to the Si, produced into a longer or shorter, generally broken, styliform process, corresponding to that of the second pair of legs; this process is beset inwards as well as terminally by the most distally placed marginal bristles, and in this way forms a prolongation of the inner margin proper; the third basipodite is anteriorly and terminally produced into a distinct slender spine medial to the insertion of the endopodite (text-fig. 60 c), like that of *Scottocalanus*. On the anterior surface of the third feet, except in the third outer segments, a delicate spinulation is found; the spinulation of the posterior surface is like Farran's description, but a basal group is found in the third outer segment. The *fourth pair* of legs (text-fig. 60 c) has the second basipodite very clumsy without marginal bristles, and is suddenly restricted near the tip; on the posterior surface transversely placed short spines were observed in Ri II, and in a less degree in Ri III, but the anterior surface is covered all over with areas of more or less delicate teeth; the serrations of the terminal setae are more or less fused in the middle; a glandular pore is observed not only in Re II and III, but in Re I as well. The *fifth pair* of legs has the exopodite divided into a short basal and a longer, somewhat enlarged outer segment, possessing a shorter terminal and a longer more proximal seta.

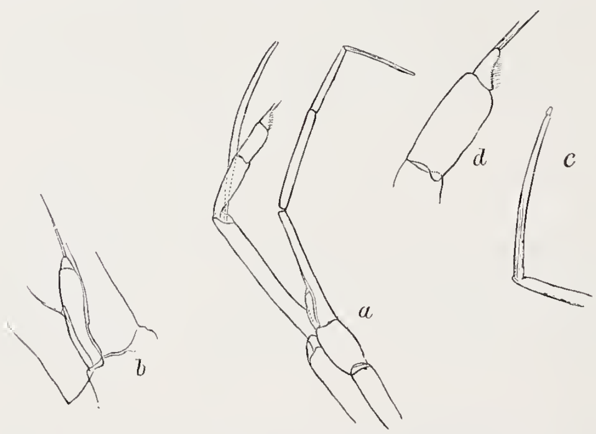
Text-fig. 60. *Scaphocalanus obtusifrons* G. O. Sars f♀. a. Head × 33. b. Pes II sin in ant. view × 58. c. Pes IV sin in ant. view × 58.

The anterior portion of the *labrum* proper is distinctly more produced in front than seen in fig. 8 a of *S. magnus*; the arrangement of the setae is, as seen in fig. 9 b, rather characteristic; the anterior curved group of long delicate setae is posteriorly on each side divided into an outer and inner portion; in the middle an anteriorly convex row is found; for further details I refer to the figure. The *oral surface* of the labrum (Pl. VII fig. 9 e) shows a rather characteristic structure, bearing most resemblance to that of *Scottocalanus*; the first oblique group of the longitudinal series is smaller than in *S. magnus*, and it is followed by two or three more or less fused groups of fairly long setae, between which the transverse median rows are placed, behind the mentioned groups an oblique one of more slender hairs, corresponding to the square one of *S. magnus* is found. Laterally, in front, two groups of delicate hairs are found. No distinct *lamina labialis* was observed; in front of the serrula 6-dentata an inner and an outer longitudinal series were found (Pl. VII fig. 9 d); the arrangement of hairs between and behind the serrulae was not studied in details. In the middle, between the labial lobes, a large median group of setae was found, which on each lobe is continued into two lateral series placed closely to each other; more laterally, well separated from this system, a lateral row of shorter setae, starting from a basal group, was observed.

The intestinal tract is anteriorly produced into a rather slender rostral coecal sac; posteriorly the wide stomach is attenuated, and is, somewhat in front of the abdomen, continued through a slight curvature into the straight intestine proper.

f♂. Size of specimen from Thor St. 180 was 3·84 mm.; anterior division 2·65; urosome 1·19 mm.

The body is somewhat more slender than in the female, with rounded lateral corners of the well marked short fifth somite; the rostral filaments are scarcely different. The *urosome* is almost half as long as the anterior division, and the comparative length of its somites is 23, 40, 34, 44 and 4 (Pl. VIII fig. 8 c).



Text-fig. 61. *Scaphocalanus obtusifrons* G. O. Sars f♂. a. Pes V × 58. b. Pes V dext. Ri × 150. c. Pes V dext. Re III × 150. d. Pes V sin. Ri × 150.

The *antennulae* scarcely extend to the end of the furca; the number of free segments is scarcely different from that found in *S. magnus*, but the segments 13 and 15 are partly fused with the preceding ones, as the articular line is wanting behind; the measurements and the appendages are very much like those of *S. globiceps*. The *antennae* and *mandibulae* are scarcely different from those of *S. magnus*. The *maxillulae* are fairly well developed; the Le possesses 9 setae; the Li I has at least 8 rather delicate setae, the Li II has 2 setae and the Li III has 4 setae; the third basipodite has 4 setae; and the Ri 2 + 5 setae; the exopodite has as in the female 8 setae. The *maxillae* are fairly developed, with 4 setae in each of the four proximal lobes; the lobe V has one spine somewhat stronger than the corresponding one of the lobe IV; the endopodite has 6 soft sensory setae, but not amalliform ones, the *maxillipeds* are like those of the male of *S. magnus*, but no setae were observed in the middle of the second basipodite.

The natatory legs show in all features of interest complete similarity to those of the female.

The *fifth pair* of legs is very characteristic, as seen in text-fig. 61 a; on the right side (Pl. VIII fig. 8 c) we have a long and slender first basal segment, followed by a well enlarged second segment. The right endopodite (text-fig. 61 b) is rather short, somewhat clavate, and has a slender, delicate seta almost half as long as the segment; the right exopodite consists of three long slender ones, of which the first is much the longer and thicker, while the third, somewhat plate-shaped one, is the shortest and most slender (text-fig. 61 c). The two basal segments on the left side are, like those of *S. magnus*, long and slender; the left exopodite has 3 segments (text-fig. 61 d), of which the third one, which is much the shortest, is distinctly attenuated, with a terminal seta; the left endopodite is long and slender and extends distinctly beyond the end of the exopodite.

Y♂♀ (St. V). Size of specimen (male as well as female) from Thor St. 152 was 3·65 mm.; anterior division 2·96 mm.; urosome 0·69 mm.

The abdomen has four somites, but in other respects scarcely any difference was observed from the adult females, except by the better developed articulation of the exopodite of the fifth pair of legs in the females (fig. 8e). The fifth pair of legs of the males is clumsy, and most similar to that of *Scottocalanus*, but has the setae better developed (fig. 8d Pl. VIII).

Occurrence. The Ingolf Expedition has not gathered this species, but the S/S Thor has brought it home from several localities.

In Denmark Strait it was found:

21/6 1904	St. 154	65°27 L. N.	27°10 L. W.			3 f♀.
19/6 1904	St. 152	65°00 L. N.	28°10 L. W.	Yt.	1000 M. Wire	12 f♀, 1 y♀ (V), 3 y♂ (V).

In the Atlantic, south of Iceland:

1/9 1904	St. 285	62°49 L. N.	18°46 L. W.	Yt.	500 M. Wire	1 y♀ (V).
10/7 1904	St. 180	61°34 L. N.	19°05 L. W.	Yt.	1800 M. Wire	1 f♀, 1 f♂.
11/7 1904	St. 183	61°30 L. N.	17°08 L. W.	Yt.	1800 M. Wire	7 f♀, 1 f♂, 2 y♀ (V), 2 y♂ (V).
24/5 1904	St. 104	62°47 L. N.	15°03 L. W.	Yt.	1500 M. Wire	10 f♀, 1 y♂ (V).

In the Iceland-Færoe channel:

29/8 1904	St. 165	60°00 L. N.	10°35 L. W.	Yt.	1000 M. Wire	1 f♀.
22/5 1904	St. 99	61°05 L. N.	9°35 L. W.	Yt.	1700 M. Wire	2 f♀, 6 f♂.
1/9 1905	St. 167	57°46 L. N.	9°55 L. W.	Yt.	1500 M. Wire	15 f♀, 1 y♀ (V), 1 y♂ (V).
8/6 1905	St. 72	57°47 L. N.	11°33 L. W.	Yt.	1500 M. Wire	14 f♀, 5 y♂ (V).

Distribution. "This species is a noticeable feature of the deep water plankton off the west coast of Ireland" "at depths of from 330 to 1150 fathoms" (Farran); it has been taken by the Monaco Expedition as well as in the Malay Archipelago.

Remarks. That this species is identical with Farran's *Sc. emarginata* is scarcely doubtful; Farran's specimens were identified by Sars with his *A. obtusifrons*, which is, however, distinctly bigger and has the fifth feet somewhat different "muni en dedans d'une épine assez forte et allongée, et en autre de 2 petits denticules, l'un apical, l'autre sortant du bord extérieur". It differs from Scott's description by the wanting delicate spinulation of the posterior surface of the fourth exopodite.

This species is nearly related to, if not identical with, Wolfenden's *S. aequalis* from the South Atlantic (1911, p. 255), as well as with *S. inornata* Esterly (1906, p. 67), but the descriptions are too insufficient for solving the question.

The species is characterised by the robust shape of the body and the antennulae, which are longer than the body, without Spr. in segment 17, and without setae in segment 10. The Se Re I pes I is comparatively short, and only attains the middle of the following segment, while the Se Ri I pes II is long and pointed. The St. Re III pes II has about 70 partly fused teeth. The inner terminal seta of the anterior surface of Basp. III—IV is well developed, long and slender. The second basipodite of the third pair of legs has a distinct lateral tooth, but no spinous lamina.

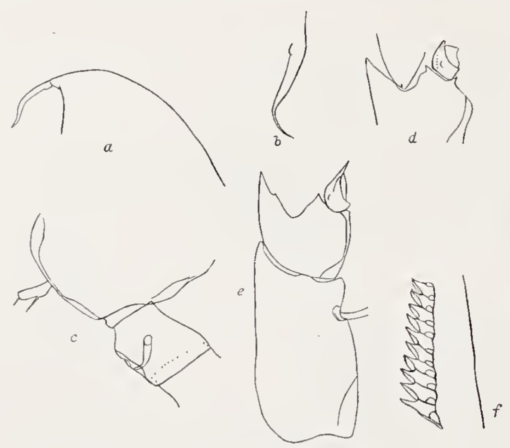
62. **Scaphocalanus validus** Farran.

(Pl. VII figs 11 a—b; text-figs 62 a—f.)

1908. Scolecithrix valida n. sp. Farran, pp. 55—57, pl. V figs 14—15, pl. VI fig. 7.

Description. f♀. Size of specimen from Thor St. 183 was 3·95 mm.; anterior division 3·1 mm.; urosome 0·85 mm. Farran's specimens measured 3·8—3·95 mm.

The body is more slender, and the head less suddenly raised in lateral view than in *S. obtusifrons*, but more distinctly so than in *S. globiceps* (text-figs 62 a—b). The rostrum is most like that of the former species, with the basal part less enlarged and with fairly long, apparently undivided, filaments. The lateral corners are slightly produced and rounded (text-fig. 62 c). The genital somite is better produced below, and its receptaculum seminis appears more slender than in the preceding species; the comparative length between the abdominal somites and the furcal rami is 45, 28, 25, 9 and 17; the furcal rami are 1·5 as long as wide; along the hinder border of somites II—IV a marginal seam with delicate serrations is observed.



Text-fig. 62. *Scaphocalanus validus* Farr. f♀.
a. Head × 33. b. Rostrum from the right × 59. c. Genital somite × 33. d. Pes II sin. in anterior view × 59. e. Pes III sin. × 59. f. St. pes II sin. × 150.

The *antennulae* do not reach the end of the furca; the segments 24—25 are fairly well separated; "Æsthetasken" are found in segments $8 \sim 9$, 12, 14 and 19; the segment 10 has a distinct seta, and a proximal seta is found in segments 12—14 18, and sometimes in segment 15, but never in segment 17; the Sp. of segment 24 is somewhat longer than segment 25. The segment 19 is distinctly 1·2 as long as segments $8 \sim 9$ and 15, which are of almost equal length; segment 16 is 1·2 as long as 15. The third basipodite of the *mandibulae* seems to have only 2 setae medially; in other respects the mandibulae as well as the antennae are like those of the preceding species. The *maxillulae* have 7 + 2 setae in the Le, 10 + 2 in the Li I, 2 in Li II, 4 in Li III and 5 in the third basipodite; the Ri I has 3 setae, the Ri II $\sim$ III 5 and the Re has 9 setae. The *maxillae* and *maxillipeds* are scarcely different from Farran's description.

The *first pair* of legs has the Se Re I extending to the base of Se Re II; in the outer edge of the Re III, proximally to the middle, a distinct glandular pore is found, better developed than in other species. The *second pair* of legs (text-fig. 62 d) is like Farran's fig. 16 Pl. V; the Se of Ri I is rather short and clumsy, and the St. of Re III has about 35 serrations, some of which are fused at their base (text-fig. 62 f); the anterior surface of the appendage is minutely granular, and the posterior one has, in addition to the usual spines, areas of smaller teeth. No glandular pores were observed. The *third pair* of legs (text-fig. 62 e) has no distinct styliform process at the inner margin of the second basipodite, and the slender terminal tooth of the anterior surface of the third basipodite medial to the insertion of the endopodite is very short and clumsy; the posterior surface of the third basipodite has a number of short spines in contrast to that of the second foot, which is smooth; in other respects this pair is like that of the preceding species. The *fourth pair* of legs has a long and slender second basipodite without marginal setae. The *fifth pair* of legs is like Farran's figure, with a long and strong inner seta, a rather short terminal seta, and a very delicate outer one; all segments are fused, but the two basal ones are indicated.

The anterior portion of the *labrum* is, in lateral view, less prominent than in preceding species; in front of the labrum proper behind the transverse line, which limits the antennal somite, a tuft of long setae is found. The arrangement of setae on the anterior surface of the *labrum* (Pl. VII fig. 11 a) is, as seen by comparing figures (cf. 9 b), like that of *S. obtusifrons*, but the lateral posterior group is better developed, and the central group has only a few setae. The *oral* surface of the labrum is most like that of *S. globicips* (Pl. VII fig. 10 a), but the granular area in front has much smaller granules, and it is much smaller. The structure of the *lamina labialis* etc. is completely like that of *S. globiceps.*

Y♂ (St. V). Size of young male from Thor St. 183 was 3·25 mm.; anterior division 2·51 mm.; urosome 0·74 mm.

The only difference, except the usual one in the shape af the abdomen, is found in the more obtuse inner tooth of the third basipodite of the fourth foot. The segment 10 of the *antennulae* has a seta, but the segment 17 has no proximal seta. The fifth pair of legs is more slender than in *S. obtusifrons,* but is alike in other respects.

Occurrence etc. The S/S Thor has gathered the species at a single station viz: $^{11}/_{7}$ 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 5 f♀, 2 y♂ (V). It has only been recorded once by Farran, who has examined six specimens, taken at a depth of 700 fathoms off the west coast of Ireland. As to the differences from the related species I refer to *S. globiceps.* The species is characterized by antennulae about as long as the body, with a seta in segment 17. The Se of Re I pes I is fairly long and slender, and the Se Ri I pes II is rather short and obtuse. The St. of Re III pes II has 35 partly fused teeth. The inner terminal seta of the anterior surface of Basp. III pes III—IV is only poorly developed. The second basipodite of the third pair of legs has no spinous lamina.

63. Scaphocalanus globiceps (Farran.)

(Pl. VII figs 10 a—b; fig. 11 b; Pl. VIII figs 9 a—c; text-figs 63 a—b.)

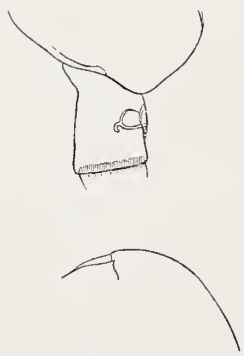
1905.? Scolecithricella gracilis n. sp. G. O. Sars, p. 2.
1908. Scolecithrix globiceps n. sp. Farran, pp. 54—55, pl. V figs 8—13, pl VI fig. 8.

Description. f♀. Size of specimen from Thor St. 183 was 4·48 mm.; anterior division 3·38 mm.; urosome 1·10 mm. Farran's specimens measured 4·3—4·5 mm.

The body is more slender, and the abdomen comparatively longer than in the preceding species; the fifth thoracic tergite is somewhat produced, but rounded. The rostral branches, arising from a short basal part, are almost straight, stiff and fairly long, apparently longer than the pointed slender filaments (text-fig. 63 a). The genital somite is only slightly produced below, and has an elongate, distally not enlarged, receptaculum seminis (text-fig. 63 b). The comparative length between the abdominal somites is 53, 35, 30 and 10. The serration along the posterior margin of the somites is distinct, at least dorsally. The *antennulae* extend to the end of the furca; the appendages differ from those of

S. validus by the presence of a proximal seta in segment 17; the measurement is like that of the preceding species, but for the segments 8∾9 and 19 which are of equal length. The manducatory part has 3 setae in the third basipodite, but in other respects the *mandibulae* as well as the *antennae* and *maxillulae* are scarcely different from those of the preceding species. The *maxillae* and *maxillipeds* show, as pointed out by Farran, a few rather unimportant differences.

The *first pair* of legs is scarcely different from Farran's description, and the *second pair* is very similar as well; the Se of the first outer segment is short and robust; the anterior surface of the third basipodite as well as of the two branches is covered all over with areas of small spinules; on the posterior surface the number of teeth is like Farran's fig., but a patch of distinct teeth is found near the apex of the third basipodite. The terminal seta is adorned with about 20, well separated, coarse serrations. A glandular pore was observed at the base of Se 3 Re III. The *third pair* of legs has, along the exterior border of the second basipodite, a low lamina, which, in the middle, has a row of 15—20 fairly long spines not observed in the other species, and most distinct when observed in situ; the spinulation, especially of the anterior surface, is better marked than in the second pair; on the posterior surface of the third basipodite it is scarcely better developed. The inner tooth of the anterior surface of the third basipodite is short and rounded. The second basipodite of the *fourth pair* of legs is comparatively less slender than in the preceding species; the inner tooth of the third basipodite is just indicated; the spinulation of the anterior surface of the basipodites as well as of the first outer and inner segments is well developed; the distal segments of the exopodites as well as the endopodites are wanting. The *fifth pair* of legs is scarcely different from Farran's description.



Text-fig. 63.
Scaphocalanus globiceps Farran. f♀.
a. Head × 33. b. Genital somite × 33.

The *anterior* surface of the *labrum* seems, in most respects, to be like that of *S. obtusifrons* (Pl. VII fig. 9 b), but the *oral surface* differs distinctly from that species (Pl. VII fig. 10 a, cf. fig. 9 c); the most characteristic feature is found in the distinct spinulation behind the marginal setae around the two first median circular spots and as far lateral as the first well developed group of short spines; as to the other features I refer to the figure. The *lamina labialis* is scarcely indicated; in front of it, the usual inner and outer row is seen (fig. 10 b); posteriorly, between the serrula 6-dentata, a median group of short spines is found, as well as a paired one more behind. In the middle, behind the labial lobe, two more or less separated groups of shorter and longer hairs are found, laterally continued into a wide oblique row along the inner margin of the lobe. More laterally the lobe possesses an angle-shaped series of densely placed hairs as well as a basal group without direct connection.

f♂. Size of specimen from Thor St. 180 was 4·44 mm.; anterior division 2·99; urosome 1·45 mm.

The body is somewhat more slender than in the female, and the abdomen is about half as long as the anterior division; the comparative length of the abdominal somites is 15, 45, 40, 45, 4 and 14; the furcal rami are about 1.3 as long as wide. The *antennulae* reach somewhat beyond the end of the third abdominal somite; the segment 13 is fairly well separated from 12, and segment 14 from 15, but segments 20 and 21 are completely fused on the right side, but well separated on the left; beyond segments 8∾9 2 setae were found only in segments 12 and 14. Segment 22 is 1·4 shorter than segment 19. The mouth-appendages are comparatively slightly transformed; the third basipodite of the *mandibulae* has, in addition to a fairly long Se 1 and a quite rudimentary Si 2, a small rounded process. The *maxillulae* and the *maxillae* are scarcely less developed than in the female; the *maxillipeds* are comparatively less slender, but the amalliform seta of the second basipodite is well developed as in the female. The *natatory legs* are practically like those of the female, but the spinulation, especially, of the anterior surface is less developed, and the medial terminal tooth of the anterior surface of the fourth pair of legs is better developed; the terminal seta of Re III pes II has about 60 serrations. Along the outer margin of the second basipodite of the third pair of legs, a lamina with a row of short spines is found.

The *fifth pair* of legs, which in natural position is seen to extend a little beyond the end of the abdomen is very much like that of *S. obtusifrons*. The right endopodite (Pl. VIII fig. 9 b) is rather short, distally somewhat triangularly produced, and rather suddenly attenuated to a fairly long spine. The right basipodite (fig. 9 a) is, outwards, produced into a long process which is fused with the first outer segment; a terminal process of somewhat triangular shape, as in *S. magnus*, as well as a median one is observed; the second outer segment is rather short and somewhat curved, and the third one is short, flat, slightly curved and somewhat attenuated (fig. 9 a). The basipodites of the left foot are long and slender; the comparatively short and slender endopodite is slightly curved, and indistinctly divided into two proximal segments of about equal length as well as a short third segment with a fairly slender terminal seta beyond a rounded process. The left exopodite is comparatively long and clumsy; its first segment is the longer, and has two triangular processes, while the third one is the shortest, and hairy (Pl. VII fig. 11 b).

Y♂♀ (St. V). Size of female from Thor St. 183 was 3·49 mm.; anterior division 2·71; urosome 0·78 mm.

The shape of the body shows the usual difference from that of the adult female; the distal segments of the antennulae are comparatively longer; the segment 19 is 1·1 as long as segments 8 ∾ 9; the fifth pair of legs is somewhat smaller, but in other respects scarcely different.

Occurrence. The S/S Thor has taken this species at three stations in deep water viz:

1/9 1904 St. 285 62°49 L. N. 18°46 L. W. Yt. 500? M. Wire 1 f♀.
10/7 1904 St. 180 61°34 L. N. 19°05 L. W. Yt. 1800 M. Wire 2 f♀ + 1 f♂.
11/7 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 2 f♀, 3 f♂, 2 y♀ (V).

Distribution. The species has only been recorded twice by Farran off the west coast of Ireland at 1000 and at 700 fathoms.

Remarks. This species is certainly identical with Farran's species, as they do not differ in any features of interest. Though, as far as the description goes, it agrees completely with Sars' *Scolecithricella gracilis*, especially in the structure of the fourth pair of legs, I prefer to refer it to Farran's species, as it is well distinguished from *Scolecitricella* according to Sars' own definition.

The described male, which is well distinguished from that of *S. obtusifrons* by its long and more slender fifth foot, I have, on full consideration, referred to this species rather than to *S. validus* with which it agrees in a few features, on account of its size and the spinous lamina along the outer margin of the second basipodite of the third foot.

Scaphocalanus globiceps, obtusifrons, validus and *robustus* seem to be nearly related, and are, without detailed investigation rather difficult to distinguish from each other. In contrast to Scott, who refers them to *Scolecithricella,* I follow Sars, and regard them as more nearly related to *Scaphocalanus magnus,* with which they agree by the number of segments in the antennulae, by the appendages of the maxillae, and by the structure of the fifth foot in the male. About the differences between *S. robustus* and *globiceps* I refer to the former species. The female of *S. globiceps* is characterised by slender shape comparatively short antennulae, which have a single setae in segment 10 and a Spr. in segment 17. Se Re I pes I is long and slender, and Se Ri I pes II is short and clumsy. St. Re III pes II has about 20 well separated teeth. The inner terminal seta of the anterior surface of Basp. III pes III—IV is only poorly developed. The second basipodite of the third pair of legs has, laterally, a spinous lamina.

64. **Scaphocalanus robustus** Th. Scott.

(Pl. VII figs 12 a—c; text-figs 64 a—c).

1894. Amallophora robusta n. sp. Th. Scott, pp. 56—57, pl IV figs 24—26.

1896. Scolecithrix robusta Th. Scott. Giesbrecht & Schmeil, p. 47.

1908. — — — Farran, p. 57, pl. VI fig. 3.

Description. f♀. Size of specimen from Thor St. 167 was 2·78 mm.; anterior division 2·12 mm.; urosome 0·66 mm. Scott's specimen measured 3 mm. and Farran's 2·65—3·1 mm.

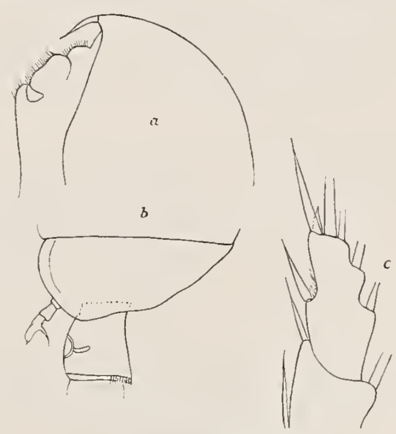
The rostrum has rather short filaments (text-fig. 64 a). The head is distinctly raised, and the body is rather robust; the first thoracic somite is fused with the head, and the fourth and fifth thoracic somites with each other; the lateral corners are slightly produced and rounded. The genital somite is only slightly produced below; the receptaculum seminis is elongated and slender, but rather short (text-fig. 64 b). The comparative length of the abdominal somites and the furcal branches is 33, 20, 18 10 and 14; the genital somite is almost as wide and deep as long, and the furcal rami are a little longer than wide. The serration along the hinder margin of somites 2—4 is well developed.

The *antennulae* extend to the end of the genital somite; the limitation between segments 24 and 25 is rather indistinct; the appendages are like those of *S. globiceps*, with a single seta in segment 10, and 2 in segment 17. The measurements are similar to those of the preceding species; the segments 19 and 16 are almost of equal length, and 1·3 as long as segments 8 ∾ 9, which are, again, a little shorter than segment 15. The *antennae, mandibulae, maxillulae* and *maxillipeds* are like those found in *S. globiceps.* The *maxillae* possess 4 amalliform and 4 vermiform sensory appendages.

When the *natatory legs* sitting on the animal are examined from the side, a curious difference is found between the 3 first pairs and the fourth pair of legs in the basipodites as in related species; the posterior surface of the three first pairs is seen to be excavated, while that of the fourth pair appears cylindric, and in lateral view is almost twice as deep as that of the third foot. The *first foot* is very much like that of *S. globiceps,* but the Se Re I scarcely extends to the end of Re II (text-fig. 64 c). The *second foot* has the outer-edge spine of the first outer segment long and sickle-shaped, and the outer-edge spine of the first inner segment short and rounded; the St has 30 short, well separated teeth; the armature of the anterior and posterior surface is scarcely different from that of *S. globiceps*. The *third pair* of legs is like those of the preceding species, but the outer-edge spinous lamina of the second basipodite is wanting, and the posterior surface of the third basipodite has a patch of strong spines, wanting in the second pair. The *fourth pair* of legs is distinctly granular on the anterior surface, but has fairly long spines in a longitudinal area on the two inner segments in addition to the granulation; on the posterior surface of the two distal outer segments as well as on the distal inner one a few short spines are observed; on the posterior surface of the second inner segment a transverse row of 8 long spines is found. The *fifth foot* agrees fairly well with Scott's and Farran's description, but the articulation is very indistinct.

The *labrum* is comparatively slightly produced in front (Pl. VII fig. 12 a). The arrangement of setae on the *anterior surface* is rather characteristic; in front a median group of fairly long bristles, 3—4 deep continued into a lateral group of a number of shorter hairs, extending laterally to in front of a posterior lateral group of densely placed hairs. In the middle, laterally partly fused with mentioned anterior group, a transverse series of comparatively few short setae. Add to this a marginal group of numerous bristles.

The oral surface of the *labrum* (Pl. VII fig. 12 b) shows some similarity to *S. validus*, and in a less degree to *S. globiceps;* the granular area around the first median circular spot is only small; the lateral marginal and the first lateral group form a fairly long oblique group, medially consisting of granules, and converging towards the second median circular spot; the following lateral groups are in the main like the structures in the preceding species. The arrangement of setae around the *"lamina labialis"*, and upon the labial lobes, is very much like that of *S. globiceps*.



Text-fig. 64.
Scaphocalanus robustus Th. Scott f♀.
a. Head × 18. b. genital somite × 18.
c. Pes I sin. × 135.

Variation. In the first right foot in one of the specimens a median outer-edge seta was observed in the third outer segment.

Occurrence. The S/S Thor has collected three females of this species at the following stations:

$^{19}/_{6}$ 1904 St. 152 65°00 L. N. 28°10 L. W. Yt. 1000 M. Wire.
$^{11}/_{7}$ 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire.
$^{1}/_{9}$ 1905 St. 167 57°47 L. N. 11°33 L. W. Yt. 1500 M. Wire.

Distribution. This species has only been recorded twice, namely from the Gulf of Guinea in a gathering from 85 fathoms ($^{5}/_{2}$ 4°26 L. S. 10° L. E.), and from the west coast of Ireland "on four stations at depths of from 400 to 680 fathoms".

Remarks. Though this species differs from that described by Scott by less robust shape, by 4 for 5 amalliform setae of the maxillae, and by the slightly different shape of the fifth foot, it seems natural to regard the two as identical. It seems to be nearly related to *S. obtusifrons*, but differs by a more robust shape, by the structure of the third pair of legs, and by the longer antennulae.

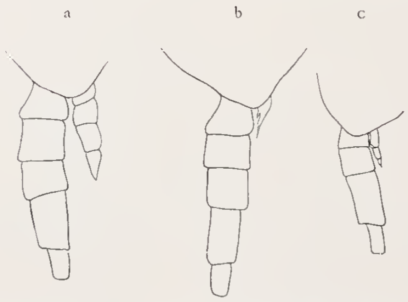
65. Scolecithricella minor Brady.

(Pl. VII fig. 13; Pl. VIII figs 10 a—c; text-figs 65 a—c.)

1883.? Scolecithrix minor n. sp. Brady, pp. 58—59, pl. XVI figs 15—16, pl. XVIII figs 1—5.
1892.? — — Brady. Giesbrecht, p. 266.
1894.? — — — Th. Scott, p. 50.
1898.? — — — Giesbrecht & Schmeil, p. 46.
1902.? — Römeri n. sp. Mràzek, pp. 513—515, Taf. 6, text-figs 11—13.
1903. Scolecithricella minor Brady. G. O. Sars, pp. 55—56, pls XXXVII—XXXVIII.
1904. Scolecithrix minor Brady. Wolfenden, p. 111.
1905. — — — Th. Scott, p 223.
1905. — — — Farran, p. 35.
1906. Scolecithricella minor Brady. Pearson, p. 18.
1907. — — — Koefoed & Damas, p. 397.
1908. — — — Farran, p. 51.
1908. Scolecithrix minor Brady. v. Bremen, pp. 73—74, text-f. 85.
1913. Scolecithricella minor Brady. Stephensen, pp. 314—315.

Description. f♀. Size of specimen from Ingolf St. 40 was 1·52 mm.; anterior division 1·22 mm.; urosome 0·3 mm. Sars's specimens measured 1·40 mm.

The *antennulae* extend slightly beyond the end of the thorax; the segments 1 and 2 are indistinctly separated, and so are segments 24 and 25; the segments 8 ∾ 9 are almost completely fused with 10. The Sp of segment 24 is placed terminally, and extends distinctly beyond the end of segment 25. The *mouth-limbs* are completely like Sars' figures, and so are the natatory legs; the second basipodite of the fourth pair of legs has 3—4 rather stiff, marginal setae. In lateral view the third as well as the fourth foot has in the second basipodite an outer-edge lamina, which terminally is produced into a small tooth, much bigger in the fourth foot; this lamina has in the third pair, almost in the middle, about 5 rather short and delicate teeth.



Text-fig. 65. *Scolecithricella minor* Brady. a—b. Y♂—♀ (St. V). Abdomen × 87. c. Y♂ (St. IV). Abdomen × 57.

The *labrum* and area in front of it is in lateral view very much like Sars' figure Pl. XXXVII; the labrum proper and its anterior portion, which is only slightly prominent, have only a slightly pronounced concavity between them. The *anterior surface* of the labrum is like that of *S. ovata* (cf. Pl. VII fig. 14 b); most anteriorly a transverse row of long slender bristles is found, continued laterally and posteriorly into a row of shorter setae; behind this, almost in the middle, a transverse row of shorter setae is found.

The *oral surface* of the labrum shows a great similarity to that of *S. ovata* (cf. fig. 14 c), but the anterior lateral group is not well separated from the marginal setae, and the following group is not convex outwards, and is directed towards the second median circular spot. The rudimentary *lamina labialis* (Pl. VII fig. 13 a) scarcely shows features of great interest. The arrangement of hairs upon and behind the labial lobes shows great similarity to Pl. VII fig. 14 b, but the median and the lateral groups of hairs are fused.

f♂. Size of specimen from Ingolf St. 40 was 1·34 mm.; anterior division 0·99 mm.; urosome 0·35 mm. Sars' specimens measured 1·40 mm.

The *antennulae* are like Sars' figure, but segments 20 ∾ 21 bear only a single seta not two. The mouth-appendages are very much like those of the female, except the *mandibulae* which have the third basipodite distinctly longer than wide, the *maxillae* which have the sensory setae better developed, and the *maxillipeds* which are shorter and more clumsy. The *natatory legs* are scarcely different from those of the female. The *fifth foot* is like Sars' description; the left endopodite which is placed on a small protuberance, is short and clumsy, and indistinctly divided into two segments.

Y♂♀ (St. V). Size of female from Ingolf St. 70 was 1·15 mm.; anterior division 0·90 mm.; urosome 0·25 mm. A young male from same station measured 1·17 mm.

The shape of the body is practically like that of the adult females; the first as well as the fifth thoracic somites are fairly well marked in front. The antennulae extend somewhat beyond the end of the body, but the measurements are scarcely different. The third and fourth feet are like those of the adult female, and so is the fifth foot, except for the very indistinct lateral seta. The only difference between male and female is found in the structure of the fifth foot, which is seen in Pl. VIII figs 10 a—b (textfigs 65 a—b).

Y♂♀ (St. IV). Size of female as well as of male from Ingolf St. 19 was 0·95 mm.; anterior division 0·74 mm.; urosome 0·21 mm.

The shape of the body is in main like adult female. The distal segments of the antennulae are comparatively longer. The only difference between the sexes is found in the fifth pair of legs, the structure of which is seen in figures (text-fig. 65 c and Pl. VIII fig. 10 c).

Occurrence. Of this species the Ingolf Expedition has taken a big number of specimens while the S/S Thor has not taken any specimens in the samples taken with the young-fish trawl.

In Davis Strait and in the Atlantic west of Greenland, the Ingolf Exp. has gathered it at 6 stations.

5/7 95 St. 29 63°34 L. N. 54°31 L. W. V^{I}. 50—0 fathoms. Temp. surf. 3·5° C. 1 f♀.
1/7 95 St. 27 64°54 L. N. 55°10 L. W. V^{I}. 200—0 — — 3·9° C. 31 f♀ (1 with sperm.), 10 f♂, 2 y♀ (V).
25/6 95 St. 24 63°06 L. N. 56°00 L. W. V^{I}. 100—0 — — 4·2° C. 25 f♀ (2 with sp.), 13 f♂, 14 y♀ (V), 3 y♂ (V), 1 y♂ (IV).
26/6 95 St. 25 63°30 L. N. 54°24 L. W. V^{I}. 200—0 — — 2·9° C. 82 f♀, 12 f♂, 17 y♀, 15 y♂.
28/7 95 St. 36 61°50 L. N. 56°21 L. W. V^{I}. 100—0 — — 8·5° C. 3 f♀, 11 y♀, 6 y♂, 3 y♀ (IV), 3 y♂ (IV).
30/7 95 St. 38 59°12 L. N. 51°05 L. W. V^{I}. 100—0 — — 10° C. 95 f♀ (10 with sp.), 15 f♂, 5 y♀ (V), 10 y♂ (V).

In the Atlantic south-west of Iceland and east of Greenland the species was taken at 5 stations.

20/6 95 St. 20 58°20 L. N. 40°48 L. W. V^{I}. 200—0 fathoms. Temp. surf. 6·1° C. 40 f♀ (1 with sp.), 16 f♂, 13 y♀ (V), 10 y♂ (V).
18/6 95 St. 19 60°29 L. N. 34°14 L. W. V^{I}. 300—0 — — 9° C. 100 f♀ (10 with sp.), 30 f♂ (3 with sp.), 15 y♀ (V), 5 y♂ (V), 1 y♀ (IV).
17/6 95 St. 18 61°44 L. N. 30°29 L. W. V^{I}. 200—0 fathoms. Temp. surf. 10° C. 55 f♀ (5 with sp.), 25 f♂, 1 y♀ (V), 1 y♂ (V).
13/6 96 St. 80 61°02 L. N. 29°32 L. W. P. 100—0 — — 8·5° C. 1 y♂ (V).
10/6 94 St. 17 62°54 L. N. 26°34 L. W. V^{I}. 200—0 — — 9·1° C. 4 f♀, 2 f♂, 1 y♀, 1 y♂.

In Denmark Strait it was taken at 5 stations.

27/6 96	St. 95	65°14 L. N.	30°29 L. W.	Closing net. 700 fathoms		2 f♀.
20/5 95	St. 11	64°34 L. N.	31°12 L. W.	V^{I}. 200—0 fathoms.	Temp. surf. 8·2° C.	10 f♀, 1 f♂, 5 y♀, 5 y♂.
20/5 95	St. 10	64°19 L. N.	28°52 L. W.	V^{I}. 200—0 —	— 7·9° C.	1 f♀, 2 f♂.
20/5 95	St. 9	64°18 L. N.	27°10 L. W.	V^{I}. 100—0 —	— 7·9° C.	1 f♀, 3 f♂.
19/5 95	St. 8	63°56 L. N,	24°40 L. W.	V^{I}. 100—0 —	— 8·5° C.	65 f♀ (2 with sp.), 37 f♂, 1 y♀ (V).

In the Atlantic south of Iceland it was taken at 6 stations.

9/8 95	St. 40	62°00 L. N.	21°36 L. W.	V^{I}. 100—0 fathoms.	Temp. surf. 13·5° C.	60 f♀, 15 f♂, 24 y♀ (V), 15 y♂ (V), 2 y♂ (IV).
3/6 96	St. 68	62°06 L. N.	22°30 L. W.	V^{I}. 100—0 —	— 8·8° C.	4 f♀.
1/6 96	St. 63	62°40 L. N.	19°05 L. W.	V^{I}. 100—0 —	— 8·3° C.	26 f♀, 6 f♂, 5 y♀ (V).
18/5 96	St. 54	63°08 L. N.	15°40 L. W.	V^{I}. 100—0 —	— 9° C.	10 f♀, 6 f♂, 3 y♀, 2 y♂.
13/5 96	St. 49	62°07 L. N.	15°07 L. W.	V^{I}. 100—0 —	— 9·3° C.	15 f♀, 5 f♂, 6 y♀, 4 y♂.
12/5 96	St. 47	61°32 L. N.	13°40 L. W.	V^{I}. 100—0 —	— 10·6° C.	58 f♀ (10 with sp.), 22 f♂, 3 y♀ (V), 2 y♂ (V).

The Danish East Greenland Exp. 1900 has in surface hauls taken a few specimens, viz:

24/9	F. 390	8 p. m.	61°06 L. N.	15°26 L. W.	4 f♀.
	F. 392	12 p. m.	—	—	1 f♀, 1 f♂.
25/9	F. 393	2 a. m.	60°29 L. N.	12°10 L. W.	15 f♀, 6 f♂
	F. 402	8 a. m.	—	—	1 f♀.
	F. 403		—	—	3 f♀, 1 y♂ (V).
26/9	F. 412	8 p. m.	60°13 L. N.	9°42 L. W.	1 f♀.

In the Iceland-Færoe channel the Ingolf-Exp. has taken it in 5 samples.

14/5 96	9·30 a. m.	64°13 L. N.	15°00 L. W.	Apst. 6	Temp. at surf. 7·8° C.	1 f♀, 1 y♂ (V).
15/5 96	St. 52	63°57 L. N.	13°32 L. W.	V^{I}. 200—0 fathoms.	— 8·3° C.	8 f♀, 2 f♂, 2 y♀, 1 y♂.
20/5 96	St. 57	63°37 L. N.	13°02 L. W.	V^{I}. 100—0 —	— 8·2° C.	1 f♀, 3 f♂, 1 y♀, 1 y♂.
11/5 96	St. 45	61°31 L. N.	9°45 L. W.	V^{I}. 200—0 —	— 9·1° C.	16 f♀ (4 with sp.), 8 f♂, 9 y♀ (V), 4 y♂ (V).
11/5 95	St. 1	62°30 L. N.	8°21 L. W.	V^{I}. 50—0 —	— 10° C.	3 f♀.

North-east of Iceland the Ingolf Exp. has taken it at two stations.

25/7 96	St. 119	67°53 L. N.	10°19 L. W.	P. 100—0 fathoms.	Temp. at surf. 5° C.	1 f♀.
26/7 96	St. 117	69°13 L. N.	8°23 L. W.	V^{I}. 100—0 —	— 4·1° C.	1 y♀ (V).

Outside the Ingolf area, specimens were examined from two localities, viz:

Dan. East Gr. Exp. 1900 21/6 1 p. m. 63°33 L. N. 0°04 L. W. Closing net. 75—50 fathoms. 1 f♀.
Joh. Petersen 73° L. N. 8° L. E. 3 f♀, 2 y♀ (V).

Distribution. Brady's specimens were taken in the Indian Ocean 47° L. S. 45° L. E. at the surface. By Th. Scott it was recorded from the Gulf of Guinea, and, according to Farran, it is fairly common off the west coast of Ireland at depths of from 100 to 1000 fathoms; occasionally it has been found at or near the surface. According to Sars it is a true pelagic form (often occurring close to the surface of the sea), which is found along the greater part of the Norwegian coast as far north as Lofoten Islands, as well as sometimes in the open sea. In the sea between Spitzbergen and Greenland as far north as 80°17 L. N. the Duc d'Orléans has gathered this species in 32 samples from about 80, between $^{7}/_{7}$ and $^{15}/_{8}$ 1905, as well in cold as in temperate water. It was neither found at the very surface nor below 500 meters, but in 12 out of 14 samples taken at a depth of from 100 to 200 meters, generally scarce never abundant; in 8 samples adult males as well as females were found at a depth of from 20 to 400 meters.

Remarks. I have followed Sars in referring the northern form to Brady's species from the Indian Ocean, though his description is too incomplete for a certain identification. In spite of minor differences, f. inst. in the shape of pes V of the adult female, I am fairly convinced that Mràzek's *S. Römeri* is identical with this species. As the species has not been found, as far as I know, in any of the extensive collections from the South- and Mid-Atlantic or Indian Oceans, I think we are entitled to regard this species as one which has its chief centre of distribution in the North-Atlantic and in a less degree in the Arctic seas cummunicating with it. It seems not to have been found in the North Sea proper or adjacent waters; may be on account of lower salinity.

The records of the "Ingolf," which are all from the months May to July, and almost all with the vertical net down to about 100 fathoms, tell the same story as the above mentioned records of the Duc d'Orléans; that the species in these regions and at this season is only exceptionally found at the surface; if it were not so, it must have been found in several of the numerous surface samples from the Ingolf or the Danish East-Greenland Exp. It is worth recording that the species was found in several surface samples gathered from the mentioned expedition in the month of September, southwest of the Færoes. The Ingolf material does not allow any final conclusion about the time of propagation, but as adult males were found in 19 out of 24 samples (in a percentage varying from about 10 to 50) taken from May to July, and as spermatophores were often attached to the genital somite of the female as well as sometimes to that of the male, it is almost certain that the species is propagating then. The Duc d'Orléans found only males in 8 out of 32 samples. Adult males were gathered southwest of the Færoes in the month of September. Young animals of the penultimate stage were found in most samples, except in those from the month of September.

66. Scolecithricella Ingolfii n. sp.

(Pl. VIII figs 11 a—c).

Description. f♀. The shape of the body is practically like that of *S. minor*; the head is perhaps a little more raised. The lateral corner is, like that of preceding species, somewhat triangularly produced. The *antennulae* and oral appendages are completely like those of *S. minor*.

The *first pair* of legs is scarcely different; the first inner segment of the *second* foot has a fairly distinct pointed outer spine; the outer-edge lamina of the third pair of legs has no spines. Along the inner margin of the second basipodite only two setae are observed; the inner terminal tooth of the third basipodite is longer and more slender. The *fifth pair* of legs is fairly well developed, with three indistinct segments (fig. 11 b); on the left side two indistinct terminal setae are found; on the right side the endopodite is indicated by a small process, and the exopodite has, inwards, a distinct spine. A similar asymmetric structure was also observed in a specimen from Ing. St. 19. In a specimen from Ing. St. 9, the left leg had a somewhat better developed endopodite, and the exopodite had a terminal and an inner seta, fairly long and placed nearer the tip than the base. In the specimen from Ø. Exp. 1900, the legs were symmetrical, and showed, as seen in Pl. VIII fig. 11 c, a somewhat different structure.

Occurrence. The Ingolf Expedition has gathered this species at three stations viz:

$^{1}/_{7}$ 1895	St. 27	64°54 L. N.	55°10 L. W.	V^{I}. 200—0 fathoms	Temp. at the surface			3·9° C.	2 f♀.
$^{18}/_{6}$ 1895	St. 19	60°29 L. N.	34°14 L. W.	V^{I}. 300—0	—	—	—	6° C.	1 f♀.
$^{20}/_{5}$ 1895	St. 9	64°18 L. N.	27°10 L. W.	V^{I}. 100—0	—	—	—	7° C.	2 f♀.

The Danish East-Greenland Expedition has $^{25}/_{9}$ 2 p. m. 1900 60°19 L. N. 22°10 L. W. F. 399 gathered a single adult female.

As far as I was able to ascertain, this species has not been described hitherto. It is very much related to *S. minor*, and it is not without doubt that I have established it as a new species, as, at almost all the localites it was found in company with that species; but as the character found in the much longer fifth foot was found to be fairly constant in spite of small variations, I thought it right to do so.

67. **Scolecithricella ovata** Farran.

(Pl. VII figs 14 a—d; Pl. VIII figs 12 a—f).

1905. Scolecithrix ovata n. sp. Farran, p. 37, pl. VI figs 13—18, pl. VIII figs 1—5.
1906. Scolecithricella ovata Farr. Pearson, p. 18.
1908. Scolecithrix ovata Farr. Farran, p. 51.
1908. — — — v. Bremen, p. 72, fig. 83.

Description. Size of specimen from Ing. St. 19 was 2·32 mm.; anterior division 1·84 mm.; urosome 0·48. Another specimen measured 2·5 mm. Farran's specimens measured 2·3 mm.

The shape of the body is in main features like Farran's description; the head is fairly well raised, and the rounded lateral-corners are slightly produced. The first and the fifth thoracic somites are not marked out in front. The rostrum consists of two short, obtuse, slightly divergent teeth, arising from a short lamelliform undivided process, to which are attached fairly slender and apparently obtuse rostral filaments, several times longer than the rostrum proper and, in direction downwards and backwards, reaching beyond the insertion of the antennulae; these filaments are wanting in most specimens.

The abdomen has the genital somite only slightly produced below; the receptaculum seminis is elongated-pear-shaped, and generally very prominent. The comparative length between the abdominal somites and the furcal rami, which are almost twice as long as wide is 22, 12, 14, 3 and 12.

The *antennulae* have 23 segments of which the segments 24 and 25 are completely fused; they reach about to the end of the third abdominal somite. The *antennulae* appear rather clumsy, and their measurements are scarcely different from Farran's figures. A proximal seta, in addition to the distal one, was found in segments 12, 14 and 18; in contrast to Farran's fig. 14 no seta whatever was observed in segment 10; the posterior seta of segment 24 is short, and scarcely extends beyond the end of segment 25. The *antennae* are like those of *S. minor*, but the inner lobe of the endopodite has only 7 setae. The *mandibulae* have on the inner side of the long and slender third basipodite two long setae placed close to each other, of which the basal is the longer and stronger; the last segment of the exopodite has 9 long setae. The *maxillulae* have 7 + 2 setae in the outer lobe. Li I has 2, Li II 3 setae, Basp. III has 4 setae and Ri I—III 3 + 3 setae. The exopodite has 5 setae. The *maxillae* are like Farran's figure, and possess numerous vermiform, but no amalliform, setae (Pl. VII fig. 14 a); the *maxillipeds* are like Farran's figure, but the second lobe of the second basipodite bears a fairly long, terminally hooked, and soft sensory seta.

The *first foot* has a well developed Se in the first outer segment, almost reaching the middle of the following segment. The *second foot* has the second basipodite rather broad; medially proximally to the insertion of Si a small tooth is observed, and laterally the margin is proximally produced into a strong tooth; the Se of the first outer segment is long and slender, and the St of Re III has about 55 basally fused teeth. The spinulation of the posterior surface is better developed than indicated by Farran. A glandular pore was observed at the base of Se 3 Re III. The *third pair* of legs has a well developed outer tooth in the second basipodite, and a short inner one, resembling that in the second foot of *S. obtusifrons*. The *fourth* pair of legs has no inner marginal bristles in the second basipodite, and no outer tooth. The St has a rather curious structure, as the marginal serrations are not completely coalesced basally, leaving an elongated fenestra. Spinulation, consisting of about 15 rather small teeth, is found on the posterior surface of the second inner segment.

The *fith* pair of legs is in the main features like Farran's figure, with the first basal segment well distinguished, and with the second more or less well separated from the broad lamellar third segment. The legs are generally asymmetrical, partly because the articulation is better developed on the left than on the right side, and partly because the number of setae is rather variable. On the left side we generally find a shorter terminal and a longer distal seta as figured by Farran, on the right sometimes the terminal and sometimes the medial seta is absent, but often both are present.

The anterior portion of the *labrum* is distinctly prominent in front; the *anterior* surface shows a rather simple arrangement of the bristles (fig. 14 b) most similar to that of *S. obtusifrons*, though less complicated; in addition to the marginal rows of bristles an anterior transverse distinctly convex row, composed of several units, and a posterior shorter one are observed. The *oral* surface of the labrum has the anterior lateral group fairly well separated from the marginal rows (fig. 14 c); the posterior groups of the longitudinal series are, as seen in figure, more or less fused. As seen in fig., the transverse median groups are rather poorly developed. The structure of the *"lamina labialis"* etc. is in the main like that of the preceding species. The arrangement of the hairs upon and behind the labial lobes shows, as seen in fig. 14 b, a very marked difference between a central and two lateral groups.

The intestine is not straight, but distintly twisted, at least vertically, though in a less degree than in *Lophothrix frontalis*.

Y♂♀ (St. V). Size of young female from Ing. St. 19 was 1·86 mm.; anterior division 1·47; urosome 0·39. Another female from Thor St. 82 measured 1·6 mm.

The shape of the body is like that of the adult female; the comparative length of the abdominal somites and the furcal rami is 7, 9, 9, 11 and 9. The *antennulae* reach the base of the furca; the distal segments are comparatively longer. The inner lobe of the last segment of the endopodite of the *antennae* has 8 setae, in other respects the mouth appendages were scarcely different; no difference of interest was found in the structure of the natatory legs. The *fifth pair* of legs in the female is scarcely different from that of adult, but showed in the male, as seen in fig. 12 f Pl. VIII, a rather characteristic structure, as the left leg is much longer than the right one.

Y♂ (St. IV). Size of male from Ingolf St. 27 was 1·38 mm.; anterior division 1·1 mm.; urosome 0·28.

The difference between this and the preceding stage is found in the abdomen, consisting of three somites, the comparative length of which was 6, 9, 12 and 7. The *antennulae* reach only to the middle of the last abdominal somite.

The *first* foot differs from that of preceding stage by the fused Re II—III; the *second* foot showed the same feature, and its second basipodite has no outer tooth, while the spinulation was scarcely different. The left *fifth* foot is somewhat longer than the right, and each foot consists of three segments; no setae were observed.

Occurrence. The Ingolf has gathered this species at 4 stations in Davis Strait:

1/7 95 St. 27 64°54 L. N. 55°10 L. W. V^{I}. 200—0 fathoms Temp. at surf. 3·9° C. 3 f♀, 1 y♂ (IV).
26/6 95 St. 25 63°30 L. N. 54°25 L. W. V. 200—0 — — 2·9° C. 9 f♀, 5 y♀ (V).
30/7 95 St. 38 59°12 L. N. 51°05 L. W. V^{I}. 100—0 — — 10° C. 6 f♀.
25/6 95 St. 24 63°06 L. N. 56°00 L. W. V^{I}. 100—0 — — 4·2° C. 1 f♀.

In the Atlantic south-west of Iceland it was taken:

20/6 95 St. 20 58°20 L. N. 40°48 L. W. V^{I}. 200—0 fathoms Temp. at surf. 6·1° C. 2 y♀ (V).
18/6 95 St. 19 60°29 L. N. 34°14 L. W. V^{I}. 300—0 — — 9° C. 25 f♀, 3 y♂ (V), 3 y♀ (V).
17/6 95 St. 18 61°44 L. N. 30°29 L. W. V. 200—0 — — 10° C. 1 f♀.
16/6 95 St. 17 62°54 L. N. 26°34 L. W. V^{I}. 200—0 — — 9·1° C. 5 f♀.

In Denmark Strait the Ingolf took it:

20/5 95 St. 11 64°34 L. N. 31°12 L. W. V^{I}. 200—0 fathoms Temp. at surf. 8·2° C. 1 f♀, 2 y♀ (V).

In the Atlantic south of Iceland:

12/5 96 St. 47 61°32 L. N. 13°40 L. W. V^{I}. 100—0 fathoms Temp. at surf. 10·6° C. 5 f♀.

The "Thor" has gathered the species at a single station:

8/6 1905 St. 72 57°47 L. N. 11°33 L. W. Yt. 1500 M. Wire 2 f♀.
15/6 1905 St. 82 51°32 L. N. 12°03 L. W. Yt. 1200 M. Wire 1 y♀.

Distribution etc. This species has previously been recorded only from the west coast of Ireland, where it seems to be of frequent occurrence over deep water from the surface to 1000 fathoms, but only in small numbers. In spite of small differences I do not doubt that my specimens ought to be referred to Farran's *S. ovata.* As the maxillae do not possess any amalliform setae, I have referred the species to *Scolecithricella*, though in several respects it shows great similarity to *Scaphocalanus obtusifrons*, and perhaps is more related to this species than to *Sc. minor.*

68. **Lophothrix frontalis** Giesbr.

(Pl. VII figs 7 a—d; text-figs 66 a—f and 67 a—d).

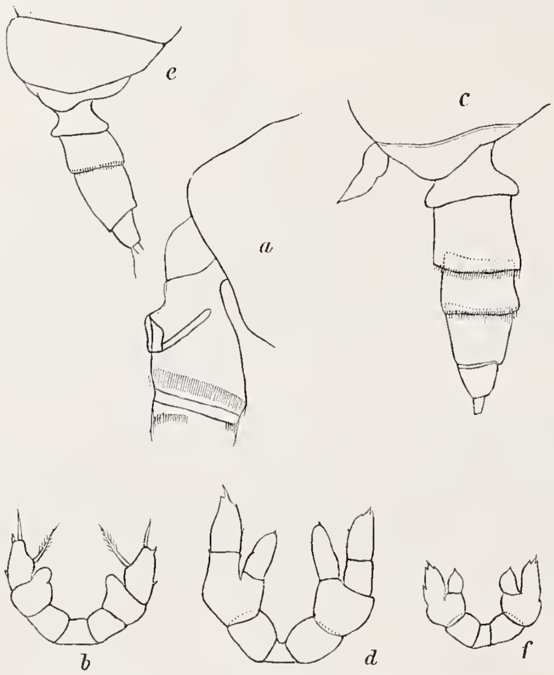
1895. Lophothrix frontalis n. sp. Giesbrecht, p. 254, pl. II.
1898. Scolecithrix frontalis Giesbr. Giesbrecht & Schmeil, p. 49.
1903. — — — J. C. Thompson, p. 21.
1904. Lophothrix frontalis Giesbr. Wolfenden, p. 120 pl. IX figs 41—42.
1905. — — — G. O. Sars, p. 6.
1906. — — — Pearson, p. 19.
1906. Scolecithrix frontalis Giesbr. Esterly, p. 65 pls 9 & 13.
1908. Lophothrix frontalis Giesbr. Farran, p. 58.
1908. Scolecithrix frontalis Giesbr. v. Bremen, pp. 79—80, fig. 93.
1909. Lophothrix frontalis Giesbr. A. Scott, p. 99, pl. XXVI figs 11—20, pl. XXIX figs 1—10.
1911. — — — Wolfenden, p. 268.

Description. f♀. Size of female from Thor St. 72 was 6·45 mm.; anterior division 5·18 mm.; urosome 1·27 mm. Giesbrecht's specimen measured 6·6 mm., Scott's 7·4, and Wolfenden's 5·5—6·0 mm.

The genital somite is slightly produced below and has an elongate receptaculum seminis, which is directed upwards and forwards (text-fig. 66 a). Along the hinder margin of somites 2—4 a well developed serration is found; the third and the fourth somites possess dorsally and anteriorly transverse groups of short spines.

The *antennulae*, which extend beyond the end of the third abdominal somite, consist of 24 segments, as segments 24 and 25 are fairly well separated. "Æsthetasken" are, in contrast to Scott's figure, beyond segments 8∾9 only found in segments 12, 14, 19 and 25. The segment 10 possesses a well developed seta, and a proximal seta is beyond segment 8∾9 only found in segments 12, 14 and 18. The Sp of segment 24 extends distinctly beyond the end of segment 25. Segments 8∾9 are only a little shorter than segment 18, which is a little longer than segment 17 as well as 19, which is 1·2 as long as segment 20. The *antennae* are like Giesbrecht's figure, with the exopodite a little longer than the endopodite, which has 8 setae in the Li and 6 in the Le. The third basipodite of the *mandibulae* has three long convex setae; the first inner segment has 2 setae, and the second has 9. The *maxillulae* are like those of *S. magnus*, with 7 + 2 setae in Le, 14 setae in Li I, 2 in Li II, 5 in Li III and 4 or 5 in basipod. III. The Ri I has 3 setae, the Ri II∾III 5 setae, and the Re has 9 setae. The shape of the *maxillae* is like that of fig. 14 a; amalliform as well as vermiform setae are found. The *maxillipeds* are like Giesbrecht's description. The second, third and fourth pairs of legs do not show the marked difference in the second basipodite when observed in lateral view in situ; in the second and third feet an outer-edge lamina is found, but neither spines nor distal tooth. The first outer segment of the *first foot* has no outer seta. The *second* foot has a well developed long outer spine in the first inner segment, as figured by Giesbrecht; the anterior surface is smooth, but the posterior surface has a number of short spines, as seen in fig. 7 a Pl. VII. The *fourth* pair of legs has the inner margin of the second basipodite smooth; the third basipodite has, like the third pair, a small inner tooth on the anterior surface near the end; a few teeth were found only on the posterior surface of the two inner segments. The *fifth pair* of legs is scarcely different from Giesbrecht's description.

The *labrum* is, as seen in Wolfenden's fig. 41, more elongated than that of *S. magnus* (Pl. VII fig. 8 a), and strongly produced in front; the hinder portion of the labrum is, as in most other species, marked by an anteriorly convex line. I am fairly convinced that the anterior as well as the posterior portion of the labrum belongs to the mandibular and not to the antennal somite; the anterior portion, accordingly, does not correspond to the epistoma of *Euchæte*. The arrangement of bristles on the anterior surface is very characteristic (Pl. VII fig. 7 b). In the middle, most anteriorly, is a forward convex row of about 30 long bristles. A little more posteriorly we have on each side a long row extending laterally from the middle in front towards near the hinder margin; the setae of this row are decreasing in length posteriorly; the right and the left parts establish an acute angle open posteriorly, and, thus include a more posterior row, forming a more obtuse angle, of shorter setae.



Text-fig. 66. *Lophothrix frontalis* Giesbr.
a. f♀. Genital somite × 33. b. Y♀ (St. V) Pes V × 59. c. Y♂ (St. V). Abdomen × 33. d. Y♂ (St. V). Pes V × 59. e. Y♂ (St. IV). Abdomen × 33. f. Y♂ (St. IV). Pes V × 59.

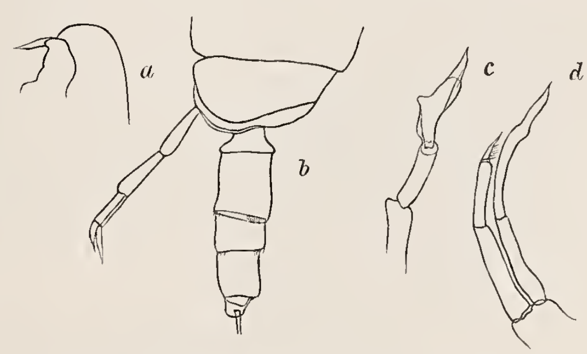
In addition to the marginal setae, posteriorly irregular groups of short setae are found on each side. The *oral* surface of the labrum is rather characteristic, the first group is poorly developed, consisting of small granules and is well separated from the groups 2—4, which are more or less fused and consist of fairly strong, densely placed setae; behind, a group of small granules is observed (fig. 7 c, which is turned upside down). A *lamina labialis* (fig. 7 d Pl. VII), consisting of a median and two lateral parts, is found. In front of the serrula 6-dentata are two rather irregular rows of delicate setae, as seen in figure. Between the serrulae at least two groups of short spines and a longitudinal row are seen on each side. The *lobus labialis* possesses a wide inner row of numerous hairs, and an outer one of few hairs; both rows start posteriorly from a median group consisting of an inner portion with numerous densely placed hairs, and an outer portion with scattered hairs. More posteriorly and laterally, two groups of a few hairs as well as irregularly placed hairs are found. The intestinal tract is curiously twisted. In front of the oesophagus a short coecal sac is observed; behind, the stomach is gradually attenuated, and forms a slight ventral convexity. At the insertion of the third pair of legs the intestine is suddenly, in a sharp bend, turned upwards and directed forwards, being thus placed dorsally to the mentioned part; somewhat in front of the maxillipeds it is continued through a second curvature into the intestine proper.

f♂. Size of male from Thor St. 183 was 5·66 mm.; anterior division 4·19 mm.; urosome 1·47 mm. Scott's specimens measured 5·75 mm.

The body is slender and attenuated in front as well as behind; in dorsal view, scarcely in lateral, a trace of rostrum, is observed. The rostrum is on each side continued into two fairly long and slender spines (text-fig. 67 a). The fifth thoracic somite is well distinguished in front, and the regularly rounded lateral corners are scarcely produced.

The *abdomen* is one third as long as the anterior division; the comparative length of the abdominal somites and the furca is 18, 67, 53, 48, 10 and 18.

The *antennulae* extend at least to the end of the third abdominal somite; the shape is similar to that of *S. magnus*, but the proximal part is straighter, the restrictions at the base of the basal segments are less pronounced, and the angle between segments 14 and 15 in less marked. Segments 8∾9 are almost completely fused with 10—12, segments 20 and 21 and 24—25 are completely fused. The appendages are scarcely different from those of *S. magnus*; the segment 20 does not possess any setae. The segments 8∾12 are 1·1 as long as segments 23—25, not, as in *S. magnus* and related species, much (1·5) shorter, and segment 22 is 1·2 shorter than segment 19. The *antenna* are scarcely different from those of adult females, and the *mandibulae* are very much like, but the manducatory parts are less powerful, and the third basipodite is comparatively wider, with two short setae inwards, and a more distally placed knob representing a third one. The Li I of the *maxillulae* is fairly well developed, and has at least 12 rather short and soft setae; in Li III only 4 setae were observed, but in other respects scarcely any difference was observed. The *maxillae* have the sensory appendages, especially the amalliform ones, slightly developed; the maxillipeds are like those of *S. magnus.*



Text-fig. 67. *Lophothrix frontalis* f♂.
a. Head × 18. b. Abdomen × 18. c. Pes V dext. Re II—III × 59. d. Pes V sin. × 59.

The *natatory legs* are scarcely different from those of the female. The *fifth* pair of legs extends almost to the end of the abdomen, and shows great similarity to that of *S. magnus.* The right endopodite, which extends somewhat beyond the end of the first outer segment, is styliform, with the terminal part fairly well articulated. The right exopodite (text-fig. 67 c) has the first segment articulated upon a long outer process of the third basipodite as long as the segment itself; the two pieces form a natural joint, elongated and outwards convex; the second outer segment is much shorter than the first; the third somewhat lamelliform segment is again somewhat longer, convex inwards, with a distinct angular process in the middle directed forwards, and produced into a pointed eminence, at the base of which a small conical process is found. The basal segments of the left leg are long and slender, and of almost equal length; the left endopodite (text-fig. 67 d) is like that of *S. magnus*, with the two first segments long and slender, and the third rather short and pointed; the left exopodite is somewhat shorter than the endopodite, and its third segment is triangularly attenuated, with fairly long setae inwards and terminally and short ones outwards.

The *anterior surface* of the *labrum* is very much like that of the female; anteriorly three irregular series of apparently very short setae are found; the series along the hinder margin is wanting. The *oral surface* has anteriorly a small conical process on each side, behind which at least two striated median spots are found; on each side an irregularly striated protuberance was found; no hairs were observed. The *lamina* labialis seems to be represented by a transverse crest; in front of it on each side a longitudinal area of very minute hairs is found, and behind, a serrula 6-dentata consisting of rather short setae is observed. The *labial lobes* are well developed, but no setae are observed upon them.

Y♂♀ (St. V). Size of female from Thor St. 72 was 4·88 mm.; anterior division 3·80 mm.; urosome 1·08 mm. Male from the same station measured 5·37 mm.

The young animals are in most respects like those of the adult females; the fifth thoracic tergite is distinctly marked out (text-fig. 66 c). The only difference is found in the structure of the fifth foot, which in one female was scarcely different from that of the adult, while in another, probably a variation, the distal outer seta is comparatively short, but in addition to it another proximal one is observed, and the endopodite is indicated by a short rounded process (text-fig. 66 b). In the male the setae are short, and a long endopodite is found (text-figs 66 b—d).

Y♂♀ (St. IV). Size of male from Thor St. 167 was 3·48 mm.; anterior division 2·90 mm.; urosome 0·58 mm.

The shape of the body shows the usual differences; the lateral corners are slightly more produced (text-fig. 66 e). The mouth-limbs are scarcely different, but the 3 last natatory legs have the number of segments reduced; the second foot, f. inst., has the 2 last outer segments fused with 3 outer spines only; the number of teeth on the posterior surface is smaller. The *fifth foot* of the female has 3 segments, a strong terminal spine, and a short outer spine, but no inner one. The fifth foot of the male is, as seen in text-fig. 66 f, distinctly smaller than in preceding stage.

Occurrence. The Ingolf has not taken this species, but it was gathered at several stations by the "Thor".

In Denmark Strait:

19/6 1904	St. 152	65°00 L. N.	28°10 L. W.	Yt. 1000 M. Wire	10 f♀, 1 y♀ (V), 4 y♂ (V).
20/6 1904	St. 153	65°27 L. N.	27°12·5 L. W.		6 f♀, 1 y♂ (V).
21/6 1904	St. 154	65°27 L. N.	27°10 L. W.		3 f♀, 1 f♂, 2 y♀ (V).

In the Atlantic South of Iceland:

12/5 1904	St. 78	61°08 L. N.	28° L. W.		1 y♀ (V).
1/9 1904	St. 285	62°49 L. N.	18°46 L. W.		14 f♀, 1 y♀ (V), 1 y♂ (V).
11/7 1904	St. 183	61°30 L. N.	17°08 L. W.	Yt. 1800 M. Wire	15 f♀, 8 f♂.
25/5 1904	St. 104	62°47 L. N.	15°03 L. W.		7 f♀; 1 f♂, 1 y♀ (V), 2 y♂ (V).

In the Færoe-Iceland channel:

22/5 1904	St. 99	61°15 L. N.	9°35 L. W.	Yt. 1700 M. Wire	1 f♀.
				Yt. 900 M. Wire	3 f♀.
4/8 1904	St. 230	63°10 L. N.	7°31 L. W.	Yt. 1200 M. Wire	1 f♀.
12/5 1904	St. 78	61°07 L. N.	9°30 L. W.		2 f♀.
29/8 1905	St. 165	60°00 L. N.	10°35 L. W.	Yt. 1000 M. Wire	1 f♀, 1 y♂ (V).

Outside the Ingolf area:

15/6 1905	St. 82	51°32 L. N.	12°03 L. W.	Yt. 1200 M. Wire	5 f♀, 1 y♀ (V), 1 y♂ (V).
				Yt. 800 M. Wire	1 f♀, 1 y♂ (V).

1/9 1905 St. 167 57°46 L. N. 9°55 L. W. Yt. 1500 M. Wire 81 f♀, 1 y♀ (V), 1 y♀ (IV).
8/6 1905 St. 72 57°52 L. N. 9°53 L. W. Yt. 1500 M. Wire 58 f♀, 3 y♀ (V), 25 y♂ (V), 1 y♂ (IV).
20/6 1905 St. 88 48°09 L. N. 8°30 L. W. Yt. 300 M. Wire 18 f♀, 2 y♀ (V), 5 y♂ (V).

Distribution. This species is probably distributed all over the Atlantic as far north as Denmark Strait and as far south as 35° L. S. It has been recorded from the Pacific (35° L. N. 125° L. W.), from the Gulf of California where, according to Esterly (1912 p. 321), it is found between 50 and 300 fathoms, and from the Malay Archipelago. According to Farran it is a not uncommon species in the N. E. Atlantic. "It was taken on every station at all depths from 330 to 1150 fathoms, and in fifteen out of thirty-four gatherings".

Remarks. In spite of a few minor differences, partly enumerated above, I regard this species as identical with Giesbrecht's, Scott's and Wolfenden's species.

69. Scottocalanus Thorii n. sp.

(Pl. VI figs 14 a—c, Pl. VIII figs 14 a—b, text-figs 68 a—i, 69 a—d and 70 a—d).

1893. ♂ nec. ♀ Scolecithrix securifrons n. sp. Th. Scott, pp. 47—48, pl. IV.
1895. nec. — persecans n. sp. Giesbrecht, pp. 253—254, Taf. 3 figs 6—12.
1898. nec. — — Giesbr. Giesbrecht & Schmeil, p. 58.
1903? — — — J. C. Thompson, p. 20.
1904? — — — Cleve, p. 197.
1905. Scottocalanus securifrons Soott. G. O. Sars, p. 7.
1905. nec. Scolecithrix persecans Giesbr. Esterly, pp. 168—167, fig. 28.
1906. ? pars. Scottocalanus securifrons Scott. Pearson, p. 19.
1908. — persecans Giesbr. Farran, p. 58.
1908. nec. Scolecithrix persecans Giesbr. v. Bremen, pp. 80—81.
1909. nec. Scottocalanus persecans Giesbr. A. Scott, pp. 105—106, pl. XXVII figs 10—18.
1911. pars. Lophothrix securifrons Scott. Wolfenden, p. 268.

Description. f♀. Size of female from Thor St. 82 was 4·69 mm.; anterior division 3·91 mm.; urosome 0·78 mm. Esterly's specimens measured 4·6 mm.

The rostrum is very strong, and only terminally subdivided into two rather short divergent branches without terminal appendages (text-figs 68 a—b). The eyes are well developed. The forehead is surmounted by a short, rather prominent crest. The shape of body is, as seen in text-figs 68 c—d, somewhat robust, and the anterior division is almost five times as long as the abdomen. The first as well as the fifth somites are fused with the preceding ones; the lateral corners are somewhat triangularly produced, but are obtusely rounded, with a small notch.

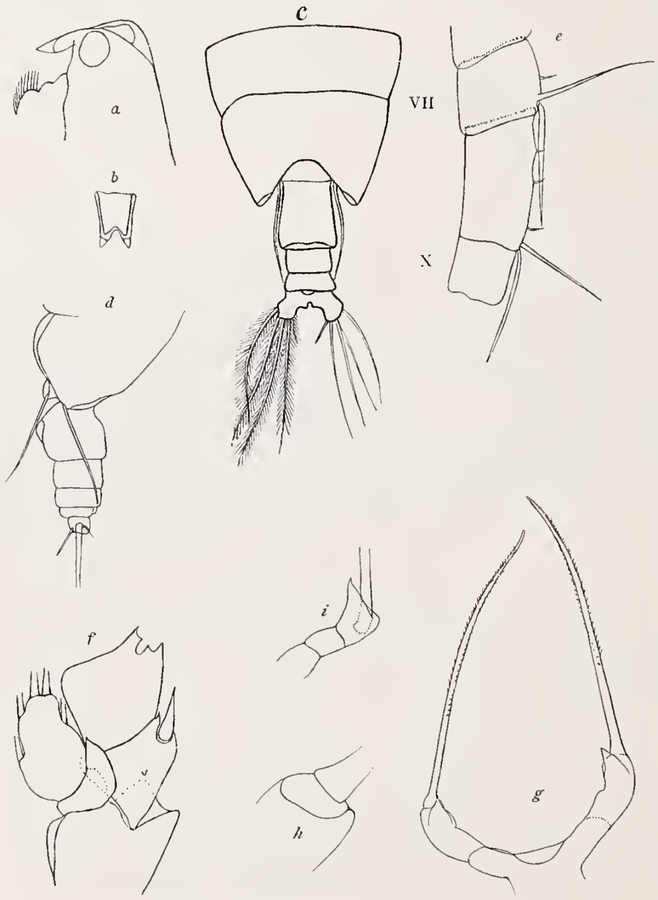
The *genital somite*, which is about as long as the following three somites, is moderately produced below, but the hinder and ventral corner does not project beyond the following somite. No serration was observed along the hinder margin of the abdominal somites.

The *antennulae* extend at least to the end of the third abdominal somite; segments 8∾9 are well separated from 10, and segments 24 and 25 are fairly well separated. The appendages differ from those of *L. frontalis* by wanting a seta in segment 10, and by the delicate Sp. of segment 24, which just extends beyond the end of segment 25; the segments 8∾9 have two soft setae (text-fig. 68 e). The measurements are very much like those of *L. frontalis*. The exopodite of the *antennae* is almost 1·5 as long as the endopodite, which has 8 setae in the outer and 6 in the inner lobe of the second segment. The *mandibulae* are in the main like those of *L. frontalis*, but the third basipodite has only two setae;

the *maxillulae* differ from those of the mentioned species by 3 setae in the second inner lobe and 8 setae in the exopodite. The posterior margin of the *maxillae* is only slightly convex, and only a few slightly developed amalliform sensory setae in addition to the vermiform one were observed. The *maxillipeds* are like those of the preceding species, but the amalliform seta of the second basipodite is rather slender, and the endopodite is comparatively elongate.

In lateral view the second basipodite of the second and third foot has an outer-edge lamina with a prominent distal tooth.

The *first foot* has 3 outer segments; the outer spine of the first segment extends somewhat beyond the middle of the second segment; in the outer margin of the third segment a distinct glandular pore is found near the base. The *second pair* of legs (text-fig. 68 f) has a large somewhat rounded outer tooth in the first outer segment. The terminal seta has about 30 well separated serrations. The posterior surface of Ri II ∾ III has 6 strong spines, and the anterior one a few shorter ones. The posterior surface has a single row of teeth in the second outer segment and two rows in the third. Indistinct glandular pores are found at the base of Se Re II and Se 3 Re III. The *third pair* of legs has a well developed inner tooth terminally on the anterior surface of the third basipodite; the third to fifth serration of the terminal spine is shorter than the more proximal and distal ones; the arrangement of the spinules is less developed than in the second pair of legs. The *fourth foot* has a short clumsy second basipodite without marginal setae outwards; the endopodite has no teeth posteriorly, but has a few on the anterior surface of Ri II and III, as in the preceding pairs; the exopodite is almost smooth. Well developed glandular pores are found in Re I as well as in Re II—III. The *fifth pair* of legs has three rather indistinct segments; inwards a small conical process bearing a short spine and, with a rudimentary hair at the base of the strong outer spine, almost extending to the end of the third abdominal somite; in the distal half the spine is interiorly serrated, and terminally, a few hairs are found outwards (text-figs 68 g—i).

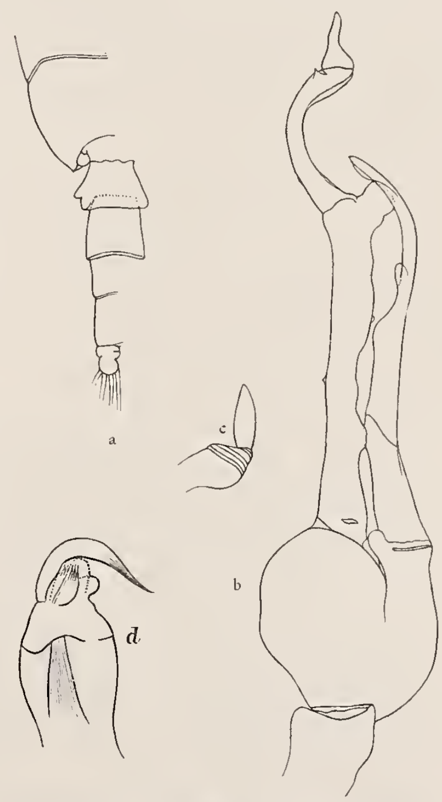


Text-fig. 68. *Scottocalanus Thorii* n. sp. f♀.
a. Head × 18. b. Rostrum × 33. c. Abdomen in dorsal view × 15. d. Abdomen in lateral view × 15. e. Segments VII—X of the antennulae. f. Pes II dext. in anterior view. g. Pes V in anterior view × 59. h. Base of spine in posterior view × 150. i. Base of spine in partly anterior view × 59.

The lateral view of the *labrum* is like that of *S. magnus*, but the anterior part of the labrum is less produced, and in front of it a smooth, rounded elevation is found. The anterior surface of the *labrum* (Pl. VI fig. 14 a) shows some similarity to that of *L. frontalis* (Pl. VII fig. 7 b). Most anteriorly a curved row of fairly long setae, in the middle connected with the opposite side, is found; somewhat more posteriorly, and extending from the middle anteriorly to the hinder margin posteriorly, an elongated semicircular row is found (in fig. 14 a, this row is wrongly represented as being separated from that of the opposite side); this row is several setae high, and the length of its setae decreases backwards. More posteriorly another convex row of shorter setae is found, and between the end of this row and the mentioned outer row a short oblique series is found. Posteriorly and laterally scattered hairs are found, and more medially an almost transverse row. The posterior marginal setae are well developed. The *oral surface* of the labrum (Pl. VI fig. 14 b) shows greatest similarity to that of *S. obtusifrons* (Pl. VII fig. 9 c). Laterally, in front, a big area with short setae is observed, belonging to the marginal system. The first lateral group consists of a few granules, and is well separated from the three following more or less fused groups of fairly strong setae; posteriorly one or two groups of more delicate setae. The arrangement of the transverse rows is seen in figure. The *lamina labialis* (fig. 14 c) seems to be represented by two rounded structures meeting in the middle; in front of it the two usual rows of setae are found. The arrangement of the hairs behind and between the serrula 6-dentata is seen in figure. In the middle between the labial lobes a large group of densely placed hairs is found, which laterally is continued into an inner marginal row of longer and a more lateral row of shorter hairs. Independent of these, and more laterally, two rows of short setae are found.

f♂. Size of male from Thor St. 82 was 5·24 mm.; anterior division 3·93 mm.; urosome 1·31 mm. Th. Scott's specimens measured c. 4 mm., Giesbrecht's 4·5, Esterly's 5·3 and A. Scott's 4·4 mm.

The shape of the body is somewhat more slender than in the female. The *rostrum* is more slender than that of the female, and its branches have sometimes a delicate terminal filament. The fifth thoracic tergite is fairly well marked in front, and is distinctly rounded (text-fig. 69 a).



Text-fig. 69. *Scottocalanus Thorii* n. sp. f♂. a. Abdomen × 15. b. Pes V dext. from the left and partly from below × 59. c. Re III dext. from below. d. Pes V sin. Re III from the right side.

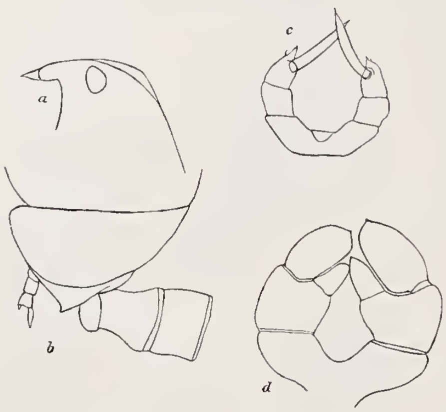
The *abdomen*, which is about one third of the anterior division, has on the left side of the first somite a backwards directed, rather prominent process, in which the genital opening is found; a fairly distinct serrated seam was found along the hinder margin of the second to the fourth somites.

The *antennulae* extend to the end of the fourth abdominal somite, and are almost straight. Segments 8∾9 to 13 are more or less fused, but the articular membranes between segments 8∾9 and 10, and between 12 and 13, are fairly well developed anteriorly; the segments 21 and 22 are fused on the right side, while segments 24 and 25 are well separated on both sides. The articulation between segments 14 and 15 is only poorly developed. Most of the bristles are soft-skinned, and very much like sensory setae. One or two "Æsthetasken" were found in all segments from 1—19; a proximal seta was found in segments 12 and 14, but not in segment 18. The Sp. of segment 24 does not extend to the end of segment 25. The segments 8—12 are 1·4 as long as segments 23—25, and segment 19 is 1·1 as long as 23. The antennae, mandibulae and maxillulae are practically like those of the adult females. The sensory organs of the *maxillae* are better developed, and the *maxillipeds* show the usual differences. The *natatory legs* are scarcely different from those of the females.

The *fifth pair* of legs is distinctly longer than the abdomen. The *right leg* (text-fig. 69 b) has the third basipodite rounded in the usual way; inwards a short process is found, where the endopodite is articulated; this extends distinctly beyond the end of the first outer segment, is gradually attenuated, distally curved and here slightly hollowed. The first outer segment has several projections medially, and is distinctly produced inwards terminally, where is the outwards convex second segment, with a shallow excavation facing forwards and inwards; the third segment is short and somewhat attenuated (text-fig. 69 c).

The basipodites of the *left leg* are, as usual, long and slender; the endopodite, which extends somewhat beyond the first outer segment, is a thin, elongated structure with indication of segmentation in the middle, somewhat enlarged terminally, and with a small terminal seta. The left exopodite consists of two segments of almost equal length; the second is somewhat enlarged, and is terminated with 2—3 leaf-like structures in addition to a slender hook-shaped organ dissolved into "setae" terminally, and a plate with at least 7 long serrations (text-fig. 69 d and Pl. VIII figs 14 a—b).

The labrum etc. are in all features of interest like those of the female; a curious feature was, however, found in the arrangement of the hairs on the anterior surface, as the oblique row of hairs between the two convex rows was wanting.



Text-fig. 70. *Scottocalanus Thorii* n. sp. a. Y♀ (St. V). Head × 33. b. Abdomen × 33. c. Pes V in post. view × 59. d. Y♂ (St. V). Pes V × 59.

Y♂♀ (St. V). Size of female from Thor St. 88 was 3·84 mm.; anterior division 3·06 mm; urosome 0·78 mm. Male from St. 82 measured 3·63 mm.

The shape of the body (text-figs 70 a—b) is in the main like that of the adult female, but the frontal keel is just indicated; the fifth thoracic somite is well marked in front, and its lateral corner is produced into a short but distinct tooth. The abdomen consists of four somites, of which the second is longer than the first and third, which are of equal length and longer than the fourth. The first abdominal somite has a small process on the left side; the serrated membrane of the somites II—IV is only indicated. The appendages are, with the exception of the fifth pair of legs, like those of the adult females as well as alike in the two sexes. In the female (text-fig. 70 c) the fifth foot consists of three distinct, almost square segments in addition to a short terminal one, produced into a short spine, at the base of which an exterior delicate hair is found; at the base of the last segment a strong spine is found, at least as long as the 3 distal segments. The fifth pair of the male consists of two short basal segments in addition to the undivided branches, somewhat asymmetrical (text-fig. 70 d).

Occurrence. The Ingolf Expedition has not gathered this species, but it was taken at the following stations by the Thor.

In Denmark Strait

19/6	1904	St. 152	65°00 L. N.	28°10 L. W.	Yt. 1000 M. Wire	1 f♀.
20/6	1904	St. 153	65°27 L. N.	27°12 L. W.	Yt. ?	1 f♀.

In the Atlantic, south of Iceland

1/9	1904	St. 285	62°49 L. N.	18°46 L. W.		3 f♂, 1 f♀.
10/7	1904	St. 180	61°34 L. N.	19°05 L. W.	Yt. 1800 M. Wire	1 f♀.
11/7	1904	St. 183	61°30 L. N.	17°08 L. W.	Yt. 1800 M. Wire	2 f♀.
25/5	1904	St. 104	62°47 L. N.	15°03 L. W.		2 f♀, 1 f♂.

In the Iceland-Færoe channel

29/8	1905	St. 164	61°20 L. N.	11°00 L. W.	Yt. 300 M. Wire	1 f♂.
29/8	1905	St. 165	60°00 L. N.	10°35 L. W.	Yt. ?	1 f♀, 1 f♂.
22/5	1904	St. 99	61°15 L. N.	9°35 L. W.	Yt. 1700 M. Wire	1 f♂.
12/5	1904	St. 78	61°07 L. N.	9°30 L. W.		1 f♀.

Outside the Ingolf area

15/6	1905	St. 82	51°32 L. N.	12°03 L. W.	Yt. 800 M. Wire	1 f♀, 1 y♀ (V).
					Yt. 1200 M. Wire	10 f♀, 1 f♂, 2 y♂ (V).
1/9	1905	St. 167	57°46 L. N.	9°55 L. W.	Yt. 1500 M. Wire	6 f♀, 1 y♂ (V).
8/6	1905	St. 72	57°52 L. N.	9°53 L. W.	Yt. 1500 M. Wire	5 f♀, 9 f♂.
20/6	1905	St. 88	48°09 L. N.	8°30 L. W.	Yt. 300 M. Wire	1 f♂, 3 y♀ (V).

Distribution. This species is by Farran recorded as fairly common on the west coast of Ireland "at depths of from 330 to 1150 fathoms"; it has been recorded by the Monaco Expedition, and from the gulf of Guinea. The records from the South Atlantic, the Pacific and the Indian Ocean cannot be accepted.

Remarks. That the species is identical with the male of *Sc. securifrons* Scott and with Farran's *S. persecans* seems not to be doubtful. I think, that Farran, in contrast to Sars, is right in applying the name *Sc. securifrons* to the species with the pointed lateral corner, as Canu, who was the first to rediscover the species, has done so. Farran has identified the Atlantic species with Giesbrecht's *S. persecans,* and, as will be seen in the nomenclature of Plate VI, I once thought he was right. But on full consideration I feel obliged to follow A. Scott, and admit that *S. persecans* is another species, and I have accordingly given the Atlantic species the name *S. Thorii* in appreciation of the good work of this expedition. The female of *S. persecans* has been only imperfectly described by Esterly, but the fifth foot seems to be somewhat different. The male of *S. persecans* is characterized "by the moderately long spines on the rami of the rostrum", and by several structures in the structure of the fifth foot.

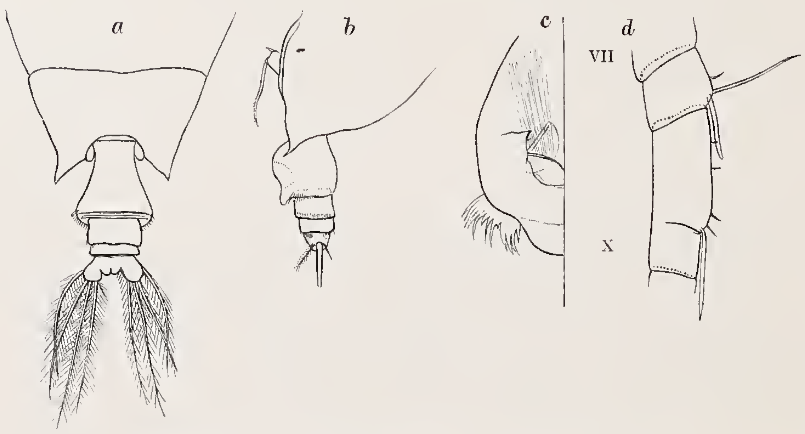
70. Scottocalanus securifrons Th. Scott.

(Pl. VIII figs 13 a—b; text-figs 71 a—d, 72 a—e and 73 a—d.)

1893. ♀ nec. ♂. Scolecithrix securifrons n. sp. Th. Scott, pp. 47—48, pl. IV—V.
1896. Scolecithrix securifrons Scott. Canu, p. 425.
1898. — — — Giesbr. & Schmeil, p. 49.
1903. pars. — — — Norman, p. 137.
1903. — — — J. C. Thompson, pp. 20—21.
1904.? — — — Cleve, p. 197.
1904. Lophothrix — n. sp. Wolfenden, p. 120, pl. IX figs 12—15.
1905. Scottocalanus acutus n. sp. G. O. Sars, p. 7.
1906.? pars. — securifrons Scott. Pearson, p. 19.
1908. — — — Farran, p. 57.
1908. ♀ nec. ♂ Scolecithrix securifrons Scott. v. Bremen, p. 76 fig. 88.
1909. Scottocalanus securifrons Scott. A. Scott, pp. 104—105 pl. XXV figs 1—9, pl. XXVIII figs 1—9.
1911. pars. Lophothrix securifrons Scott. Wolfenden, p. 268.

Description. f♀. Size of female from Thor St. 82 was 4·49 mm.; anterior division (to the end of the lateral corners) 3·77 mm.; urosome 0·72 mm. Th. Scott's specimens measured 4 mm. and A. Scott's 4·3 mm.

The crista is scarcely different from that of the preceding species, but the lateral corners are triangularly produced into spine-like processes, which in dorsal view are seen to be directed somewhat outwards (text-figs 71 a—b). The rostrum has the basal portion elongate, with parallel margins; the divergent rami are short, without distinct tooth. The genital somite is strongly swollen below, and it is distally produced into a strong process which overlaps the proximal half of the following somite. Along the hinder margin of somites II—IV a generally well developed serrated seam is observed (text-figs 71 a—b).



Text-fig. 71. *Scottocalanus securifrons* Th. Scott f♀.
a—b. Abdomen × 15. c. Genital somite from below × 46.
d. Segments VII—X of the antennulae.

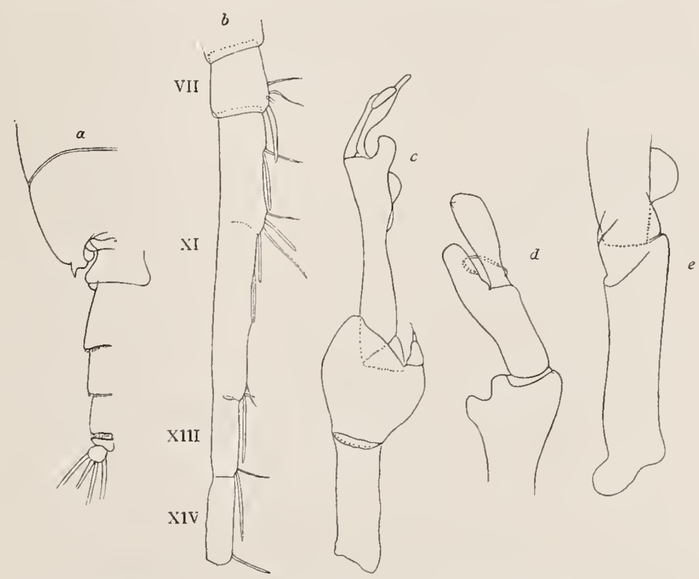
The *antennulae* are like those of the preceding species, but the articular membrane between segments 8∾9 and 10 are wanting posteriorly, and segments 8∾9 have only one sensory seta (text-fig. 71 d). The oral appendages are scarcely different from those of the preceding species.

The *natatory legs* are very similar to those of the preceding species, but the outer spines of the second basipodite, as well as the inner of the third one, are comparatively longer in the second and third pairs of legs. The second basipodite of the *first pair* of legs has anteriorly and outwards near the end a rounded broad process; the Se of Re I is comparatively longer. The Se of Re I in the second foot is distinctly pointed. The *fifth pair* of legs is shorter; the inner process is longer, and its spine is longer and stronger; the outer spine is much shorter, as it does not reach the end of the genital somite, and the inner serration consists of fewer teeth.

The structure of the *labrum* etc. is scarcely different from that of the preceding species.

f♂. Size of male from Thor St. 82 was 4·98 mm.; anterior division 3·81 mm.; urosome 1·17 mm.; Scott's specimens measured 4·75 mm.

The *rostrum* has the basal portion long and rather slender, and is divided into two rather short branches, which each possesses a very short tooth; the whole structure is completely like Scott's fig. 4, Pl. XXVII. The crista is scarcely different from that of the female. The fifth thoracic tergite has near the dorsal margin a distinct slender tooth, almost reaching the middle of the first genital somite. The abdomen (text-fig. 72 a) is like that of the preceding species, but the lateral process of the first genital somite is less prominent. The *antennulae* as well as the oral appendages are scarcely different from those of *S. Thorii* (text-fig. 72 b); the *natatory* legs do not differ from those of the females. The right endopodite of pes V (text-fig. 72 c) is very short, and consists of three segments, which are indistinctly separated; the second segment is the longest, and the third one is a short conical process bearing a slender seta. The first outer segment is long, and distinctly widened out terminally, where it medially possesses 3 expansions anteriorly and a single more prominent outer one posteriorly; the second outer segment is comparatively short, and, outwards, convex with a terminal expansion, and the third one is short, rounded, with a single spine. The described terminal parts of the right exopodite form a clasping organ (text-fig. 72 c—d). The two cylindric basal segments of *the left leg* (text-fig. 72 e) have each a basal rounded process as seen in figure; the third basipodite has an inner terminal one as well. The left endopodite consists of two segments, of which the one is rather short and rounded with distal process, while the other has two diverging processes, of which the one is axeshaped. The *left exopodite* consists of a short basal segment and a longer distal one, inwards excavated and enlarged towards end; the inner margin of this is terminally and posteriorly densely spinous, and anteriorly a laminous process divided into two spines is found. The third segments consists of a rounded basal portion with a few teeth, and a much longer pointed spinelike portion (Pl. VIII figs 13 a—b).



Text-fig. 72. *Scottocalanus securifrons* Th. Scott f ♂. a. Abdomen × 15. b. Segments VII—XIV of the left antennula × 51. c. Pes V dext. × 33. d. Pes V dext. Re II—III in right view. e. Pes V sin. two first segments in dorsal view.

Y ⚥ (St. V). Size of female from Thor St. 82 was 3·45 mm.; anterior division 2·80; urosome 0.65 mm. Size of female from St. 90 was 3·54 mm.

The frontal keel is less prominent than in the adult, though distinct. The lateral corner is produced into a distinct tooth (text-figs 73 a—e). The *fifth foot* of the female is much shorter than in the preceding species; the limitation between the segments is more indistinct, the third outer segment is only represented by a short spine, and the inner spine is not as long as the three terminal segments (text-figs 73 c—d). The *fifth foot* of the male is characterized by a short, distinct spine in the left exopodite as well as by the pointed endopodite; the branches of the right side, especially the endopodite, are distinctly more rounded.

Occurrence. In the Atlantic, south of Iceland, the Thor has gathered this species.

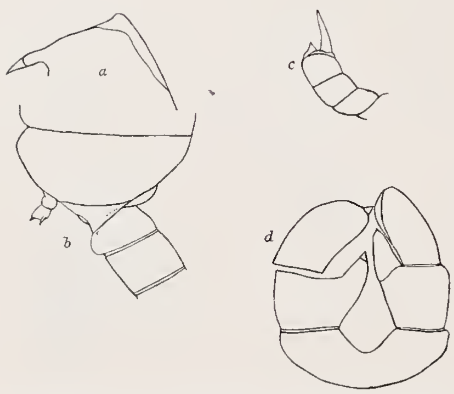
9/7 1904 St. 178 63°08 L. N. 21°30 L. W. Yt. 750 M. Wire 1 f♀.
11/7 1904 St. 183 61°30 L. N. 19°05 L. W. Yt. 750 M. Wire 1 f♀.
25/5 1904 St. 104 62°47 L. N. 15°03 L. W. Yt. 1800 M. Wire 1 f♀.

In the Iceland-Færoe Channel:

29/8 1905 St. 164 61°20 L. N. 11°00 L. W. Yt. 300 M. Wire 2 f♀.

Outside the Ingolf area:

15/6 1905 St. 82 51°32 L. N. 12°03 L. W. Yt. 800 M. Wire 1 f♂.
Yt. 1200 M. Wire 18 f♀, 5 f♂, 3 y♀ (V).
8/6 1905 St. 72 57°52 L. N. 9°53 L. W. Yt. 1500 M. Wire 1 f♀.
20/6 1905 St. 88 48°09 L. N. 8°30 L. W. Yt. 300 M. Wire 3 f♀, 8 f♂, 1 y♀ (V).
21/6 1905 St. 90 47°47 L. N. 8°00 L. W. Yt. 300 M. Wire 4 f♀, 7 f♂, 1 y♀ (V), 1 y♂ (V).



Text-fig. 73. *Scottocalanus securifrons* Th. Scott. a—b. Y♀ (St. V). Head and first abdominal somites × 33. c. Y♀ (St. V). Pes V dext. in posterior view × 59. d. Y♂ (St. V). Pes V × 59.

Distribution. This species is, according to Farran, very characteristic of deep-water tow-nettings off the west coast of Ireland, most plentifully at about 700 fathoms, but it was taken at 100 fathoms. It has been recorded from the Bay of Biscay by the Monaco Expedition, from the Gulf of Guinea, and by Wolfenden in the Atlantic as far south as 35° L. S. By A. Scott it has been recorded from the Malay Archipelago.

Remarks. As this species (males, females, adult as well as young ones) is distinguished from the preceding species by a number of important characters, viz. pointed lateral corners and the structure of the fifth foot, Wolfenden is certainly wrong in regarding *Scott. acutus* G. O. Sars and *Sc. securifrons* Th. Scott (Sars) as the same species. The species, which A. Scott has described from the Malayan Seas and referred to this species, seems in all essentials to be like the Atlantic form.

Phaënnidae.

71. **Cornucalanus chelifer** Thomps.

(Pl. VII figs 4 a—h, Pl. VIII figs 15 a—g).

1903? Scolecithrix chelifer n. sp. J. C. Thompson, pp. 21—22, pl. V figs 1-9.
1905. — — — Farran, p. 36, pl. VII figs 18—19.
1905. Cornucalanus magnus n. sp. Wolfenden, pp. 21—22, pl. VII.
1906. Onchocalanus chelifer Thomps. Pearson, p. 19.
1907. Cornucalanus chelifer Thomps. G. O. Sars, p. 27.
1908. — — — Farran, pp. 49-50.
1908. Onchocalanus chelifer Thomps. v. Bremen, pp. 65-66, fig. 76.
1911. Cornucalanus magnus Wolf. Wolfenden, pp. 281—83, pl. XXXII figs 1—10, text-fig. 45.

Description. f♀. Size of female from Thor St. 183 was 8·7 mm; anterior division 6·7 mm.; urosome 2 mm. Wolfenden's specimens measured 8 mm.

The head has a low terminal crista with a dorsal spine directed forwards and downwards (Pl. VIII fig. 15 a). The rostrum is bifurcate with the spines directed downwards and backwards, each bearing terminally a slender backwards curved filament. The shape of the body is like Wolfenden's figure; the articulation between the head and first thoracic tergite, as well as between the fourth and fifth tergites is well developed; the lateral corners are somewhat triangularly produced, are rounded and possess a small tooth (Pl. VII fig. 4 a).

The *abdomen*, which is about one third as long as the anterior division, has a serrated seam along the hinder margin of somites II—IV; the somites, especially the genital one, are all over covered with short hairs or spines. The genital somite, which is a little longer than deep, is distinctly produced below; the receptaculum seminis is, as seen in fig. 4 a, well developed. The fifth abdominal somite is scarcely visible from above, the comparative length between the three first somites and the furcal branches, which are wider than long, is 35, 22, 17 and 10. The St 2, at the base of which a dorsal tooth is seen, is almost half as long as the body and twice as long as the other setae.

The *antennulae*, which scarcely extend to the end of the cephalo-thorax, consist of 24 segments. "Æsthetasken" are found in segments 2, 3, 5, 7, 9, 12, 14, 19 and 25, as well as in segments 18 and 21, but here representing the distal seta. A proximal seta was found in segment 12 as well as in segments 14—18. The Sp. of segment 23 is well removed from the tip of segment ($^1/_4$—$^1/_5$ of its length), and extends scarcely to the end of segment 25. The segment 21 is 1·3 as long as segment 22.

The endopodite of the *antennae* is two thirds as long as the exopodite; its second segment has 8 setae in the inner lobe and 6 in the outer lobe. The manducatory part of the *mandibulae* is long and slender, with fairly well developed teeth; the third basipodite, which is about as long as wide, has three setae inwards; the second segment of the endopodite has 9 Sp.

The Lob I of the *maxillulae* is long and slender; the Li 2 has two long plumous setae, the Li 3 has 4 setae, and the third basipodite has 4 Sa and 1 Sp. The Ri I has 3 setae, the Ri II has 3, of which one is very delicate, and the Ri III has 4 setae. The exopodite has 10 setae and two groups of short spines on the anterior surface; the Le has 7 + 2 setae.

The *maxillae* and *maxillipeds* have a very characteristic structure, but are scarcely different from Wolfenden's figure.

The *first pair* of legs is like Wolfenden's figure; the segments are broad, and the exopodite has 3 segments with powerful outer setae; the endopodite has 3 fairly long spines on the posterior surface; the exopodite has on the posterior surface of Re II at the base of Si five slender spines, and at the base of Si I Re III two spines. A glandular pore is found beyond the middle in the outer margin of Re III. The *second pair* of legs is like Wolfenden's figure, but the segments are comparatively longer; the first inner segment is produced into a fairly long, somewhat rounded, spine; the armature of the posterior surface is scarcely different from Wolfenden's description. The St has the serrations almost completely fused in the distal three fourths, but only fused in the middle in the proximal fourth, leaving a basal fenestra free. Small glandular pores were found at the base of Se Re I and II, and at the base of Se 1 and 3 of Re III. The *third* pair of legs is in main features like the *fourth* pair;

the number of glandular pores is like that of the second foot. The *fourth* foot is like Wolfenden's figure, but the armature of the posterior surface of the third outer segment differs in minor details (Pl. VII fig. 4 b); the structure of the St. is like that of the second foot (Pl. VIII fig. 15 b). The *fifth* pair of legs (fig. 4 c) consists of three segments, bearing a few hairs posteriorly; the terminal segment is rather slender, attenuated, and produced into a rather short terminal spine.

The lateral outline of the *labrum* etc. is rather characteristic, as seen in fig. 15 a; a well developed *epistoma* densely covered with about 40 long setae on each side was found; the *labrum proper* is densely covered with setae, the arrangement of which is similar to that seen in fig. 5 e, though differing in details; anteriorly a group of rather short setae (about 3 deep) is found; this group is on each side continued into a large group of long setae, placed laterally and posteriorly, extending towards the hinder margin, where groups of shorter setae are found. In the area in front of the mentioned groups a median group of fairly long setae is observed.

The *oral surface* of the labrum (fig. 4 d) is rather characteristic. Laterally, in front, an almost transverse row of rather short setae is found; behind this a longitudinal row of setae is observed. In the middle, on each side, 3—4 almost completely fused groups of densely placed, fairly long, setae are found. In the middle, around the median circular spots, areas of short spines or granules are found. The *lamina labialis* seems to be wanting, but the serrula 6-dentata is well developed (Pl. VII fig. 4 e); in front, a median wide and elongated group of fairly long setae is found, as well as a lateral rounded one. Between the serrulae and behind, 2 groups of setae are found. The arrangement of the densely placed hairs on the labial lobes and on the area behind was not studied in details, but shows great similarity to that of *O. magnus* (fig. 5 e).

f ♂. Size of male was 6·17 mm.; anterior division 4·95 mm.; urosome 1·22 mm.

The head is rounded, without any frontal crista or spine (fig. 15 d). The rostrum is strong, with short terminal filaments. The lateral corners are rounded, without any spine (Pl. VII fig. 4 f).

The *abdomen* is only one fourth as long as the anterior division; along the hinder margin of somites II—IV a marginal serrated seam is found; the fifth abdominal somite is almost rudimentary; the comparative length of the first four abdominal somites and the furcal branches is 8, 20, 15, 10 and 5.

The *antennulae* extend to the end of the cephalo-thorax; the two first segments are inflated and much more powerful than those following; they contain 24 segments, but the articulation between 8 ∾ 9 and 10 and between 12 and 13 is wanting posteriorly. "Æsthetasken" are found in the following numbers, 1 in segment 1, 4 in segment 2, 2 in segments 3—8 ∾ 9, and a single one in segments 10—19, 22 and 25. The mensurements are scarcely different from those of the females. The *antennae* are like those of the female, while the *mandibulae* differ from those of the female by the much wider third basipodite with three short setae medially.

The *maxillulae* differ from those of the female by the rudimentary setae of the Li I and the two short setae of Li II. The *maxillae* are very similar to those of *O. cristatus* (Pl. VII fig. 6 c), but the spine of lob. IV is comparatively stronger, being longer, though less powerful, than that of lob. V; the number of the setae is scarcely different from that of the female; the sensory setae of the endopodite have a rather curious structure, with a more or less prominent, rather short, terminal filament surrounded by short delicate dentations. The *maxillipeds* are widely different from those of the females, especially on account of the wanting strong spines of the endopodite; the dentation of the third basipodite is not better developed than in related species; the fourth lobe of the second basipodite has two short setae in addition to the spine.

The *natatory* legs are scarcely different from those of the female. The *fifth pair* of legs is not unlike Wolfenden's description, but his right foot corresponds to the left one in my specimens (Pl. VII figs 4 f—g). The right foot (fig. 15 e) consists only of three segments and a short terminal tooth. The left leg consists of 5 long proximal segments, in addition to a fairly short, attenuated and hairy third outer segment, which has a short terminal seta (fig. 4 g).

Y♂♀ (St. V). Size of female from Thor St. 183 was 6·3 mm.; anterior division 5·1 mm.; urosome 1·2 mm. Size of male 6·4 mm.

The shape of the body is like that of the adult female, but the lateral corner is more pointed (fig. 15 f); the abdomen consists of four somites, the comparative length of which was 10, 19, 14, 8 and 5. The appendages, except the fifth feet, are in the young female like those of the adult females (Pl. VII fig. 4 h), this pair is even less developed than that of the adult, as seen in the drawing; in the male each leg consists of four segments, and the left leg is considerably longer than the right one; about the arrangement of hairs and setae I refer to fig. 15 g.

Occurrence. The Thor has in Denmark Strait once gathered this species viz:

19/6 1904 St. 152 65°00 L. N. 28°10 L. W. Yt. 200 M. Wire 1 f♀.

In the Atlantic, south of Iceland:

10/7 1904 St. 180 61°34 L. N. 19°05 L. W. Yt. 1800 M. Wire 1 f♀, 1 f♂.
11/7 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 31 f♀, 6 f♂, 3 y♀ (V), 4 y♂ (V).

In the Iceland-Færoe Channel:

12/5 1904 St. 78 61°07 L. N. 9°30 L. W. 3 f♀.

In the Atlantic, south west of the Færoes:

8/6 1905 St. 72 57°52 L. N. 9°53 L. W. Yt. 1500 M. Wire 4 f♀.

Distribution. According to Farran "this species is of frequent occurrence in deep-water townettings off the west coast of Ireland", at depths of from 330 to 1150 fathoms. By the Gauss it was taken 9/10 near the Cape Verde Islands, and 12/11 it was taken about 35° L. S. 0·5° L. E.

Remarks. In spite of minor differences I do not doubt that this species is identical with *Cornucalanus magnus* Wolf.; Wolfenden refers Thompson's *Sc. chelifer* to a different species on account of a wanting frontal spine; as Thompson's description of a young male is so very imperfect, I prefer to follow Farran and Pearson.

72. Onchocalanus magnus Wolfenden.

(Pl. VII figs 5 a—g; Pl. VIII figs 16 a—d).

1906? Xanthocalanus magnus n. sp. Wolfenden, pp. 32—33, pl. X.
1908? — — Wolf. Wolfenden, p. 37, pl. VII figs 1—9.
1911? Onchocalanus frigidus n. sp. Wolfenden, pp. 276—277.
— nec. — magnus Wolf. Wolfenden, pp. 275—276, pl. XXX.

Description. Size of female from Thor St. 183 was 8·3 mm.; anterior division 6·5 mm.; urosome 1·8 mm. Wolfenden's specimens measured 8·8 mm.

The body is rather elongated; the head (fig. 5 a) is well raised, with distinct eyes, but without trace of frontal keel or spine. The rostrum (Pl. VIII fig. 16 a) is bifurcate, with fairly long, slightly divergent spines, one of which, at least, possesses a slender filament. The lateral corner is triangularly produced, and has a well marked pointed tooth, which in some specimens, however, is only indicated, but is generally most distinct on the right side.

The *abdomen* (Pl. VII fig. 5 b) is scarcely one third as long as the anterior division; the genital somite is rather suddenly produced below; the genital opening is more broad than long, and is placed in the middle of a densely hirsute area; the lateral margins are somewhat overlapping and pointed in front; an elongated receptaculum seminis is found. The anal somite is scarcely visible from above; the comparative length of the three first abdominal somites and the furcal branches is 32, 22, 16 and 11. The marginal serrated seam along the hinder margin of segments 2—4 is only poorly developed.

The somites are more or less hirsute, especially ventrally; the first somite has the hairs more distinct, especially dorsally in front, where a pad of densely placed hairs is found.

The *antennulae* reach almost to the end of the body and consist of 24 segments the appendages are scarcely different from those of *C. chelifer*; the Sp. of segment 24 is one third removed from the end of the segment, and is far from reaching the tip of the segment 25. The segments 21 and 22 are of almost equal length. The exopodite and the endopodite of the *antennae* are of almost equal length; the *mandibulae* and *maxillulae* are in main features like those of *C. chelifer.* The basipodite of the *maxillae* is first strongly excavated and then distinctly produced; the lobe 1 has 5 setae, the lobes 2—4 have 3 setae; the posterior seta of the fourth lobe is stronger than the preceding setae, but much weaker than the strong curved spine of the fifth lobe, at the base of which 3 fairly long and slender setae are found. The endopodite has 6 brush-shaped sensory organs in addition to a long slender one. The *maxillipeds* show great similarity to those of *C. chelifer*; the comparative length between the main divisions is 18, 29 and 15. The first and second basipodites are like those of *C. chelifer*; the third basipodite is about 6 times as long as wide, with the three proximal setae well separated from each other; and inwards and basally with an area of densely placed delicate spines. The second segment of the endopodite has one short serrated curved spine and two long ones; the third segment has two similar spines.

The *first pair* of legs is like that of the preceding species, but the segments are much more slender. The *second pair* of legs is like those of the preceding species, but is distinctly more slender; the third outer segment is about twice as long as wide, and as long as the terminal spine. The outer spine of the first inner segment is fairly long and somewhat obtuse; on the anterior surface of the second inner segment a small pore surrounded by slender hairs is found; indistinct glandular pores were only found in Re II and at the base of Se 3 Re III. On the posterior surface of the two inner segments coronas of spines were found, while larger and smaller prickles were found in numbers in the outer segments. The *third pair* of legs differs from the following pair by the comparatively longer and thicker teeth, especially in the endopodite. The *fourth pair* of legs has marginal setae in the second basipodite; a glandular pore is observed in the second outer segment; the posterior surface is covered with groups of short prickles or fairly long setae, with all intermediary steps between; the setae are comparatively shorter in the two outer segments. Anteriorly, hairs are only found in the second basipodite, where, f. inst., laterally a large group of long setae is found.

The *fifth* pair of legs (fig. 5 d) consists of three segments; the exopodite has a terminal and two outer spines; the anterior surface is almost smooth, while the posterior surface as well as the sides are covered with long setae.

In front of the rather prominent labrum proper a prominent *epistoma* (Pl. VII fig. 5 a), which is densely covered with long bristles (fig. 5 e), is found; the bristles of the labrum are neatly arranged into two anterior groups of long bristles, about three lateral groups of shorter hairs and a single marginal row. The *oral* surface of the labrum (fig. 5 f) is anteriorly densely covered with a number of short minute prickles; scarcely distinguished from these, two lateral groups of hairs are found, probably corresponding to two groups in *C. chelifer*. Almost in the middle, on each side, about three almost completely fused groups of short bristles as seen in figure are found, and more behind, an oblique group of delicate hairs is found. In the middle densely placed granules are found in transverse areas. No distinct lamina labialis is found; in front of the serrula 6-dentata (fig. 5 g) a large inner group of short granules is found, and an outer longitudinal row of fairly long hairs. Behind, a horse-shoe shaped group of granules is found on each side and, well separated from this, as seen in fig. 5 e, irregularly placed short hairs. Along the inner margin of the labial lobes inwards short spines, and more outwards long bristles, are found.

Y♀ (St. V). Size of female from Thor St. 183 was 6·25 mm.; anterior division 5 mm.; urosome 1·25 mm.

The shape of the body is scarcely different from that of the adult, but for the regularly pointed lateral corner. The comparative length of the four abdominal somites and the furcal branches is 10, 15, 13, 8 and 6. The abdominal somites are almost completely smooth. But for the comparatively shorter fifth foot, the appendages are scarcely different from those of the adult females.

Occurrence. The Thor has taken this species at two stations.

$^{11}/_{7}$ 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 2 f♀, 2 y♀ (V).
$^{8}/_{6}$ 1905 St. 72 57°52 L. N. 9°35 L. W. Yt. 1500 M. Wire 1 y♀ (V).

Distribution. This species has previously been found in the Antarctic Seas.

Wolfenden has originally given the name *X. magnus* to a species about 8·8 mm. long with pointed lateral corners. Later on he has subdivided his original species into a smaller one with rounded lateral corners to which he applies the name *O. magnus*, and a larger one which he names *O. frigidus*. I think the name *magnus* must necessarily be used for the bigger species.

I am very doubtful, if my North Atlantic species is really identical with the Antarctic one; Wolfenden's description, however, is in several important points too incomplete to settle the question.

The differences are the following. In my specimens the first as well as the fifth thoracic somites are well marked in front; the genital somite is not as long as the following three somites, the vulva has no "lateral flap" on each side, and the genital somite can scarcely be called "very swollen ventrally". The antennulae are longer, as they reach distinctly beyond the middle of the genital somite. The Li 2 of the maxillulae has 2 not 3 setae. The Ri 2 of the fourth foot has no "corona of spines", but a number of fairly long bristles, and the fifth feet seem to be somewhat different.

73. Onchocalanus cristatus Wolf.

(Pl. VII figs 6 a—e; Pl. VIII figs 17 a—f).

1904. Xanthocalanus cristatus n. sp. Wolfenden, p. 119, pl. IX figs 18—19.
1905. Onchocalanus trigoniceps n. sp. G. O. Sars, p. 20.
1906. Xanthocalanus cristatus Wolf. Pearson, p. 20.
1906? — similis n. sp. Esterly, pp. 68—69, pls 9—13.
1907. Onchocalanus cristatus Wolf. G. O. Sars, p. 3.
1908. Onchocalanus cristatus Wolf. Farran, p. 49.
1908. Xanthocalanus cristatus Wolf. Wolfenden, p. 34.
1908. — — — v. Bremen, p. 62 fig. 70.
1909? Onchocalanus cristatus Wolf. A. Scott, pp. 82—83, pl. XXXIV figs 1—8.
1911. — — — Wolfenden, pp. 277—278.

Description. f♀. Size of female from Thor St. 183 was 8·15 mm.; anterior division 6·45 mm.; urosome 1·70. Another specimen measured 7·5 mm. Wolfenden's specimen measured 5·5 mm., Sars's 7 mm. and Scott's 6·6 mm.

The shape of the body is like that of *O. magnus*, but it is more slender; the first as well as the fifth thoracic somite is well marked out in front. The head (Pl. VIII fig. 17 a) is well raised, and surmounted with a dorsal low crest, visible in dorsal as well as in lateral view. The rostrum consists of a basal portion and two fairly long somewhat divergent spines without distinct terminal filament. The lateral corners are triangularly produced and terminated with a distinct tooth.

The *abdomen* is a little more than one fourth as long as the anterior division; the genital somite is like that of *O. magnus*, but is less produced below. The comparative length of the abdominal somites and the furcal branches is 28, 18, 13 and 6; the somites are hairy in a similar way as in the other species.

The *antennulae* are like those of *O. magnus*, and extend about to the end of the furca; the only difference is found in the slightly different measurements of the segment 13, which is 1·24 (not 1·4) as long as segment 12, and of segment 24 which is 1·1 as long as segment 23 (not a little shorter). The *antennae*, *mandibulae* and *maxillulae* are scarcely different from those of *O. magnus*. The *maxillae* are like those of the preceding species; the endopodite possesses in addition to a short seta of usual structure a long slender sensory seta and 5 fairly long ones, the slightly enlarged part of which is more or less "brush-shaped". The *maxillipeds* are like those of the preceding species, but the third outer segment has 4 instead of 3 strong curved spines. The *first* pair of legs differs only by rather unimportant details in the armature of the posterior surface. The Se of the first inner segment is long, slender, and distinctly pointed in the *second* pair of legs. The *third* as well as the *fourth* pair of legs differs from *O. magnus* in the details of the arrangement of the hairs, and by the curiously contorted terminal spine. The *fifth* pair of legs consists of three segments, of which the third, attenuated one, is longer than the second, but shorter than the two basal ones combined; it has, as seen in fig. 6 a Pl. VII, a terminal and two outer spines. The anterior surface is smooth, while the sides as well as the posterior surface are all over covered with fairly strong setae or spines.

The *labrum* (Pl. VIII fig. 17 a) etc. are not in any features of great interest different from the corresponding organs of the preceding species.

f ♂. Size of male was 6·5 mm.; anterior division 5·07 mm.; urosome 1·43 mm.

The body is more slender than in the female; the head shows trace of a crista, especially in dorsal view. The lateral corners are rounded and possess a small, well marked tooth.

The *abdomen* is fairly slender (Pl. VII fig. 6 b) and is, as seen in figure, beset with hairy spots. The comparative length of the first four abdominal somites and the furcal branches is 25, 55, 45, 28 and 15.

The *antennulae* extend about to the end of the body; the proximal 7 segments are more powerful than in the female. The segments 8 ∾ 9 to 13 are posteriorly indistinctly separated, as the articular membrane is sometimes missing; the segments 20 and 21 are, on the right side, partly fused; the appendages are scarcely different from the male of *C. chelifer*. The *antennae* scarcely differ from those of the female, but the *mandibulae* differ by the wide third basipodite with three rather short inner setae; the *maxillulae* are more soft-skinned than in the female; the Li 1 has 8 short setae, but the number of setae is in other respects like that of the female. The *maxillae* (fig. 6 c) is a soft-skinned organ of somewhat similar shape to that of the female; the number of setae in the lobes is seen in figure; the endopodite has 7 sensory setae, differing from rather clumsy ones basally to more slender ones distally.

The *maxillipeds* are distinctly more robust than in the females; the comparative length between the main divisions is 34, 34 and 15, the setae of the second basipodite, especially the sensory one in the middle, are less developed; the strong curved setae of the endopodite are represented by rather weak setae.

The *natatory* legs are scarcely different from those of the female. The *fifth* pair of legs extends almost to the end of the abdomen. The *right leg* is much shorter than the two first segments in the left leg (cf. Pl. VII fig. 6 b), and it forms an outward convexity; the outer margin of the second segment is slightly convex, and somewhat spinous; the third segment is indistinctly divided into two parts, and has at least a terminal and an outer rather weak spine as well as a number of stiff hairs terminally on the posterior surface. The *left leg* has two long cylindric basal segments, of which the distal one is much the longer; the second segment is convex outwards, and here possesses terminally about 7 stiff hairs. The exopodite consists of three segments, decreasing in length as well as in thickness from the first towards the third; the third segment (Pl. VIII fig. 17 e) is somewhat attenuated and hairy, and is in possesion of a short terminal spine.

The *epistoma* (Pl. VIII fig. 17 c) is well developed, with two rows of long setae; the *labrum* proper has, anteriorly, a well developed projection, but is posteriorly rather soft-skinned, with undulated lines in the chitin; anteriorly 2—4 rows of long bristles are found; posteriorly, rows of short bristles were observed; the marginal row of hairs was apparently wanting. The *oral* surface of the labrum is not unlike that of the female, but the granulation in front is wanting; three well separated lateral groups of hairs were found on each side. In the middle, just behind the third median circular spot, a single transverse group of short bristles was found. In front of a well developed *serrula 6-dentata* with short teeth, a median elongated group with two longitudinal rows and, laterally, a single convex row were found. The labial lobes are well developed, with short marginal bristles; between the lobes a small pointed process is found on each side.

Y♀ (St. V). Size of female from Thor St. 183 was 6·15 mm.; anterior division 4·9 mm.; urosome 1·25 mm.

The shape of the body is more slender than in the adult female. Short, but distinct rostral, filaments were found in the examined specimen. The comparative length of the abdominal somites and the furcal branches is 30, 50, 40, 20 and 17; the somites are distinctly hirsute. The appendages do not show any difference of importance, except the fifth pair of legs; this was in one specimen (St. 167) shorter than that of the adult female, and especially the last segment was less slender; in another, however (St. 183) (fig. 17 f Pl. VIII), the last segment was, as seen in figure, divided into two; as the right and the left foot were almost quite alike, I am most disposed to regard this feature as an abnormity and not as one characteristic of the male.

Y♀ (St. IV). Size of female from Thor St. 183 was 4·36 mm.; anterior division 3·44 mm.; urosome 0·92.

The comparative length of the abdominal somites and the furcal branches is 28, 40, 40 and 17. The *maxillulae* have only 9 setae in the exopodite. The natatory legs show the usual differences, as the Ri II—III and Re II—III are fused; the second to fourth pairs of legs have only 3 Se in the Re II∾III. The *fifth* pair of legs (Pl. VII 6 e) is rather short and clumsy, with the first outer seta of Re III rather indistinct.

Occurrence. The Thor has taken this species in Denmark Strait:

19/6 1904 St. 152 65°00 L. N. 28°10 L. W. 1 f♀.

In the Atlantic, south of Iceland:

10/7 1904 St. 180 61°34 L. N. 19°05 L. W. Yt. 1800 M. Wire 1 y♀ (V).
11/7 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 3 f♀, 5 f♂, 2 y♀ (V), 1 y♀ (IV).
21/5 1904 St. 99 61°15 L. N. 9°35 L. W. Yt. 1500 M. Wire 1 f♀.

In the Iceland-Færoe channel:

29/8 1904 St. 165 60°00 L. N. 10°35 L. W. Yt. 1000 M. Wire 1 y♀.
22/5 1904 St. 99 61°15 L. N. 9°35 L. W. Yt. 1700 M. Wire 1 f♀; 1 y♀ (V).
4/8 1904 St. 230 63°10 L. N. 7°31 L. W. Yt. 1200 M. Wire 1 f♀.

In the Atlantic, south west of the Færoes:

9/6 1905 St. 72 57°52 L. N. 9°55 L. W. Yt. 1500 M. Wire 2 f♀, 3 y♀ (V), 2 y♀ (IV).

Distribution. This species has previously been recorded from the North-East Atlantic and is, according to Farran, not uncommon off the west coast of Ireland "at depths of from 330 to 1150 fathoms"; the other records are rather doubtful.

Remarks. On full consideration I do not doubt that the females and males are rightly referred to the same species.

My specimens differ from Wolfenden's original description by its much larger size, and by the maxillae, which do not possess "seven short thick brush processes", and, from a note (1906 p. 32) by the number of setae in the third basipodite and the endopodite of the maxillulae. It differs from Sars' *O. trigoniceps* by its size and the anteriorly well marked first thoracic tergite.

It differs from Scott's species from the Malay Archipelago by the less slender fifth foot without inner spine, and by the endopodite of the maxillae, which does not possess 6 strongly brush-shaped setae.

This species is nearly related to Esterly's *X. similis*; it differs, according to him, especially by the four segments of the fifth pair of legs (Pl. XIII fig. 77). As the only examined female (from the Gulf of California), which is 6·5 mm. long, is a young one of the penultimate stage, I think, although the fifth pair of legs is completely like the four-segmented one which I have examined of the same stage (Pl. VIII fig. 17 f), that a more detailed description is needed of specimens from this region before settling the question.

74. **Onchocalanus hirtipes** G. O. Sars.

(Text-figs 74 a—i).

1905. Onchocalanus hirtipes n. sp. G. O. Sars, p. 20.
1908. — — G. O. Sars. Farran, p. 49.
1909. Onchocalanus hirtipes G. O. Sars. A. Scott, p. 83, pl. XXXIV figs 9—17.

Description. f♀. Size of female from Thor St. 183 was 5·3 mm.; anterior division 4·0 mm.; urosome 1·3 mm. Sars' specimens measured 4·7 mm., Farran's 5·7 and Scott's 5 mm.

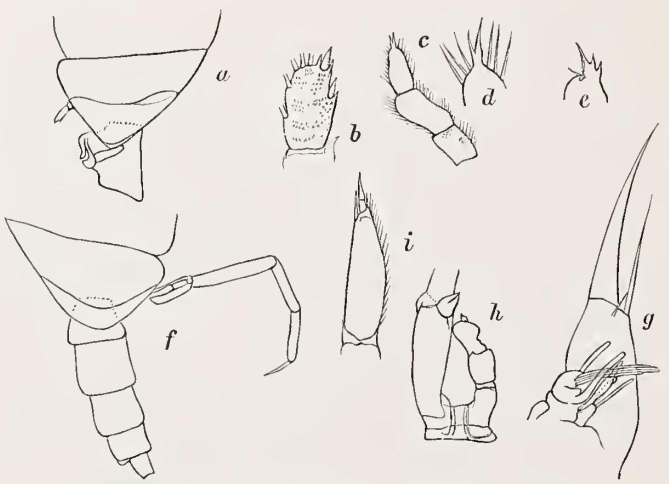
The body is moderately slender. The head is suddenly, but not very much, raised, and does not possess any crista. The fairly long *rostrum* has two only slightly divergent spines, each possessing a long, slender terminal filament. The first as well as the fifth thoracic tergites are well marked in front; the lateral corners are somewhat triangularly produced, but rounded (text-fig. 74 a).

The *abdomen* is one third as long as the anterior division; the genital somite is strongly produced below, and has a short receptaculum; in dorsal view it is seen to be much broader somewhat in front of the middle; in front and in a less degree behind it becomes suddenly narrow. The serrated seam along the hinder margin from the second to fourth somite is well developed. Short, stiff, scattered hairs are found on each side of the genital somite, and tufts of fairly long hairs on the ventral surface of the fifth somite.

The *antennulae* reach about to the end of the genital somite; the appendages are scarcely different from those of *C. chelifer*, except the Sp. of the segment 24, which is one third removed from the tip of the segment, and extends to the end of segment 25. The segment 13 is 1·6 as long as segment 12, and the segment 24 is a little longer than 23.

The exopodite and the endopodite of the *antennae* are of almost equal length; the Si of the first basipodite is as in the preceding species short. The *mandibulae* and *maxillulae* are like those of *C. chelifer*, but for the presence of 11 setae in the endopodite (5 in the Ri III) of the maxillulae. The structure of the *maxillae* is like that of the two preceding species; the endopodite has, in addition to a single vermiform seta, 7 rather curiously developed "brush-shaped" setae, similar to those figured in Scott's fig. 14 (Pl. XXXIV). The *maxillipeds* are similar to those of the preceding species; the comparative length of its main divisions is 65, 80 and 47; the sensory setae of the second basipodite is distinctly brush-shaped, and scarcely twice as long as wide on the left side, but on the right side it is like that of other species; the number of curved setae in the endopodite is as in the preceding species, but they are comparatively weaker.

The *first pair* of legs is like that of the preceding species; the Se of the Re I extends somewhat beyond the end of the Re II. The endopodite has on its posterior surface $3 + 2$ spines; the exopodite has 5 spines at the base of Se Re I, 6 spines at the base of Si Re II, and near the inner margin of Re III three groups consisting of 4, 3 and 3 spines. The endopodite of the *second pair* of legs has a long pointed Se in the Re I; on the posterior surface of Ri I a group of 5 fairly strong spines is found, and in Ri II two outer rows of 6 spines and an inner one of 8 weaker spines. The terminal seta, which is like that of the preceding species, is as long as the third outer segment; on the posterior surface of the third basipodite and the exopodite groups of rather short spines are found; the number of glandular pores is like that of *O. magnus*. The armature of the posterior surface of the *third pair* of legs is like that of the preceding species; the endopodite has 5 long spines in Ri I, a curved row of 7 long spines and an inner group of about 20 setae in Ri II, and in Ri III groups of 5 strong and 12 short spines; the exopodite has a number of short spines and bristles. The third outer segment is, as shown in text-fig. 73 b, curiously short, probably due to accident; a similar abnormal structure has been described by Wolfenden in the fourth pair of legs of the male of *C. chelifer* (1911 p. 283). The *fourth pair* of legs has the armature somewhat less developed, but the third outer segment was transformed in a similar way. The terminal segments of the third and fourth pairs of legs were only examined on the left side, as they were wanting on the right side.



Text-fig. 74. *Onchocalanus hirtipes* G. O. Sars.
a. f♀. Genital somite × 33. b. f♀. Pes III Re III × 59. c. f♀. Pes V sin. d–e. f♀. Pes V Re III sin. et dext. × 150. f. f♂. Abdomen × 33. g. Maxilla sin. in ant. view × 150. h. f♂. Pes V in ant. view × 59. i. f♂. Pes V sin. Re III.

The *fifth pair* of legs (text-figs 74 c—e) consists of three segments, which are almost completely smooth on the anterior surface, but posteriorly at least in distal half of the segments, they are covered with fairly long stiff hairs; the left leg has terminally a bifurcate process (fig. 74 d), and in the right a three-divided one (fig. 74 e) is found.

The lateral view of the *labrum* etc. is like that of the preceding species; the organs were not examined in detail in the single specimen at my disposal.

f♂. Size of male from Thor St. 183 was 4·04 mm.; anterior division 3·05 mm.; urosome 0·99 mm.

The shape of the cephalosome is scarcely different from that of the female (text-fig. 74 f). The *abdomen* has, as usual, five somites, but the fifth one is scarcely visible from above; the comparative length of the four somites and the furcal branches, which are as long as wide is 25, 40, 33, 20 and 12. The distal segments of the *antennulae* were wanting; the proximal segments are like those of the preceding species. The *antennae*, *mandibulae* and *maxillulae* show the same differences from those of the female as in *O. cristatus.*

The *maxillae* are in general shape like those of the preceding species (cf. Pl. VII fig. 6 c); the structure and arrangement of the 8 sensory setae in the endopodite are seen in text-fig. 74 g. The *maxillipeds* are like those of the female; the comparative length of the main divisions is 55, 65 and 32; the endopodite is somewhat shorter, and its setae are less strong. The sensory seta of the second basipodite is three to four times as long as wide, curved, and somewhat attenuated; it is thus well distinguished from the short one of the female, as well as from the comparatively long and straight one of the male in *O. cristatus*.

The *first* pair of legs differs from that of the female by the want of spines on the posterior surface of the Re I, and by three spines only in Ri. The *second* pair of legs is scarcely different from that of the female. The *third* pair of legs is in main features like that of the female; the third outer segment is of usual structure, and the armature of the posterior surface is like that of *O. magnus*. The *fourth* pair of legs was very defective.

The *fifth* pair of legs, like that of *O. cristatus*, consists of a short right leg extending scarcely to the end of the first segment of the left side, and of a long and slender left leg, which extends distinctly beyond the end of the abdomen (text-fig. 74 f); the right leg has, as seen in text-fig. 74 h, three fairly long and broad proximal segments in addition to a rudimentary terminal one, continued into a short spine. The left leg consists, as seen in figure, of five elongated segments like those of *O. cristatus*; the third outer segment is, however, as seen in text-fig. 74 i, less slender, and has in addition to the terminal seta a distal outer one.

Occurrence. The Thor has taken a male and a female of this species $^{11}/_{7}$ 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire.

Distribution. Previously a single specimen (♀) has been gathered by the Monaco St. 1849, 36°17 L. N. 28°28 L. W. 0—3000 M., on the west coast of Ireland (55° L. N. 10° L. W. at 1150 fathoms) and by the Siboga at 3° L. S. 127° L. E.

Remarks. My specimens do not differ from Sars' short description, and agree with Farran's specimens in the shape of the genital somite, but differ by the shape of the fifth pair of legs, which is not "five-jointed" on the one side. From Scott's figures they differ by minor points in the structure of the antennulae, but especially by the third segment of the fifth foot, which has a distal Se in addition to an undivided St; as, however, the fifth foot seems to vary from the one specimen to the other, there is not at present sufficient justification for separating the two species from each other.

75. Onchocalanus affinis n. sp.

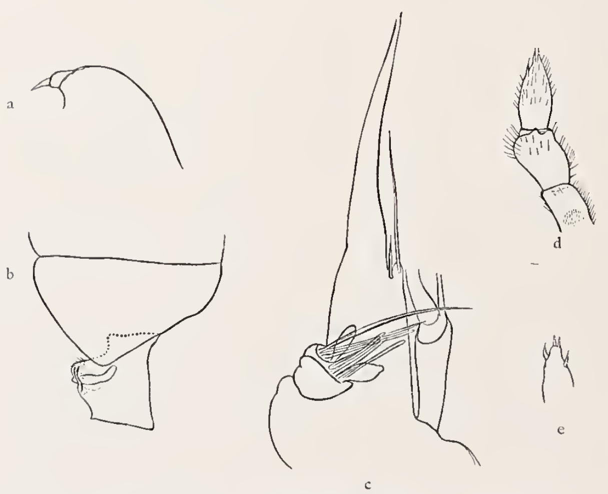
(Text-figs 75 a—e and 76 a—d).

Description. f♀. Size of female from Thor St. 183 was 6·3 mm.; anterior division 5·09 mm.; urosome 1·4 mm.

The body is somewhat more slender than in the preceding species. The head is more suddenly raised; the basal portion, which is more powerful than in the preceding species, is directed more downwards (text-fig. 75 a). The first and the fifth tergites are only indistinctly marked in front; the lateral corners are triangularly produced and obtusely rounded.

The *abdomen* (text-fig. 75 b) differs from that of the preceding species by the shape of the genital somite; dorsally the somite, somewhat in front of the middle, is rather suddenly wider than more anteriorly, but posteriorly it is of almost equal width. The comparative length of the three first abdominal somites and the furca is 75, 50, 30 and 22.

The *antennulae* reach at least to the end of the third abdominal somite; the Sp of segment 24 is one third removed from the tip of the segment, and is far from extending to the end of segment 25; in other respects the antennulae are like those of the preceding species. The oral appendages are scarcely different from those of *O. hirtipes*; the comparative length of the main divisions in the maxillipeds is 85, 100 and 57; the sensory seta of the second basipodite is fairly long like that of *O. cristatus*.

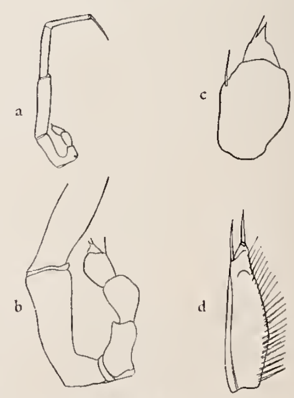


Text-fig. 75. *Onchocalanus affinis* n. sp. f♀. a. Rostrum × 18. b. Abdomen × 18. c. Maxilla sin. in anterior view × 150. d—e. Pes V sin. et dext. × 59.

The *first pair* of legs differs from that of *O. hirtipes* by the number of spines; the endopodite has 4 spines; the exopodite has no spines in Re I, 7 spines at the base of Si Re II, and in Re III 3, 6 and 6 spines near the inner margin. The number of spines on the posterior surface in the *second* pair of legs is somewhat greater than in *O. hirtipes*; the endopodite has in Ri II 8 + 6 + 12 spines. In the structure of the *third* and *fourth* legs no difference from the preceding species was observed. The *fifth pair* of legs (text-figs 75 d—e) differs from that of the preceding species by the structure of the terminal spines of Re III; in the left leg two terminal spines in addition to a Se were found; on the right side the Se is poorly developed, but a fairly strong Si was found. The anterior surface is, as in *O. hirtipes*, almost completely smooth.

f♂. Size of male from Thor St. 180 was 5·19 mm.; anterior division 4·1 mm.; urosome 1·09 mm.

The shape of the body is like that of the preceding species; the lateral corners are more rounded and less produced than in the female. The comparative length between the abdominal somites and the furcal branches is 30, 45, 36, 24, 2 and 15. The *antennulae* almost reach to the end of furca; they show the usual differences from those of the female. The *antennae*, *mandibulae* and *maxillulae* are scarcely different from those of the adult female. The *maxillae* differ by the structure of some of the sensory setae of the endopodite (text-figs 75 c). The *maxillipeds* are like those of the preceding species, but the sensory seta is shorter than in the preceding species; the comparative length of the main divisions is 75, 80 and 42. The *natatory legs* are scarcely different from those of the female.



Text-fig. 76. *Onchocalanus affinis* n. sp. f♂. a. Pes V × 18. b. Basal segments of pes V × 59. c. Pes V Re III dext. in posterior view × 150. d. Re III sin. × 150.

The *fifth* pair of legs (text-figs 76 a—b) is only in minor points different from that of *O. hirtipes*; the right leg extends somewhat beyond the first segment of the other side. The terminal segment of the *right* leg is somewhat bigger than in the preceding species (text-fig. 76 c); the third outer segment has on the left side, as seen in text-fig. 76 d, a somewhat different shape from that of *O. hirtipes*.

Occurrence. The Thor has gathered 2 specimens:

$^{11}/_7$ 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 1 f♀.
$^{10}/_7$ 1904 St. 180 61°34 L. N. 16°05 L. W. Yt. 1800 M. Wire 1 f♂.

Remarks. It is not without some doubt that I have established a new species for the described male and female. In spite of the variations in the fifth pair of legs, which is not uncommon to several species, I think that the different shape of the fifth pair of legs, the larger size, and the different armament of the first pair of legs warrant the establishment of a new species for the female. I think that the males of the two species are distinctly distinguishable especially by the right leg of the fifth pair of legs.

76. Xanthocalanus Greenii Farran.

(Pl. VII figs 3 a—g; Pl. VIII figs 18 a—d).

1905. Xanthocalanus Greenii n. sp. Farran, p. 39, pl. VIII figs 1—13.
1906. — — Farr. Pearson, 20.
1906? — calaminus n. sp. Wolfenden, p. 34, pl. XI figs 3—5.
1907. — Greeni Farr. G. O. Sars, p. 13.
1908. Xanthocalanus Greeni Farr. Farran, p. 48.
1908. — — — v. Bremen, p. 60, fig. 67.
1908. — calaminus Wolf. Wolfenden, p. 34.
1911? Talacalanus calaminus Wolf. Wolfenden, pp. 279—281, Taf. XXXI, figs 9—12, text-figs 44 a—b.

Description. **Y♂ (St. V).** Size of young male was 8·12 mm.; anterior division 6·69 mm.; urosome 1·43 mm. Farran's specimen measured 6·0 mm. and Wolfenden's 5·5 mm.

The anterior division is short and robust, about 4·5 as long as the abdomen. The rostrum consists of a proximal portion, continued into 2 thin, but stiff, rather long and somewhat divergent branches (Pl. VIII fig. 18 a). The head is rounded without any trace of crest. The first thoracic tergite is well marked in front by an articular line, which, beneath, is seen to be continued between the insertion of the maxillae and maxillipeds, as is the fifth thoracic tergite, as seen in fig. 18 b. The lateral corners are produced and terminated with a small tooth.

The comparative length of the abdominal somites and the furcal branches is 10, 17, 13, 7 and 15; the furcal branches are 1·4 as long as wide; serrated seam along the hinder margin of somite II—III is well developed.

The *antennulae* extend almost to the end of body; the appendages of the 24 segments are like those of the preceding species; the Sp. of segment 24, which was broken, was placed in the middle of the segment; the measurements are in the main like Farran's description. The *antennae* are like Farran's description, with two rami of about equal length. The *mandibulae* have a long and slender manducatory part with rather weak teeth; the third basipodite has three long slender spines, of which the most distal is almost twice as long as the proximal ones. The *maxillulae* have 7 long powerful + shorter bristles in the exterior lobe; the Li I (Pl. VII fig. 3 a) has 4 rather delicate Sa and 10 Sp., of which at least 8 are widened out to lancet-shaped laminae with delicate serration, as seen in fig. 3 b; the Li 2 has 4 setae, and so has Li 3, and while the third basipodite has 4 Sa + 1 Sp the endopodite has 11 setae and the exopodite 10. The *maxillae* are only slightly produced posteriorly; Lob. I has 5 setae, lobe II—III has 3 setae, and lobe IV (Pl. VII fig. 3 c) has a strong slightly curved serrated spine in addition to the usual pinnate setae with laminae-formed serrated membrane; the lobe V has two rather delicate bristles posteriorly, of which one is short, and in addition 2 very long serrated membraniferous setae (figs 3 c—d). The endopodite (cf. Wolfenden's Pl. XXXI fig. 11) has 7 longer or shorter brush-shaped sensory setae as well as a long slender vermiform one. The *maxillipeds* (Pl. VII fig. 3 e) are in main features like those described by Farran and Wolfenden; the comparative length of the main divisions is 47, 41 and 43; the first basipodite has in the middle no brush-shaped seta, but a fairly long pointed seta; the second basipodite is distinctly twice as long as wide. The two last setae of the segments of the endopodite are curiously developed, as shown in fig. 3 f (Pl. VII); the last segment has in addition to these two setae two simple setae and a plumous one (not drawn by Wolfenden).

The *first pair* of legs is like Sars' figure of *X. borealis*, but the Se of Re I and II are short, as seen in Farran's fig. 9; both surfaces are smooth. The *second pair* of legs has a short blunt Se in the first inner segment (fig. 18 c); the second inner segments possess on the posterior surface two groups of 12 strong spines; the posterior surface of the exopodite is completely smooth; the terminal seta is short and broad (Pl. VII fig. 3 g), and its teeth are only free in their terminal portion; well developed glandular pores are found in Re I, II and III at the base of Se 3. The *third* pair of legs is like that of the preceding pair, but the second inner segment has 9, and the third inner segment has 7 spines. The *fourth pair* of legs has on the posterior surface of the second inner segment 19 comparatively short and slender spines; on the posterior surface of the third inner segment a number of short bristles is found.

The *fifth pair* of legs of the examined specimen, which is probably a young male, is distinctly different from Farran's description of a young male, and is asymmetrical; the left smaller leg consists as seen in fig. 18 d, of three segments; the exopodite has two outer and a terminal spine; a rudimentary styliform endopodite is present. The right leg is somewhat longer than that of the left side, and the endopodite as well as the exopodite has two segments.

The lateral outline of the *labrum* etc. is, as seen in fig. 18 a (Pl. VIII), rather characteristic.

Occurrence. The Thor has in 1904 or 1905 in the Atlantic south of Iceland without locality taken a young male of this interesting species.

This species has previously been recorded from the west coast of Ireland "at depths of from 680 to 1150 fathoms", from the Bay of Biscay and by the Monaco Expedition.

Remarks. On full consideration I think that this species is identical with Farran's *X. Grenii* in spite of the larger size and the distinct tooth of the lateral corner. It is probably also identical with Wolfenden's *X. calaminus*, though differing in the features mentioned as well as in a few others.

77. Xanthocalanus pinguis Farran.

(Pl. VII figs 2 a—d, text-figs 77 a—b).

1897? Xanthocalanus hirtipes n. sp. Vanhöffen, p. 282, fig. 18.
1905. — pinguis n. sp. Farran, pp. 39—40, pl. VIII—IX.
1906. — — Farr. Pearson, p. 20.
1908. Xanthocalanus pinguis Farr. Farran, p. 48, pl. IV fig. 18.
1908. — — — v. Bremen, pp. 60—61, fig. 68.
1908? — — — Wolfenden, p. 35.

Description. f♀. Size of female from Thor St. 99 was 5·19 mm.; anterior division 4·15 mm.; urosome 1·04. Farran's specimens measured 4·5—5·1 mm.

The shape of the body is in the main like that of *X. borealis*. The first and fifth somites, but especially the fifth, are well marked in front (text-fig. 77 a); the lateral corners are produced into a small tooth.

The *abdomen*, which is one fourth as long as the anterior division, has a slightly produced genital somite, and a distinct receptaculum seminis; along the hinder margin of somites II—IV a striated seam is found; the comparative length of the first three abdominal somites and the furcal rami is 18, 12, 9 and 8.

The *antennulae* extend to the end of the fourth thoracic tergite, and consist of 23 segments; the number of "Æsthetasken" is like that of *C. chelifer*; a proximal seta was found in segments 12, 14, 16 and 18, but not in segments 15 and 17; the posterior seta of segment 24 is placed in the middle of the segment, and extends just to the end of segment 25. Segment 24 is 1·2 as long as 23, and 1·5 as long as 24, which is as long as segment 22.

Text-fig. 77. *Xanthocalanus pinguis* Farr. a. f♀. Genital somite × 18. b. y♂ (St. V). Abdomen × 18.

The exopodite of the *antennae* is distinctly longer than the endopodite. The *mandibulae* are scarcely different from those of *X. borealis*, while the *maxillulae*, especially the distal portions, are more long and slender than in *X. Greeni* as well as *borealis*; the number, but not the shape, of setae in the *maxillulae* is as in *X. Greeni*, but the endopodite has only 9 setae. The *maxillae* are like Sars' and Farran's figures; the lobe V has in addition to 3 setae, of which the two are short and delicate, a serrated and distinctly curved spine, which is longer and stronger than that of the fourth lobe; the endopodite has 7 brush-shaped sensory setae in addition to a vermiform one. The *maxillipeds* are somewhat less slender than in *X. borealis*; the sensory seta of the second basipodite is fairly long and brush-shaped; the comparative length between the main divisions is 65, 73 and 48.

The *first* pair of legs is like that of *X. borealis*, but the Se of Re I extends almost to the end of Re II. The *second* pair of legs differs from that of *X. borealis* by finer serration of St; the glandular pores are like those of the preceding species. The Si of the second basipodite shows an abnormal structure probably due to traumatism, as it is suddenly narrower and then gradually enlarged, where it is divided into three again subdivided branches. The *third* and *fourth* pair of legs, the distal segments of which were wanting, are scarcely different from those of *X. borealis*. The *fifth* pair of legs (Pl. VII fig. 2 a) is in main features like Farran's earlier description, and is scarcely different from the figure which Farran has given of a larger specimen (his Pl. IV fig. 18); the anterior surface is smooth, but the posterior surface has, as shown in figure, groups of short spines.

The lateral outline of the epistoma and labrum is like that of *X. Greeni*, as seen in figure, and they are not distinctly defined from each other. The epistoma has in front a group of long slender bristles; somewhat in front of the transverse row of bristles along the posterior margin a regular transverse series of fairly long setae is found, and just in front of this a group of irregularly placed bristles is found; laterally two or three groups of short hairs are found.

On the oral surface of the *labrum* (Pl. VII fig. 2 b), in front and laterally, two oblique almost parallel wide rows of bristles were observed; in the middle, on each side, 4 more or less fused wide areas of numerous short hairs or granules were observed. The chitinous framework is on each side in front of the third median circular spot produced into a beak-like structure; somewhat behind, a transverse chitinous bar was found in the middle. Behind the fourth median circular spot a number of short granules was found.

In front of the indistinct *lamina labialis* a large group of short hairs is observed, consisting of an inner and outer part; the hairs decrease in size outwards. Between the *serrula 6-serrata* a group of granules is observed, and behind, outer and inner groups of longer and shorter hairs, as seen in figure 2 c (Pl. VII). Along the labial lobes inwards, marginal rows of long slender setae are found anteriorly and short spines posteriorly; behind the lobes in the middle, areas of minute granules are found, and the lobes possess laterally groups of irregularly placed fairly long and slender bristles, limited inwards by an oblique row of somewhat shorter hairs.

Y⚥ (St. V). Size of young male was 4·43 mm.; anterior division 3·51 mm.; urosome 0·92. Another young male as well as a female measured 3·7 mm.

The shape of the body differs from that of the adult by the comparatively better marked fifth thoracic somite (text-fig. 77 b), and by the abdomen, which has four somites, the comparative length of which is 5, 13, 9, 6 and 5; the furcal rami are a little longer than wide. The *fifth* pair of legs in the female is scarcely different from that of the adult; in the male (Pl. VII fig. 2 d) it is distinctly different; on the right side it differs by the two-segmented exopodite, the first segment of which has a distinct Se, and the terminal segment of which has 2 terminal spines; the left leg shows a similar segmentation, but is less hirsute and shows trace of segmentation in Re II.

Occurrence. The Thor has gathered this species once in the Iceland-Færoe channel and once in the Atlantic south of Iceland.

22/5 04	St. 99	61°05 L. N.	9°35 L. W.	Yt. 1700 M. Wire	2 f♀, 2 y♀ (V), 3 y♂ (V).
12/5 04	St. 78	61°08 L. N.	28° L. W.		1 y♂ (V).

Distribution. This species has been recorded from the west coast of Ireland "at a depth of 630 fathoms". If it is identical with *X. hirtipes* Vanh. and *borealis* G. O. Sars, it has a wide distribution viz. the west coast of Ireland, the Iceland-Færoe channel, the west coast of Norway, Kara Sea and the Arctic Ocean near the New Siberia Islands.

Remarks. That this species is identical with the species which Farran 1908 has mentioned as *X. pinguis?* seems not to be doubtful on account of its size 5·1 mm. and the almost identical shape of the fifth pair of legs. From the typical specimens of Farran's species (1905) it differs by the more pointed lateral corners of the fifth thoracic tergite, and by a somewhat different measurement of the antennulae [the segment 22 is as long as instead of 1·3 (in fig. 20 Pl. VIII the two segments are of almost equal length) as long as segment 25], but especially by the more distinct spinulation of the fifth pair of legs. When the variability of the fifth pair of legs is taken into consideration, I do not doubt that the two different forms belong to the same species.

It is nearly related to *X. profundus* Sars (1907 p. 14), which differs from it by larger size, 6·2 mm., and by the somewhat different shape of the fifth pair of legs.

From *X. hirtipes* and *borealis*, to which it is very nearly related, it seems to differ by greater size, by comparatively shorter antennulae, which do not reach to the end of the genital somite, and by 10 instead of 9 setae in the exopodite of the antennae.

78. **Xanthocalanus claviger** Th. Scott.

(Text-figs 78 a—d).

1909. Amallophora claviger n. sp. Th. Scott. pp. 124—125, pl. III figs 1—11, pl. IV figs 13—17.

Description. f ♂. Size of male from Thor St. 183 was 4·55 mm.; anterior division 3·22; urosome 1·33 mm.

The shape of the body is like that of *X. borealis*; the head has no crest; the rostrum is broken but seems to be fairly long, and is directed somewhat backwards. The lateral corners of

Text-fig. 78. *Xanthocalanus claviger* Th. Scott. f ♂.
a. Abdomen × 23. b. Pes V sin. Re II—III in situ from the left side × 122. c. Pes V sin. Re II—III in ant. view × 240. d. Pes V dext. in exterior view × 122.

the thorax are regularly rounded. The head and the fourth somites are almost completely fused with the following ones. The anterior division is 2·4 as long as the urosome; the comparative length of the abdominal somites are seen in the fig. 78 a. The serrated seam along the hinder margins is poorly developed.

The *antennulae* extend distinctly beyond the end of the thorax to the end of the second abdominal somite. Segments 8 ∾ 9 are only in front indistinctly separated from segments 10—12, which are completely fused; these segments are fairly well separated from segment 13, which is well separated from segment 14; the following segments are well separated from each other. A complete "trithek" is found in segments 3—9; "Æsthetasken" are found in segments 10—19, but are wanting in segments 20—24. Small proximal setae are seen in segments 12, 14, 16 and 18.

The exopodite of the *antennae* is 1·5 as long as the endopodite, which has 6 setae in the outer and 8 in the inner lobe of the second segment. The manducatory part of the *mandibulae* is soft-skinned and very long and slender, with delicate but distinct teeth; the third basipodite is widened out and possesses 2 long Si. The *maxillulae* are fairly well developed, and different from those of the male of *X. borealis*; the Le has 7 long powerful as well as 2 short bristles. The Li 1 is only a little longer than wide, and has at least 9 bristles, which are long, broad, somewhat lamellous and distinctly plumous; the Li 2 has 4 short setae, the Li 3 has 4 fairly long, partly plumous setae, and the third basipodite has 5 setae. The endopodite seems only to possess 10 setae, and so does the exopodite. The *maxillae* are rather soft-skinned; the Lob. I has 4 rather slender setae, the lob. 2—3 have 3 each; the fourth lobe has 2 slender plumous bristles and a long, broad, strongly plumous seta, and the fifth lobe has a single shorter one of similar structure in addition to 2 fairly strong plumous setae and a very delicate one. The endopodite has 2 vermiform setae, 5 rather slender brush-shaped ones, and a curious globular appendage scarcely twice as long as wide, with terminal almost circular opening and striated wall. The *maxillipeds* are scarcely different from those of *X. borealis.*

The *first* and *second pairs* of legs are scarcely different from those of *X. borealis*; the distal segments of the *third* and *fourth* legs are wanting, while the proximal ones are like those of mentioned species. The *fifth* pair of legs extends distinctly beyond the end of the abdomen; the *right* leg is comparatively short and somewhat convex outwards, but extends distinctly beyond the end of the first basal segment (text-fig. 77 a, d); it consists, as seen in figure, of 4 segments, of which the last one shows trace of further segmentation, and is terminated with a short tooth. The *left* leg consists of three elongated proximal segments, the comparative length of which is seen in figure; the first segment has inwards on the anterior surface a short keel (text-fig. 77 a—c). The fourth segment (Re II?) is much shorter than the preceding ones, and is somewhat enlarged towards the middle, where a process with two groups of about 10 bristles is found; beyond this process the segment is hollowed with a concavity facing inwards, and has about 6 setae along the outer margin, as well as a tuft of 5 more slender ones and one stronger seta terminally (text-fig. 78 b—c); apparently articulated to this segment a short "segment" with a tuft of hairs was found. The terminal segment (Re III?) has along the one margin in the middle 5 fairly strong spines, and terminally a hooked spine; at base of which four moderately slender setae are observed.

Occurrence. The Thor has collected a single male.

$^{11}/_{7}$ 1904 St. 183 61°30 L. N. 17°08 L. W. Yt. 1800 M. Wire 1 f♂.

Distribution. A few males have once been taken $^{17}/_{8}$ 1908 59°36 L. N. 7° L. W. Depth 1140 Meters.

Remarks. As far as I am able to see the male of this species, which is especially characterized by the curious development of the left foot, is identical with Scott's *Amallophora claviger.* The somewhat laminous setae which are observed in the maxillulae and maxillae suggest some affinity to *X. Grenii*; its much smaller size excludes this species.

About 20 species of *Xanthocalanus* have been described; to refer the described male to most of these may be excluded, especially on account of its much greater size (4·5 mm. against 2—3 mm. for the female). Only *X. pinguis* Farr. (4·5—5·1 mm.), *X. muticus* G. O. Sars (5·3 mm.) and *X. profundus* G. O. Sars (6·2 mm.) could possibly be the females of this species. From *X. pinguis* it seems to be distinguished by rounded lateral corners and longer antennulae. From *X. profundus* it seems to differ in quite similar features, and from *X. muticus* it seems to differ by longer rostrum, by lateral corners rounded not "obtusément triangulaire", by longer urosome, by shorter antennulae not "aussi longues que le corps". I think it is quite impossible at present to tell whether the described male ought to be regarded as identical with any of these three species, or whether it is the male of a not yet described female.

79. **Xanthocalanus hirtipes** Vanhöffen.

1897.	Xanthocalanus	hirtipes n. sp. Vanhöffen, p. 282, fig. 18.
1900.	—	borealis n. sp. G. O. Sars, pp. 49—51, pl. XI.
1902.	—	— G. O. Sars. Th. Scott, pp. 452—453, pl. XXII figs 8—9.
1902.	—	hirtipes Vanh. Mràzek, p. 523.
1903.	—	borealis G. O. Sars. G. O. Sars, p. 46, pl. XXXI—XXXII.
1904. ? ♀ nec ♂	—	subagilis n. sp. Wolfenden, p. 118, pl. IX figs 17—32.
1905.	—	borealis G. O. Sars. G. O. Sars, p. 5.
1905.	Xanthocalanus	borealis G. O. Sars. Farran, pp. 38—39, pl. VIII figs 14—17.
1906.	—	— — Pearson, p. 20.
1907.	—	— Vanh. Vanhöffen, pp. 514—517, Taf. 21, fig. 16—22.
1908.	—	— G. O. Sars. v. Bremen, pp. 58—59, fig. 66.
— pars.	—	subagilis Wolf. v. Bremen, pp. 62—63, fig. 71.
1908?	—	borealis G. O. Sars. Wolfenden, p. 33.
1913.	—	hirtipes Vanh. Stephensen, p. 318.

Of this species I have only examined a single, very mutilated, adult female found in the contents of the stomach of a *Liparis barbata* from Kara Sea. I have included it in this paper partly because it certainly belongs to the fauna of this region, and partly because a full synonymy and a discussion of its position seem to be useful.

The lateral corners of the thorax are distinctly pointed, as in Sars' figure Pl. XXXI. The exopodite of the maxillulae has only 9 setae, as stated by Sars.

The *fifth* pair of legs is most similar to that described by Vanhöffen (Taf. 21 fig. 22), with three terminal spines only, but the last segment is fairly well distinguished, and the hairs, especially those of the posterior surface of the third segment as well as those of the inner surface of the first segment, are distinctly longer. The *labrum* etc. are in all main features like that of the preceding species.

To decide whether *X. hirtipes* and *borealis* really belong to the same species is somewhat difficult without specimens of both forms at disposal. The character found in the size is not of much value, when remembering that Farran's specimens varied from 2·5 to 3·5, that Sars' measured 3·5, and Vanhöffen's 4 mm.; the characters found in the structure of the fifth pair of legs are not sufficient, when taking into consideration the great variations which, according to Farran, exist in the structure of this pair of legs. Vanhöffen thought that characters could be found in the spinulation of the posterior surface of the endopodites of the natatory legs; the differences pointed out by him are certainly due to individual variability. To define the limitations of the species within this group is probably a task just as difficult as that which has previously been discussed with *Calanus* and *Pseudocalanus*.

80. **Phaënna spinifera** Claus.

(Pl. VII figs 1 a—c; text-fig. 79).

1863.	Phaënna spinifera	n. sp. Claus. p. 189, Taf. XXXI figs 1—7.
1892.	— —	Claus. Giesbrecht, p. 293, Taf. 5, 12, 37.
1893.	— —	— Th. Scott, p. 81, pl. VI—VII.
1898.	— —	— Giesbrecht & Schmeil, p. 50.
1903.	— —	— J. C. Thompson, p. 23.
1903.	Phaënna spinifera	Claus. Thompson & Scott, p. 246.
1903.	— —	— Cleve, p. 367.
1904.	— —	— Wolfenden, p. 111.
1904.	— —	— Cleve, p. 194.
1905.	— —	— Wolfenden, p. 1009.

1905. Phaënna spinifera Claus. G. O. Sars, p. 5.
1905. — — — Farran, p. 47.
1906. — — — Pearson, p. 21.
1908. — — — Farran, p. 47.
1998. — — — v. Bremen, p. 56 fig. 63.
1909. Phaënna spinifera Claus. Pesta, p. 22.
1909. — — — A. Scott, p. 80.
1911. — — — Wolfenden, pp. 285—286.
1912. — — — Pesta, p. 24.

Description. f♀. Size of specimen from Thor St. 82 was 2·9 mm.; anterior division 2·42; urosome 0·48 mm. Giesbrecht's specimens measured 1·8—2·1 mm.

In some of the examined specimens the head possesses dorsally, as seen in text-fig. 79, a conical protuberance.

The interior lobes of the *maxillae* are placed very near to each other, the Lob. 1 has 5 setae, the Lob. 2 has 3, and the Lob. 3, which is very short, has probably 3 setae as well; the fourth lobe has at least 2 setae, of which the one is comparatively strong, and distinctly curved, and the fifth lobe has in addition to fairly strong claw-shaped setae two short slender ones; the endopodite has seven comparatively short and thick brush-shaped setae, distally apparently fused, in addition to a long and slender pointed one.

The legs are scarcely different from Giesbrecht's description. The outer margin of the third outer segment of the *first foot* has proximally to the middle a small incision and a glandular pore. On the anterior surface of the third inner segment of the second and third pairs of legs a minute glandular pore was found, but in the fourth pair none was seen. At the base of the outer spine in the Re II, and at the base of Se I and III Re III, glandular pores were found in the second pair of legs, and in the third and fourth pairs at the base of Se Re I as well. The Ri II ∾ III, which are fused in the second pair of legs, possess on the posterior surface two coronas of 8 and 6 long spines respectively, the Ri II and III of the third pair of legs have 8 and 6 spines respectively, and the Ri II of the fourth pair of legs has 6 long rather weak spines.


Text-fig. 79. *Phaënna spinifera* Claus. f♀. Lateral outline of body × 18.

The very short *labrum* and the elevation in front of it are only indistinctly separated, and the latter is placed just behind the insertion of the antennulae; the epistoma is covered by a number of longer and shorter setae; on the labrum proper a transverse group of fairly short setae is found; the marginal setae are only poorly developed (Pl. VII fig. 1 a). The oral surface (fig. 1 b) has in front 4 longer and shorter oblique groups of shorter hairs converging towards the middle, and more posteriorly, probably composed of the three hinder, a longitudinally placed elongated group of short hairs is found. In the middle at least three groups of very short hairs or granules are found. The lamina labialis is only poorly developed (Pl. VII fig. 1 c); in front of it a regular granular area is found; the area behind the lamina and on the labial lobes was not studied in details (cf. fig. 1 c).

f♂. Size of specimen from St. 82 was 2·26 mm.; anterior division 1·89 mm.; urosome 0·37 mm. Giesbrecht's specimen measured 1·8 mm.

The anterior division did not possess a lamelliform projection, as figured and described by Giesbrecht. No dorsal protuberance was found.

Y♀ **(St. V).** Size of specimen from Thor St. 82 was 2·3 mm.

The only difference was found in the different structure of the abdomen.

Occurrence. The S/S Thor has gathered a few specimens of this interesting form, viz.:

14/6 1905 St. 82 51°00 L. N. 11°43 L. W. Yt. 800 M. Wire 8 f♀, 1 f♂, 2 y♀ (V).
Yt. 1200 M. Wire 1 f♀.
20/6 1905 St. 88 48°09 L. N. 8°30 L. W. Yt. 300 M. Wire 3 f♀.

This species has been recorded from the west coast of Ireland, from the mid and south Atlantic, from the Mediterranean, the Red Sea, the Indian Ocean, the Malay Archipelago and the Pacific Ocean.

Remarks. In spite of the greater size I regard this species as identical with that described by Giesbrecht.

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EXPLANATION OF THE PLATES.

Plate I.

Fig. 1. *Calanus hyperboreus* Kröyer.

Fig. 1 a. f♀. Marginal setae of the labrum; × 77.
— 1 b. f♀. Oral surface of the labrum; × 200.
— 1 c. f♀. Lamina labialis etc. l = lamina labialis, s = serrula 6-dentata; × 200.
— 1 d. f♀. Lobi labiales and area behind. a—c = articular cavities of the maxillulae, maxillae and maxillipeds; × 44.

Fig. 2. *Macrocalanus princeps* Brady.

Fig. 2 a. f♀. Oral surface of the labrum; × 57.
— 2 b. f♀. Lamina labialis and anterior surface of the lobus labialis; × 57.

Fig. 3. *Megacalanus princeps* Wolfenden.

Fig. 3 a. f♀. Labrum, lobi labiales and area behind from below; × 24.
— 3 b. f♀. Oral surface of the labrum; × 77.
— 3 c. f♀. The lamina labialis, the lobi labiales and the right mandibula in ventral and partly anterior view. s = serrula 6-dentata; l = lamina labialis; × 57.
— 3 d. f♀. The left maxilla; × 24.
— 3 e. f♀. The left second foot in anterior view. gl = glandular pores; × 24.
— 3 f. f♀. Se Re I pes II sin. in anterior view; l = lamina cribrosa; gl = glandular pore; × 44.
— 3 g. f♀. The lamina cribrosa; × 280.
— 3 h. f♀. The left fifth foot in anterior view; × 24.
— 3 i. f♂. The segment 6 (VI) to segment 11 (XI) of left antennula; × 24.

Fig. 4. *Rhincalanus nasutus* Giesbrecht.

Fig. 4 a. Y♀ (V). The anterior part of the body in left view; × 24.
— 4 b. f♀. The right side of the abdomen in abnormal specimen; × 44.
— 4 c. f♀. The lamina labialis etc.; × 200.
— 4 d. f♀. The fifth foot in abnormal specimen from Thor 1905 St. 88; × 90.
— 4 e. f♂. The oral surface of the labrum; × 280.
— 4 f. f♂. The left antenna in posterior view; × 38.
— 4 g. f♂. The fifth foot in posterior view of specimen from Thor 1905 St. 88; × 90.
— 4 h. f♂. The fifth foot in posterior view of specimen (Nr. 2) from Thor 1905 St. 88; × 90.
— 4 i. f♂. The fifth foot in posterior view of specimen (Nr. 3); × 90.
— 4 j. f♂. The fifth foot of an abnormal specimen from Thor St. 88; × 90.
— 4 k. Y♂ (V). The fifth foot in posterior view; × 90.
— 4 l. Y♂ (IV). The fifth pair of legs in posterior view of specimen from Thor 1905 St. 72; × 90.

Fig. 5. *Eucalanus elongatus* Dana.

Fig. 5 a. f♀. The oral surface of the labrum; × 200.
— 5 b. f♀. The lamina labialis etc.; × 200.
— 5 c. f♂. The fifth pair of legs in anterior view; × 65.
— 5 d. Y♂ (V). The fifth pair of legs of an abnormal male; × 65.
— 5 e. Y♂ (V). The fifth foot in ant. view; × 65.
— 5 f. Y♂ (V). The fifth foot in ant. view; × 65.

Fig. 6. *Eucalanus attenuatus* Dana.

Fig. 6 a. Y♀ (V). The oral surface of the labrum; × 200.
— 6 b. Y♀ (V). Lamina labialis; × 200.
— 6 c. Y♂ (V). The fifth foot in post. view; × 77.

Fig. 7. *Eucalanus crassus* Giesbrecht.

Fig. 7 a. f♀. The coecal sac; × 44.

Fig. 8. *Pseudocalanus minutus* Kröyer.

Fig. 8 a. f♀. The oral surface of the labrum; × 280.

Fig. 9. *Clausocalanus arcuiformis* Dana.

Fig. 9 a. f♀. The head etc. from the left; × 77.
— 9 b. f♀. The genital somite from the left; × 77.
— 9 c. f♀. The oral surface of the labrum; × 260.
— 9 d. f♀. The lamina labialis etc.; × 260.

Fig. 10. *Spinocalanus abyssalis* Giesbrecht.

Fig. 10 a. f♀. The oral surface of the labrum; × 260.
— 10 b. f♀. The lamina labialis etc.; × 260.

Plate II.

Fig. 1. *Aetidius armatus* Boeck.

Fig. 1 a. f♀. First abdominal somite from the left; × 152.
— 1 b. f♀. First abdominal somite from below; × 152.
— 1 c. f♀. Basipodite of pes IV sin. in posterior view; × 152.
— 1 d. f♀. Lamina labialis etc.; × 280.

Fig. 2. *Chiridius obtusifrons* G. O. Sars.

Fig. 2 a. f♀. The labial structures; × 280.
— 2 b. Y♂ (V). Pes V; × 77.

Fig. 3. *Chiridius armatus* Boeck.

Fig. 3 a. f♀. Pes II sin. anterior view; × 77.
— 3 b. f♀. Labrum — oral view. g^2—g^4 the second and fourth groups of the lateral longitudinal series. S^4 the fourth central circular spot; × 200.
— 3 c. f♀. Lamina labialis and serrulae 6-dentatae; × 280.
— 3 d. f♀. Area labialis et postlabialis; × 147.
— 3 e. f♂. Pes V sin; the endopodite; × 280.

Fig. 3 f. f♂. Pes V sin; the last segment of the exopodite; × 280.
— 3 g. f♂. Pes V dext; the exopodite; × 47.
— 3 h. Y♂ (V). Pes V; × 77.
— 3 i. Y♂ (IV). Pes V; × 117.
— 3 j. f♀. Pes V in anterior view from abnormal specimen (Thor $^{6}/_{9}$ 05 St. 172); × 77.
— 3 k. f♀. Pes V in anterior view from abnormal specimen (Thor $^{7}/_{9}$ 05 St. 173); × 77.
— 3 l. f♀. Pes V in anterior view from abnormal specimen (Thor $^{22}/_{5}$ 04 St. 72); × 77.

Fig. 4. *Chiridius nasutus* n. sp.

Fig. 4 a. f♀. Pes II sin; × 77.

Fig. 5. *Chiridius modestus* n. sp.

Fig. 5 a. f♀. Pes II sin; × 77.

Fig. 6. *Aetidiopsis rostrata* G. O. Sars.

Fig. 6 a. f♀. Anterior portion of oral surface of labrum; × 280.
— 6 b. f♀. Lamina labialis etc. partly in anterior view; × 280.

Fig. 7. *Gaidius brevispinus* G. O. Sars.

Fig. 7 a. f♀. Rostrum, observed from below; × 200.
— 7 b. f♀. Abdomen with spermatophore in lateral view; × 44.
— 7 c. f♀. Genital area; × 117.
— 7 d. f♀. Exterior margin of maxilla sin. in post. view; × 77.
— 7 e. f♀. Inner margin of basp. of left pes IV in posterior view; × 117.
— 7 f. f♀. Labrum et labium; × 200. g^2 and g^4 the second and fourth group of the lateral longitudinal series; S^1—S^7 the seven lateral series of hairs upon, between and behind the labial lobes.
— 7 g. f♂. Inner margin of basp. of left pes IV in post. view; × 117.
— 7 h. y♂. Pes V ant. view; × 77.

Fig. 8. *Gaidius tenuispinus* G. O. Sars.

Fig. 8 a. y♂. Pes V ant. view; × 77.

Plate III.

Fig. 1. *Gaidius brevispinus* G. O. Sars.

Fig. 1 a. f♀. Maxillipes sin. in post. view; × 77.
— 1 b. f♀. Maxillipes sin.; basipodite III; × 77.
— 1 c. f♀. Pes IV sin. The basipodite in posterior view; × 152.
— 1 d. f♂. Manducatory portion of the mandibula; × 152.
— 1 e. f♂. The left maxillula in posterior view; × 117.
— 1 f. f♂. Maxillipes sin. in posterior view; × 77.
— 1 g. f♂. Pes I sin. in nearly anterior view; × 117.
— 1 h. f♂. Pes V in posterior view; × 77.
— 1 i. f♂. The terminal segment of the left pes V; × 200.
— 1 j. f♂. The terminal segment of the right pes V; × 200.

Fig. 2. *Gaidius tenuispinus* G. O. Sars.

Fig. 2 a. f♀. The rostrum in dorsal view; × 200.
— 2 b. f♀. The basal segments of the left antenna; × 77.

Fig. 2 c. f♀. Maxillipes sin. Lobus IV of basipod. II in anterior view; $\times$ 152.
— 2 d. f♀. Pes I. The terminal seta of the last segment of the exopodite; $\times$ 117.
— 2 e. f♀. The oral surface of the labrum; $\times$ 280.
— 2 f. f♂. Rostral spine; $\times$ 77.
— 2 g. f♂. Rostrum seen from below; $\times$ 200.
— 2 h. f♂. Maxilla; $\times$ 280.
— 2 i. f♂. Pes I. The terminal seta of the last segment of the exopodite; $\times$ 117.
— 2 j. f♂. Re II of left pes V in exterior view sitting on the animal; $\times$ 200.
— 2 k. f♂. Tip of Re III of left pes V; $\times$ 280.
— 2 l. f♂. Ri of right pes V in situation, seen from the left side; $\times$ 200.
— 2 m. f♂. Re I $\sim$ II of left pes V; $\times$ 77.
— 2 n. f♂. Pes V dext. The third segment of exopodite from inner side; $\times$ 280.

Fig. 3. *Gaetanus major* Wolfenden.

Fig. 3 a. f♀. Setae of inner margin of basipodite II of pes IV in posterior view; $\times$ 117.
— 3 b. f♀. Portion of the labrum (oral view); $\times$ 280.
— 3 c. f♀. Lamina labialis etc. observed partly from in front; $\times$ 200.
— 3 d. f♂. Pes V in posterior view; $\times$ 37.
— 3 e. f♂. Pes V dext.; the endopodite in anterior view; $\times$ 200.
— 3 f. f♂. Portion of pes V in anterior view; $\times$ 200.
— 3 g. Pes IV sin. of stage IV in anterior view; $\times$ 77.
— 3 h. Pes IV sin. of stage III in anterior view; $\times$ 77.

Fig. 4. *Gaetanus minor* Farran.

Fig. 4 a. f♀. The abdomen seen from the left side; $\times$ 44.

Fig. 5. *Gaetanus latifrons* G. O. Sars.

Fig. 5 a. f♀. Rostrum and frontal spine; $\times$ 24.
— 5 b. f♀. Abdomen with spermatophore seen from the left side; $\times$ 24.
— 5 c. f♀. Setae on inner margin of basp. II of pes IV sin. in posterior view; $\times$ 117.
— 5 d. f♀. Oral surface of the labrum; $\times$ 280.
— 5 e. f♀. Lamina labialis etc.; $\times$ 280.
— 5 f. Y♀ (V). Setae on inner margin of basp. II pes IV sin. in posterior view; $\times$ 117.
— 5 g. Y♂ (V). Same of Y♂ (pes IV dext.); $\times$ 117.

Fig. 6. *Gaetanus pileatus* Farran.

Fig. 6 a. Labrum in oral view; $\times$ 280.

Fig. 7. *Gaetanus miles* Giesbrecht.

Fig. 7 a. The left maxillipes in anterior view; $\times$ 77.
— 7 b. Setae on inner margin of basp. II of left pes IV in posterior view; $\times$ 117.

Plate IV.

Fig. 1. *Euchirella rostrata* Claus.

Fig. 1 a. f♀. Teeth along inner margin of basp. II pes IV dext. in posterior view; $\times$ 200.
— 1 b. f♀. Labrum in oral view; $\times$ 200.

Fig. 1 c. f♀. Lamina labialis etc.; × 200.
— 1 d. f♀. Lobus labialis sin.; × 117.
— 1 e. f♂. Labrum, labium and manducatory portions of the mandibulae seen from beneath; × 117.
— 1 f. f♂. The left pes I in ant. view; × 77.
— 1 g. f♂. Pes V in ant. view; × 44.
— 1 h. f♂. The distal segments of the left maxillula; × 117.

Fig. 2. *Euchirella messinensis* Claus.

Fig. 2 a. f♀. The labrum in oral view; × 200.
— 2 b. f♀. Lamina labialis; × 117.
— 2 c. f♀. Area labialis and lobi labiales; × 77.

Fig. 3. *Euchirella curticauda* Giesbrecht.

Fig. 3 a. f♀. Head; × 24.
— 3 b. f♀. Last thoracic and first abdominal somites; × 24.
— 3 c. f♀. Labrum in oral view; × 200.
— 3 d. f♀. Lamina labialis etc.; × 200.
— 3 e. f♀. Lobus labial sin.; × 77.
— 3 f. f♂. The frontal portion of the head; × 44.
— 3 g. f♂. Abdomen in left view; × 24.
— 3 h. f♂. Left maxilla in post. view; × 117.
— 3 i. f♂. Pes V in post. view; × 24.
— 3 j. f♂. Pes V dextr. Re III; × 117.
— 3 l. f♂. The last segment of the exopodite of the left pes V; × 200.
— 3 m. f♂. (signature not found on the plate, where the figure is placed to the right of 6 b). The last segments of the exopodite of the left pes V; × 117.

Fig. 4. *Euchirella intermedia* n. sp.

Fig. 4 a. f♀. Abdomen in lateral view; × 22.
— 4 b. f♀. Labrum in oral view; × 117.
— 4 c. f♀. Lobus labialis sin.; × 77.

Fig. 5. *Euchirella maxima* Wolf.

Fig. 5 a. f♀. The frontal part of the head in lateral view; × 24.
— 5 b. f♀. Abdomen in lateral view; × 24.
— 5 c. f♀. The right lateral corner of the last thoracic somite; × 24.
— 5 d. f♀. The genital somite of the abdomen seen from below; × 24.
— 5 e. f♀. Labrum in oral view; × 77.
— 5 f. f♀. Lamina labialis; × 77.
— 5 g. f♀. The left lobus labialis; × 77.
— 5 h. Y♂. The left lateral corner of the last thoracic somite; × 24.

Fig. 6. *Undeuchæte superba* n. sp.

Fig. 6 a. f♂. Pes V; × 77.
— 6 b. f♂. Pes V dext.; × 44.

Plate V.

Fig. 1. *Undeuchæte superba* n. sp.

Fig. 1 a. The abdomen in right view; × 13·5.
— 1 b. The left lateral corner of last thoracic somite; × 44.
— 1 c. Area labialis in ventral view; × 77.

Fig. 2. *Undeuchæte major* Giesbrecht.

Fig. 2 a. The labrum in oral view; × 200.
— 2 b. The lamina labialis; × 200.
— 2 c. f♂. The endopodite of the right pes V in anterior and interior view; × 77.
— 2 d. f♂. The Re III of left pes V; × 77.

Fig. 3. *Undeuchæte minor* Giesbrecht.

Fig. 3 a. f♀. The genital area from beneath; × 77.
— 3 b. f♂. The pes V in anterior view; × 33.
— 3 c. f♂. The endopodite and the exopodite of the right pes V in anterior and interior view; × 77.
— 3 d. f♂. The exopodite of the right pes V; × 24.
— 3 e. f♂. The endopodite of the right pes V; × 24.
— 3 f. f♂. The Re II—III of the left pes V; × 117.
— 3 g. f♂. The Re II of the left pes V; × 117.

Fig. 4. *Chirudina streetsi* Giesbrecht.

Fig. 4 a. f♀. The genital area from beneath; × 77.
— 4 b. f♀. The labrum in oral view; × 200.
— 4 c. f♀. The lamina labialis etc.; × 200.
— 4 d. f♀. The area labialis; × 77.
— 4 e. f♂. The pes V in posterior view; × 32.
— 4 f. f♂. The 2 last segments of the left pes V in anterior and interior view; × 98.

Fig. 5. *Chirudina abyssalis* n. sp.

Fig. 5 a. f♀. The abdomen seen from the left; × 24.
— 5 b. f♀. The left mandibula in ant. view; × 44.
— 5 c. f♀. The left maxilla in post. view; × 44.
— 5 d. f♀. The marginal teeth of the second basipodite of left pes IV in posterior view; × 117.
— 5 e. f♀. The lamina labialis etc.; × 77.
— 5 f. f♀. The area labialis; × 77.

Fig. 6. *Chirudina pustulifera* G. O. Sars.

Fig. 6 a. f♀. The abdomen in dorsal view; × 24.
— 6 b. f♀. The first abdominal somite in lateral view; × 24.
— 6 c. f♀. The genital area seen from beneath; × 77.
— 6 d. f♀. The labrum in oral view (anterior portion); × 200.

Fig. 7. *Chirudina notacantha* G. O. Sars.

Fig. 7 a. f♂. The 2 last segments of the exopodite of the left pes V; × 77.
— 7 b. f♂. The last segment of the exopodite of the left pes V from another specimen in a somewhat different position; × 77.

Fig. 8. *Chirudina parvispina* Farran.

Fig. 8 a. f♂. The 2 last segments of the exopodite of the left pes V; × 77.

Fig. 9. *Euchirella bitumida* n. sp.

Fig. 9 a. f♀. The abdomen etc. in dorsal view; × 24.
— 9 b. f♀. The abdomen seen from the left side; × 24.
— 9 c. f♀. The genital somite seen from beneath; × 24.
— 9 d. f♀. The right maxilla in post. view; × 117.
— 9 e. f♀. The labrum in oral view (anterior portion); × 200.
— 9 f. f♀. The lamina labialis; × 117.
— 9 g. f♀. The area labialis; 77.

Plate VI.

Fig. 1. *Chirudina notacantha* G. O. Sars.

Fig. 1 a. f♀. Labrum; × 147.
— 1 b. f♀. Labium; × 147.

Fig. 2. *Valdiviella insignis* Farran.

Fig. 2 a. f♀. Pes I sin.; outer margin of second and third outer segment in anterior view; × 77.
— 2 b. f♀. Anterior surface of the labrum; × 77.
— 2 c. f♀. Oral surface of the labrum; × 77.
— 2 d. f♀. Lamina labialis and serrula 6-dentata; × 77.
— 2 e. f♀. Labial lobes etc.; × 77.

Fig. 3. *Euchæte norvegica* Boeck.

Fig. 3 a. f♀. Oral surface of the labrum; × 147.
— 3 b. f♀. Lamina labialis; × 147.
— 3 c. f♀. Labial lobe; × 147.
— 3 d. f♂. Pes V sin.; second and third outer segment; × 77.
— 3 e. f♂. The oral surrounding in ventral view; × 147.
— 3 f. Y (Stage II). Maxilla sin.; × 77.

Fig. 4. *Euchæte tonsa* Giesbrecht.

Fig. 4 a. f♀. Labrum in oral view; × 147.
— 4 b. f♂. Pes V sin.; second and third outer segment; × 77.

Fig. 5. *Euchæte glacialis* H. J. Hansen.

Fig. 5 a. f♀. Lamina labialis and serrula 6-dentata; × 147.
— 5 b. f♀. Labial lobe in ventral view; × 77.
— 5 c. f♂. Maxillula sin.; × 77.
— 5 d. f♂. Pes V sin.; second and third outer segment; × 77.

Fig. 6. *Euchæte Farrani* n. sp.

Fig. 6 a. f♀. Oral surface of the labrum; × 147.

Fig. 7. *Euchæte Sarsi* Farran.

Fig. 7 a. f♀. Labrum in anterior surface; × 57.
— 7 b. f♂. Pes V sin.; second and third outer segment; × 77.

Fig. 8. *Euchæte barbata* Brady.

Fig. 8 a. f♀. Labrum in oral view; × 77.
— 8 b. f♂. Pes V sin.; second and third outer segment; × 77.

Fig. 9. *Euchæte Bradyi* n. sp.

Fig. 9 a. ♀. Labrum in oral view; × 77.

Fig. 10. *Euchæte Scotti* Farran.

Fig. 10 a. f♀. Labrum in oral view; × 77.
— 10 b. f♀. Lamina labialis and serrula 6-dentata; × 77.
— 10 c. f♂. Pes V sin.; second and third outer segment; × 77.

Fig. 11. *Euchæte bisinuata* Farran.

Fig. 11 a. f♀. Labrum in oral view; × 147.
— 11 b. f♀. Lamina labialis etc.; 147.
— 11 c. f♂. Maxillipeds; hook-shaped seta of the second basipodite (lobe IV); × 200.
— 11 d—e. f♂. Pes V sin.; third and second outer segment; × 117.

Fig. 12. *Euchæte acuta* Giesbrecht.

Fig. 12 a. f♀. Abdomen in lateral view; × 44.
— 12 b. f♀. Labrum in oral view; × 200.
— 12 c. f♀. Lamina labialis and serrula 6-dentata; × 200.

Fig. 13. *Euchæte hebes* Giesbrecht.

Fig. 13 a. f♀. Abdomen in lateral view; × 44.
— 13 b. f♀. Lamina labialis and serrula 6-dentata; × 200.

Fig. 14. *Scottocalanus Thorii* n. sp. (in the plate marked *persecans* Gbt.)

Fig. 14 a. f♀. Labrum in anterior view; × 77.
— 14 b. f♀. Labrum in oral view; × 117.
— 14 c. f♀. Lamina labialis and serrula 6-dentata; × 117.

Plate VII.

Fig. 1. *Phaënna spinifera* Claus.

Fig. 1 a. f♀. Rostrum and labrum in anterior view; × 77.
— 1 b. f♀. Labrum in oral view; × 220.
— 1 c. f♀. Lamina labialis and serrula 6-dentata; × 280.

Fig. 2. *Xanthocalanus pinguis* Farran.

Fig. 2 a. f♀. Pes V sin. in posterior view; × 77.
— 2 b. f♀. Labrum in oral view; × 200.
— 2 c. f♀. Lamina labialis and serrula 6-dentata; × 200.
— 2 d. Y♂ (Stags V). Pes V in posterior view; × 77.

Fig. 3. *Xanthocalanus Greeni* Farran.

Fig. 3 a. Y♂ (V). First inner lobe of the maxillulae in posterior view; × 44.
— 3 b. Y♂ (V). Fourth seta in anterior view; × 77.
— 3 c. Y♂ (V). Maxilla; setae of fifth lobe in posterior view; × 44.

Fig. 3 d. f♀. End of broken seta in fifth lobe of the maxillae; × 44.
— 3 e. f♀. Maxillipes sin.; × 13·5.
— 3 f. f♀. Last segment of left maxillipes; × 44.
— 3 g. f♀. Pes II sin.; terminal seta; × 44.

Fig. 4. *Cornucalanus chelifer* J. C. Thompson.

Fig. 4 a. ♀. Abdomen in lateral view; × 13·5.
— 4 b. ♀. Pes IV sin. in posterior view; × 44.
— 4 c. ♀. Pes V dext. in posterior view; × 57.
— 4 d. ♀. Labrum in oral view; × 280.
— 4 e. ♀. Serrula 6-dentata etc.; × 200.
— 4 f. ♂. Abdomen in lateral view; × 13·5.
— 4 g. ♂. Pes V sin.; third outer segment; × 117.
— 4 h. ♀ (Stage V). Pes V sin. in anterior view; × 57.

Fig. 5. *Onchocalanus magnus* Wolfenden.

Fig. 5 a. ♀. Head in lateral view; × 13·5.
— 5 b. ♀. Abdomen in lateral view; × 13·5.
— 5 c. ♀. Pes IV sin. in posterior view; × 44.
— 5 d. ♀. Pes V sin. in anterior view; × 57.
— 5 e. ♀. Labrum in anterior view and labial lobes; × 33.
— 5 f. ♀. Labrum in oral view; × 77.
— 5 g. ♀. Serrula 6-dentata and lobus labialis in anterior view; × 77.

Fig. 6. *Onchocalanus cristatus* Wolfenden.

Fig. 6 a. ♀. Pes V sin.; third outer segment; × 57.
— 6 b. ♂. Abdomen in lateral view; × 13·5.
— 6 c. ♂. Maxilla sin.; × 44.
— 6 d. ♂. Serrula 6-dentata; × 200.
— 6 e. ♀ (Stage V). Pes V sin.; × 37.

Fig. 7. *Lophothrix frontalis* Giesbrecht.

Fig. 7 a. ♀. Pes III sin.; × 24.
— 7 b. ♀. Labrum in anterior view; × 117.
— 7 c. ♀. Labrum; oral surface; × 117.
— 7 d. ♀. Lamina labialis and serrula 6-dentata; × 117.

Fig. 8. *Scaphocalanus magnus* Th. Scott.

Fig. 8 a. ♀. Labrum etc. in lateral view; × 24.
— 8 b. ♀. Pes II; endopodite; × 57.
— 8 c. ♀. Labrum in anterior view; × 77.
— 8 d. ♀. Labrum in oral view; × 200.

Fig. 9. *Scaphocalanus obtusifrons* G. O. Sars.

Fig. 9 a. ♀. Pes IV dext.; terminal seta; × 77.
— 9 b. ♀. Labrum in anterior view; × 77.
— 9 c. ♀. Labrum in oral view; × 200.
— 9 d. ♀. Serrula 6-dentata; × 200.

Fig. 10. *Scaphocalanus globiceps* Farran.

Fig. 10 a. f♀. Labrum; oral surface; × 200.
— 10 b. f♀. Serrula 6-dentata; × 200.
— 10 c. ♂. Pes V; × 77. = 11 b.

Fig. 11. *Scaphocalanus validus* Farran.

Fig. 11 a. f♀. Labrum in anterior view; × 77.
— 11 b. f♂. Pes V of *S. globiceps* Farran.

Fig. 12. *Scaphocalanus robustus* G. O. Sars.

Fig. 12 a. f♀. Labrum in anterior view; × 200.
— 12 b. f♀. Labrum in oral view; × 200.
— 12 c. f♀. Serrula 6-dentata etc.; × 200.

Fig. 13. *Scolecithricella minor* Brady.

Fig. 13 a. f♀. Serrula 6-dentata etc.; × 280.

Fig. 14. *Scolecithricella ovata* Farran.

Fig. 14 a. f♀. Maxilla sin. in anterior view; × 117.
— 14 b. f♀. Labrum in anterior view and lobi labiales; × 77.
— 14 c. f♀. Labrum in oral view; × 280.
— 14 d. f♀. Serrula 6-dentata etc.; × 280.

Pl. VIII.

Fig. 1. *Euchirella messinensis* Claus.

Fig. 1. f♂. Pes I dext. in anterior view; × 77.

Fig. 2. *Euchirella curticauda* Giesbrecht.

Fig. 2 a. ♂. Pes I sin. in anterior view; × 77.
— 2 b. Pes II dext. in anterior view in an abnormal specimen; × 77.
— 2 c. Pes V; right endopodite; × 117.

Fig. 3. *Euchirella intermedia* n. sp.

Fig. 3. f♀. Antenna dextra in anterior view; × 44.

Fig. 4. *Euchirella bitumida* n. sp.

Fig. 4 a. f♀. Head from the left; × 24.
— 4 b. f♀. Pes I sin. in anterior view; × 77.
— 4 c. f♀. Pes II dext.; endopodite; × 77.
— 4 d. f♀. Pes III dext.; endopodite; × 77.
— 4 e. f♀. The first basipodite with spines of the right and left side in posterior view; × 117.

Fig. 5. *Chirudina Streetsi* Giesbrecht.

Fig. 5 a. f♂. Head from the left; × 24.
— 5 b. f♂. Maxilla sin. in anterior view; × 117.

Fig. 6. *Scaphocalanus magnus* Th. Scott.

Fig. 6 a. f♀. Abdomen from the left; × 24.
— 6 b. f♀. Pes IV sin. in an abnormal specimen; × 44.

Fig. 6 c. f♀. Pes V in posterior view in an abnormal specimen; × 77.
— 6 d. f♂. Pes V sin.; × 77.
— 6 e. f♂. Pes V dext.; × 77.
— 6 f. Y♂ (V). Abdomen; × 24.
— 6 g. Y♂ (V). Pes V; × 57.

Fig. 7. *Scaphocalanus brevicornis* G. O. Sars.

Fig. 7 a. f♂. Abdomen from the left; × 24.
— 7 b. f♂. Pes V; tip of the right endopodite; × 77.

Fig. 8. *Scaphocalanus obtusifrons* G. O. Sars.

Fig. 8 a. f♀. Abdomen from the left; × 44.
— 8 b. Pes V. Median portion of the terminal seta; × 200.
— 8 c. f♂. Abdomen from the left; × 44.
— 8 d. Y♂ (V). Pes V; × 77.
— 8 e. Y♀ (V). Pes V; × 77.

Fig. 9. *Scaphocalanus globiceps* Farran.

Fig. 9 a. f♂. Pes V dext. in anterior view; × 77.
— 9 b—c. f♂. Pes V dext.; endopodite in anterior and lateral view; × 200.

Fig. 10. *Scolecithricella minor* Brady.

Fig. 10 a. Y♀ (V). Pes V; × 200.
— 10 b. Y♂ (V). Pes V; × 200.
— 10 c. Y♂ (Stage V). Pes V; × 200.

Fig. 11. *Scolecithricella Ingolfii* n. sp.

Fig. 11 a. ♀. Pes IV; third basipodite in anterior view; × 200.
— 11 b—c. Pes V of two females in anterior view; × 200.

Fig. 12. *Scolecithricella ovata* Farran.

Fig. 12 a. f♀. Head from below; × 77.
— 12 b. f♀. Head from the side; × 77.
— 12 c. f♀. Genital somite; × 77.
— 12 d. f♀. Pes V dext.; × 117.
— 12 e. Y♀ (Stage V). Pes V in anterior view; × 117.
— 12 f. Y♂ (Stage V). Pes V in anterior view; × 117.

Fig. 13. *Scottocalanus securifrons* Th. Scott.

Fig. 13 a. f♂. Abdomen from the left; × 20.
— 13 b—c. f♂. Pes V sin. in superior and inferior view; × 77.

Fig. 14. *Scottocalanus Thorii* n. sp.

Fig. 14 a. f♂. Abdomen from the left; × 20.
— 14 b. f♂. Pes V sin.; × 77.

Fig. 15. *Cornucalanus chelifer* J. C. Thompson.

Fig. 15 a. f♀. Head in lateral view; × 24.
— 15 b. f♀. Terminal setae of pes IV sin.; × 117.
— 15 c. f♀. Pes V sin.; the exopodite; × 200.

Fig. 15 d. f♂. Head; × 24.
— 15 e. f♂. Pes V in anterior view; × 77.
— 15 f. Y♀ (V). Abdomen from the left; × 14.
— 15 g. Y♂ (V). Pes V in anterior view; × 57.

Fig. 16. ***Onchocalanus magnus*** Wolfenden.

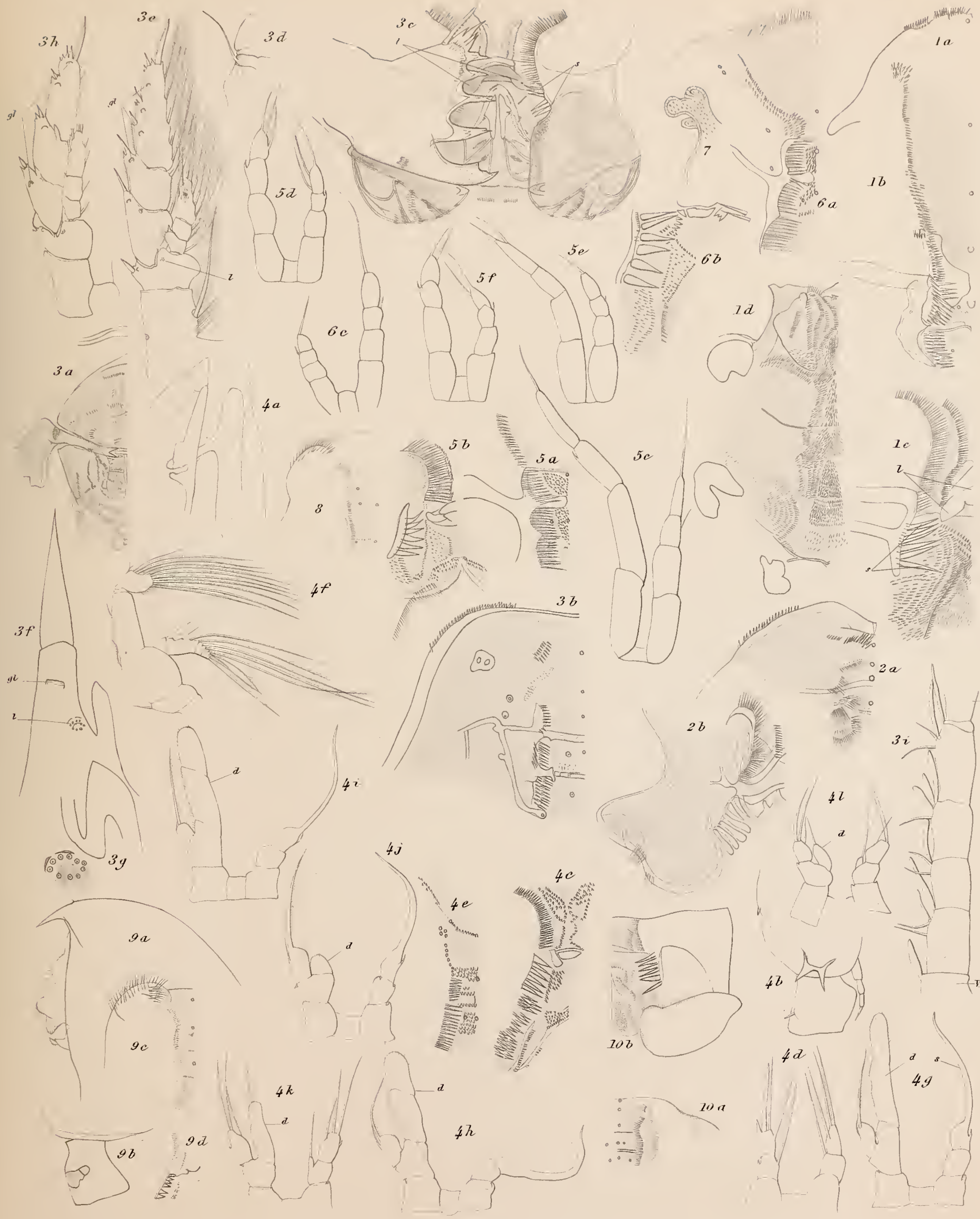
Fig. 16 a. f♀. Rostrum in anterior view; × 77.
— 16 b. f♀. Maxillula sin.; × 44.
— 16 c. f♀. Maxilla sin.; × 24.
— 16 d. f♀. Pes II; left endopodite; × 57.

Eig. 17. ***Onchocalanus cristatus*** Wolfenden.

Fig. 17 a. f♀. Head from the left; × 14.
— 17 b. f♀. Pes II; left endopodite; × 57.
— 17 c. f♂. Head from the left; × 44.
— 17 d. f♂. Pes V dext. in anterior view; × 77.
— 17 e. f♂. Pes V sin.; last segment of the exopodite; × 200.
— 17 f. f♀. Pes V sin.; × 57.

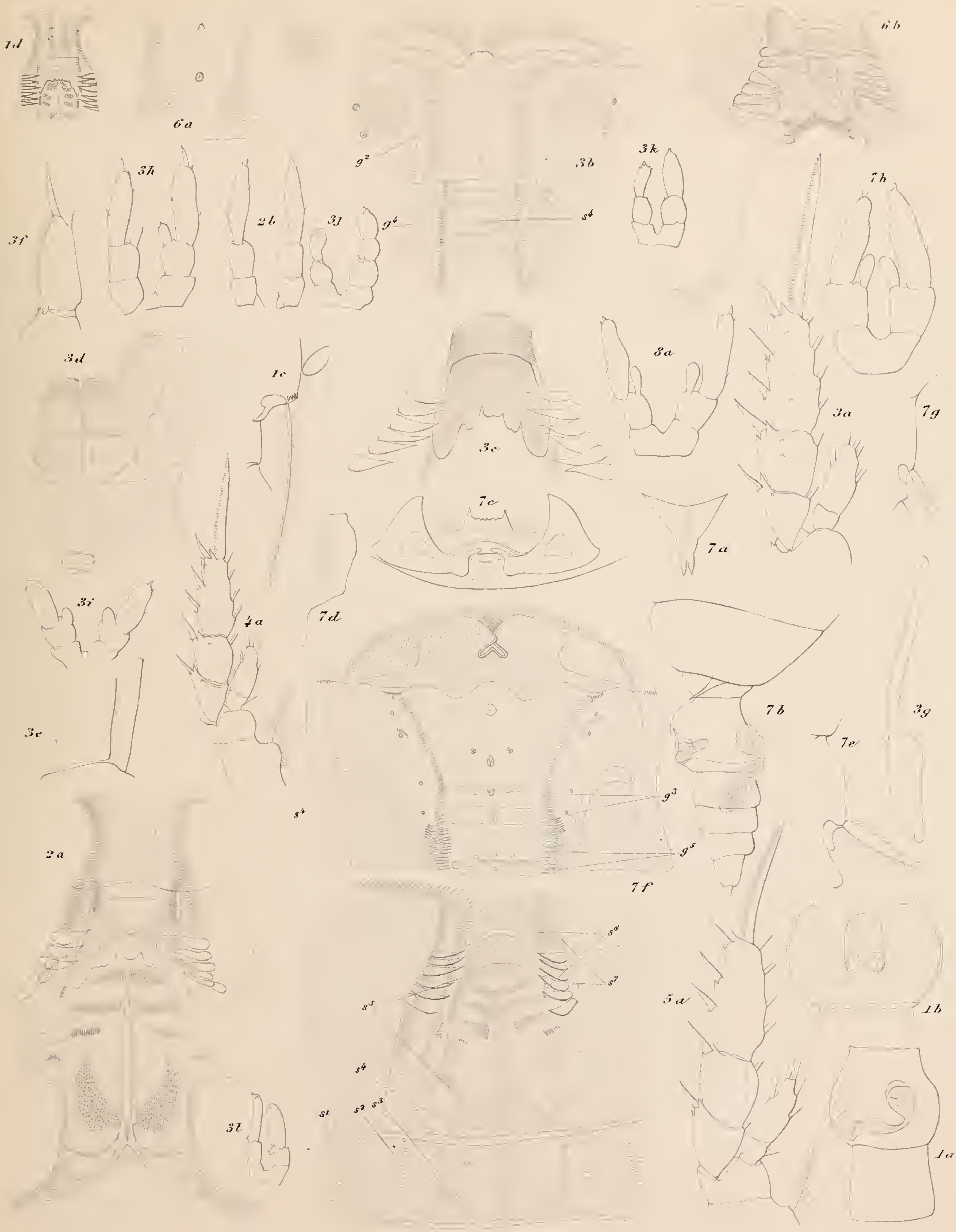
Fig. 18. ***Xanthocalanus Greeni*** Farran.

Fig. 18 a. Y♀ (V). Head from the left; × 14.
— 18 b. Y♀ (V). Abdomen from the left; × 14.
— 18 c. Y♀ (V). Pes II; left endopodite; × 44.
— 18 d. Y♀ (V). Pes V in anterior view; × 44.



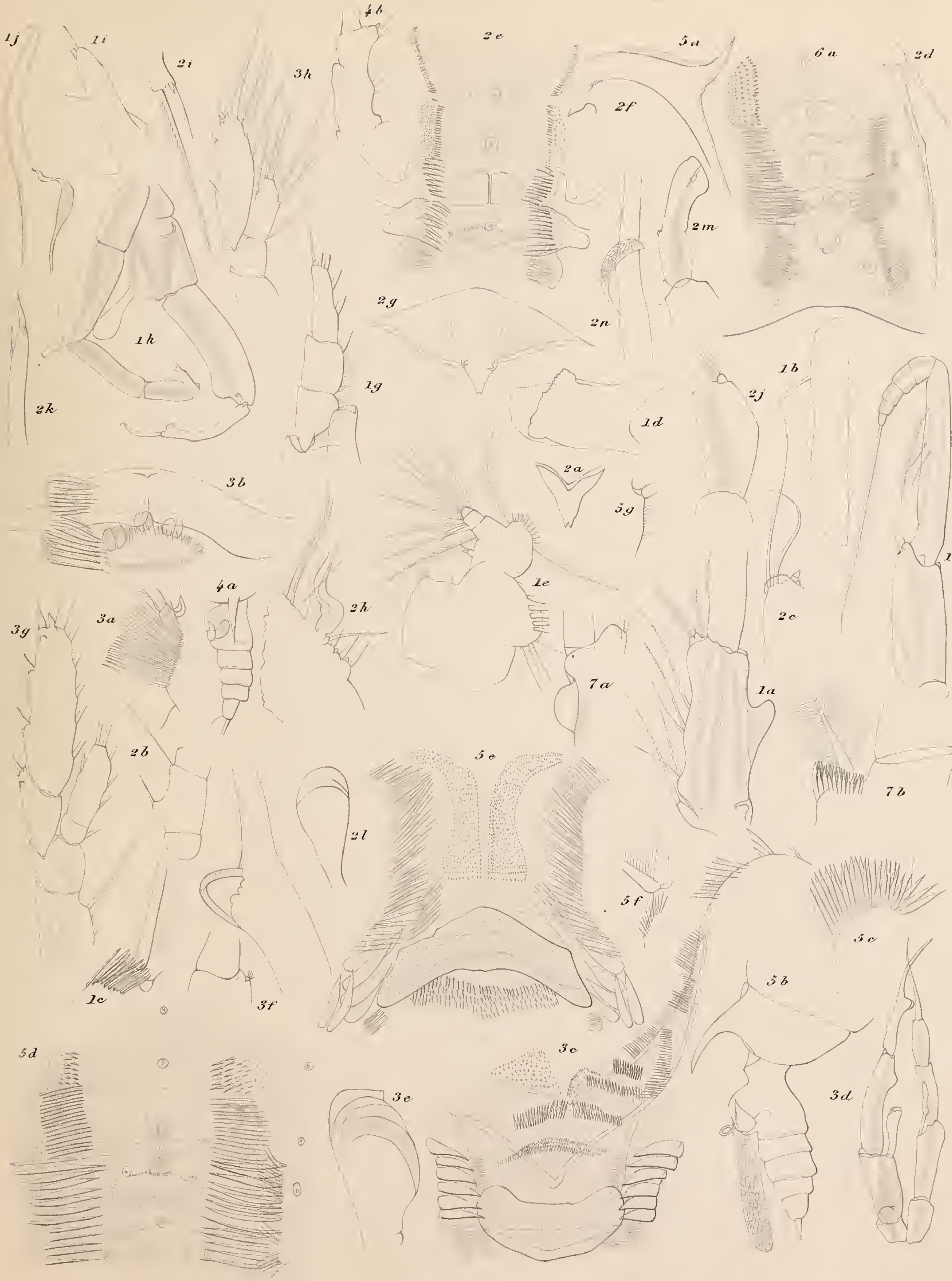
1. Calanus hyperboreus Kr. 2. Macrocalanus princeps Brady. 3. Megacalanus princeps Wolf. 4. Rhincalanus nasutus Gbt. 5. Eucalanus elongatus Dana. 6. E. attenuatus Dana. 7. E. crassus Gbt. 8. Pseudocalanus minutus Kr. 9. Clausocalanus arcuiformis Dana. 10. Spinocalanus abyssalis Gbt.

With del. T. N. Möller sc.



1. Aetidius armatus Boeck. 2. Chiridius obtusifrons G.O.S. 3. Ch. armatus Boeck. 4. Ch. nasutus n. sp.
5. Ch. modestus n. sp. 6. Aetideopsis rostrata G.O.S. 7. Gaidius brevispinus G.O.S. 8. G. tenuispinus G.O.S.

With del. T. N. Möller sc.

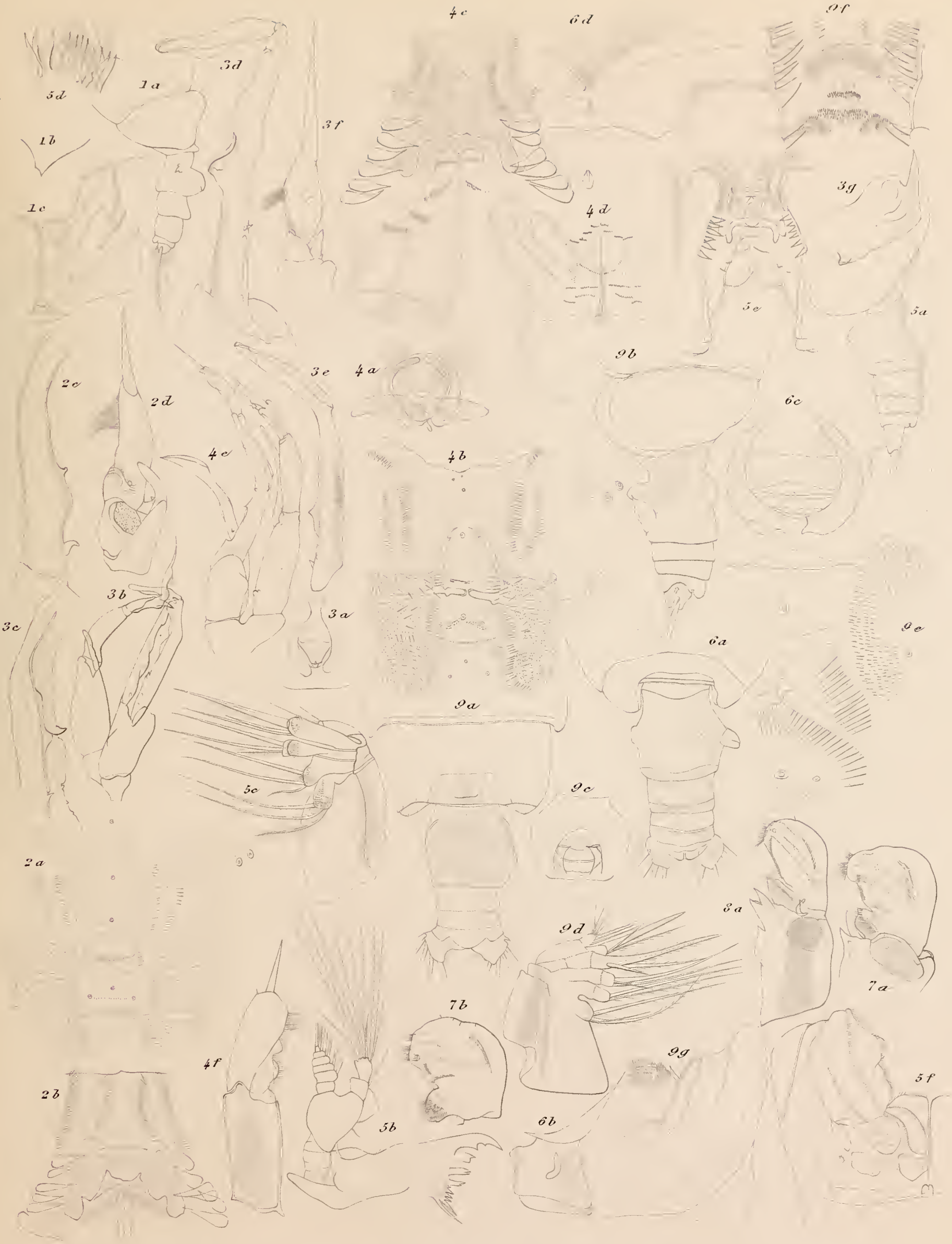


1. Gaidius brevispinus G.O.S. 2. G. tenuispinus G.O.S. 3. Gaetanus major Wolf. 4. G. minor Farr. 5. G. latifrons G.O.S. 6. G. pileatus Farr. 7. G. miles Gbt.

With del. T.N. Möller sc.

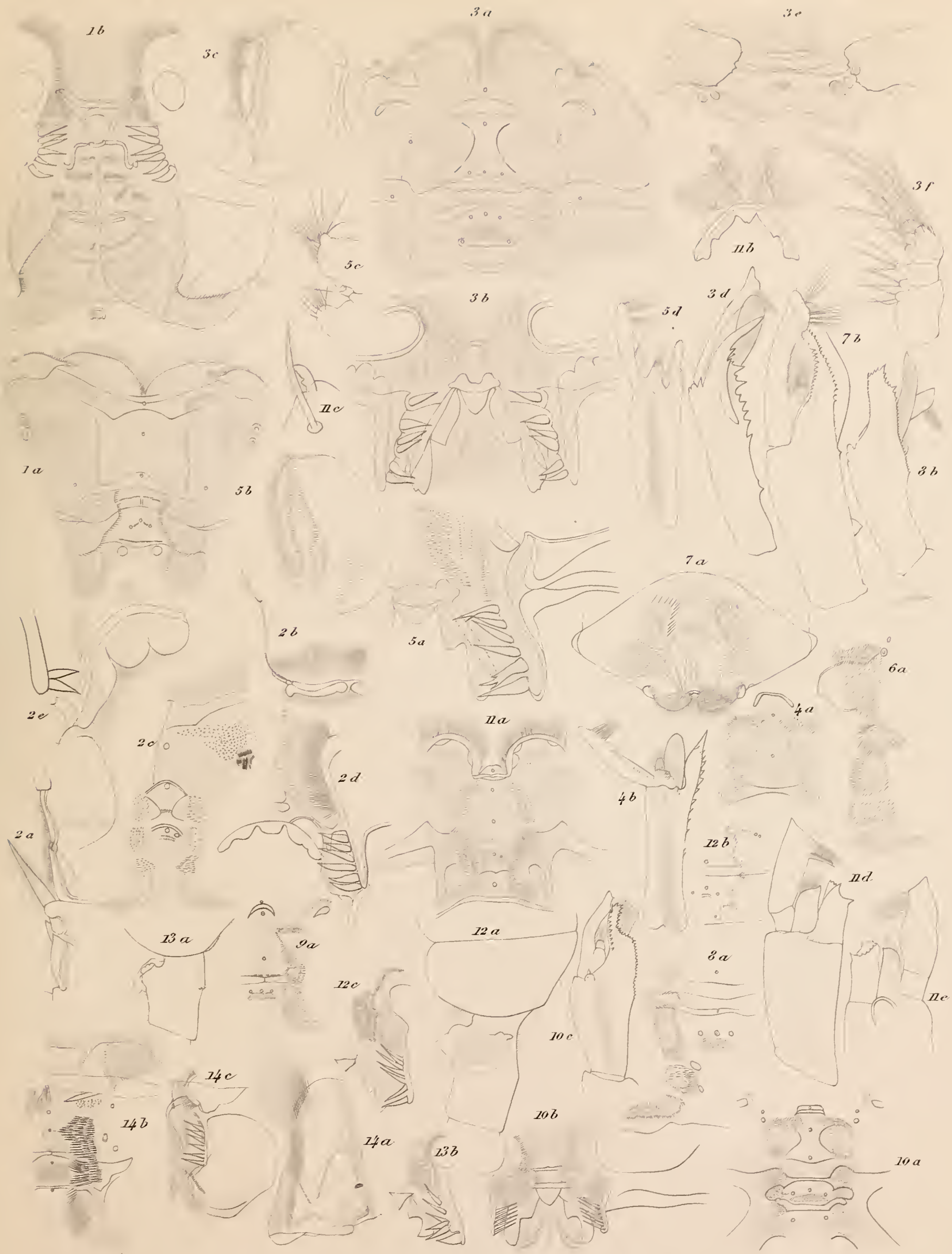
1. *Euchirella rostrata* Cls. 2. *E. messinensis* Cls. 3. *E. curticauda* Gsbt. 4. *E. intermedia* n. sp.
5. *E. maxima* n. sp. 6. *Undeuchæte superba* n. sp.

With del. T. N. Möller sc.



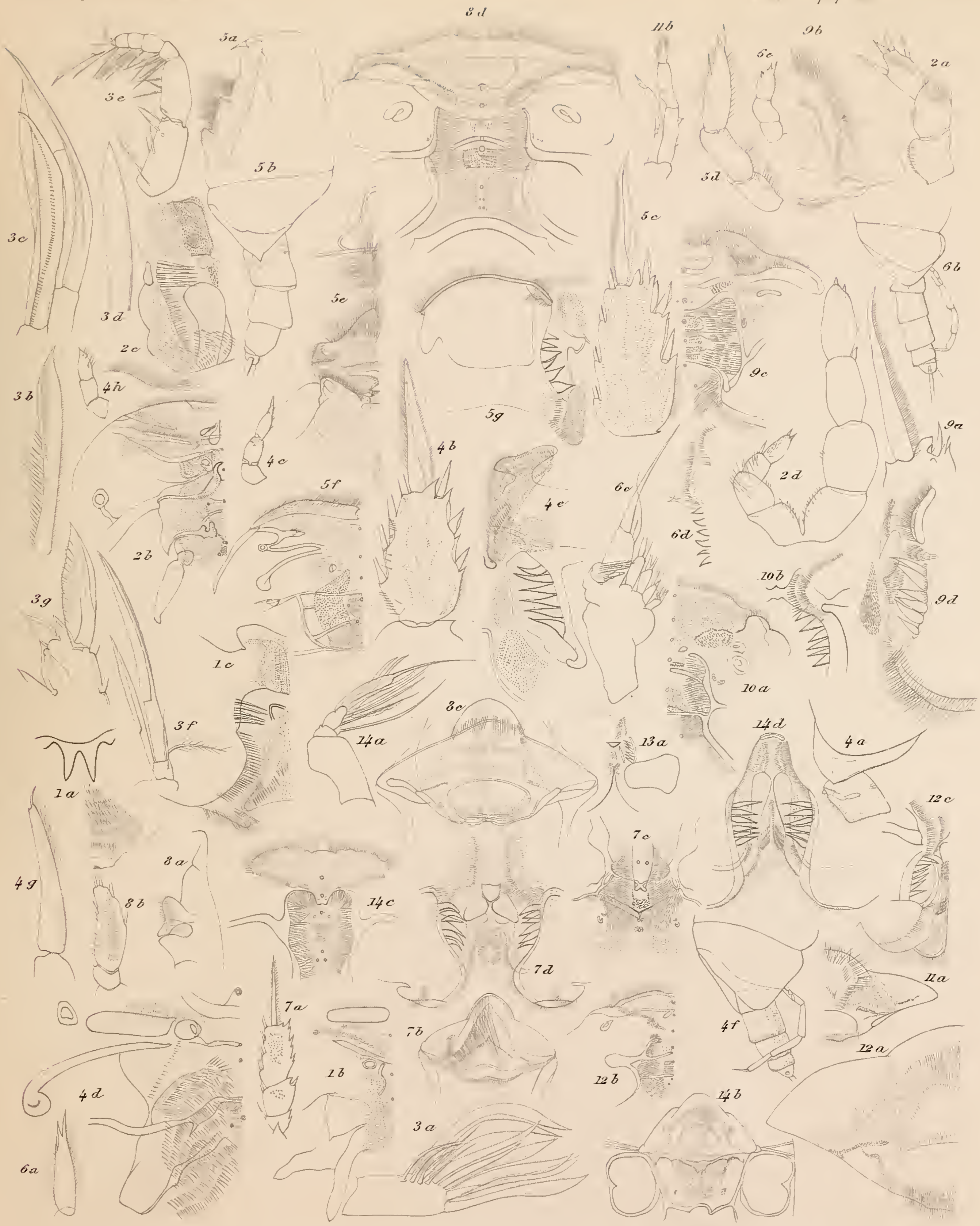
1. Undeuchæte superba n. sp. 2. U. major Gbt. 3. U. minor Gbt. 4. Chirudina streetsi Gbt. 5. C. abyssalis n. sp.

With del. 6. C. pustulifera G.O.S. 7. C. notacantha G.O.S. 8. C. parvispina Farr. 9. Euchirella bitumida n. sp. T.N. Möller sc.



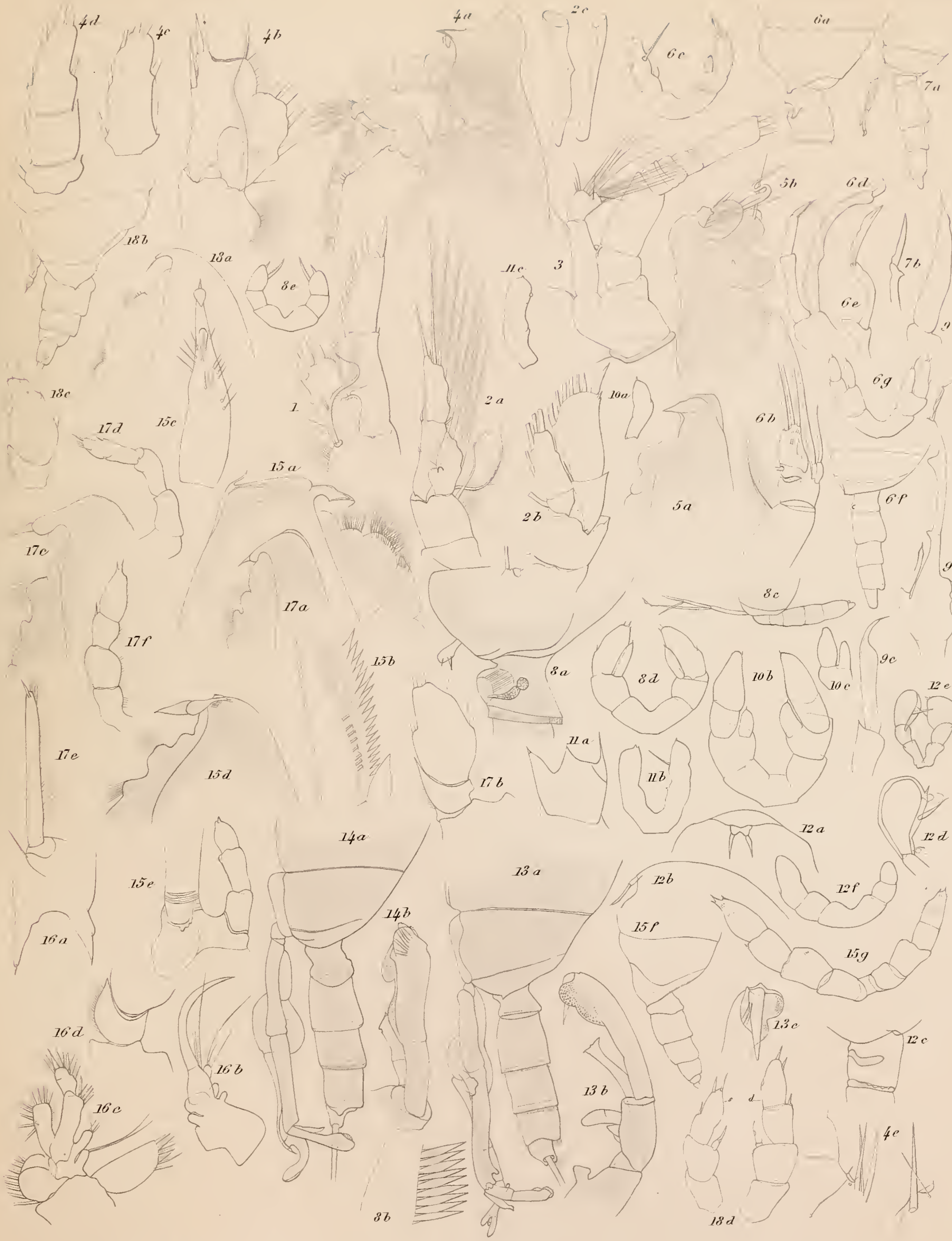
1. Chirudina notacantha G.O.S. 2. Valdiviella insignis Farr. 3. Euchæte norvegica Boeck. 4. E. tonsa Gbt. 5. E. glacialis Hans. 6. E. Farrani n.sp. 7. E. Sarsi Farr. 8. E. barbata Brad. 9. E. Bradyi n.sp. 10. E. Scotti Farr. 11. E. bisinuata Farr. 12. E. acuta Gbt. 13. E. hebes Gbt. 14. Scottocalanus persecans Gbt.

With del. T.N. Möller sc.



1. *Phaenna spinifera* Cls. 2. *Xanthocalanus pinguis* Farr. 3. *X. Greeni* Farr. 4. *Cornucalanus chelifer* Thomp.
5. *Onchocalanus magnus* Wolf. 6. *O. cristatus* Wolf. 7. *Lophothrix frontalis* Gbt. 8. *Scaphocalanus magnus* Scott.
9. *S. obtusifrons* G.O.S. 10. *S. globiceps* Farr. 11. *S. Validus* Farr. 12. *S. robustus* G.O.S.
13. *Scolecithricella minor* Brad. 14. *S. ovata* Farr.

With del. T.N.Møller sc.



1. *Euchirella messinensis* Cls. 2. *E. curticauda* Gbt. 3. *E. intermedia* n.sp. 4. *E. bitumida* n.sp. 5. *Chirudina Streetsi* Gbt.
6. *Scaphocalanus magnus* Scott. 7. *S. brevicornis* G.O.S. 8. *S. obtusifrons* G.O.S. 9. *S. globiceps* Farr. 10. *Scolecithricella minor* Brady.
11. *S. Jngolfii* n.sp. 12. *S. ovata* Farr. 13. *Scottocalanus securifrons* Scott. 14. *S. Thorii* n.sp. 15. *Cornucalanus chelifer* Thomp.
With del. 16. *Onchocalanus magnus* Wolf. 17. *O. cristatus* Wolf. 18. *Xanthocalanus Greeni* Farr. T.N. Møller sc.

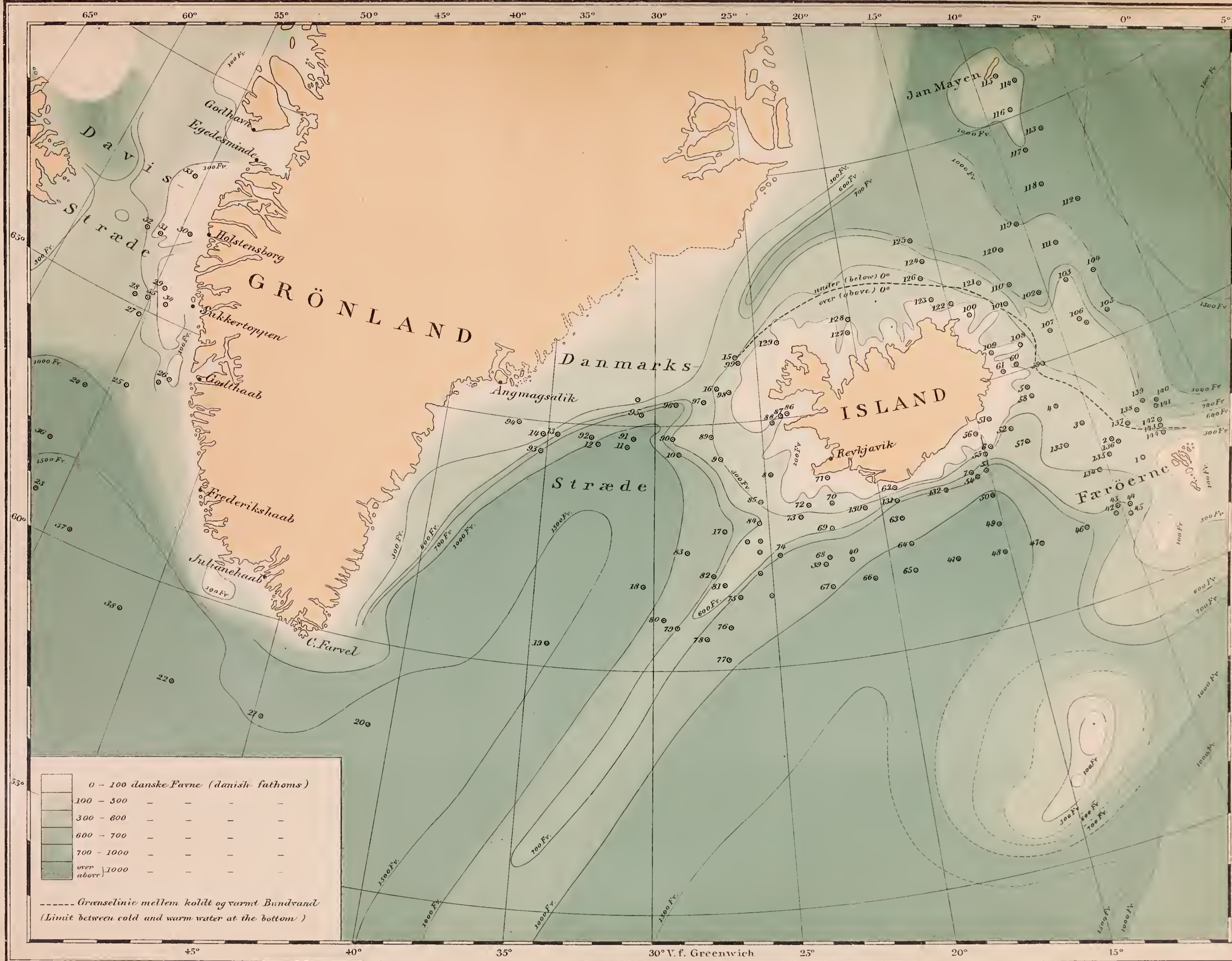
THE INGOLF-EXPEDITION

1895—1896.

THE LOCALITIES, DEPTHS, AND BOTTOMTEMPERATURES OF THE STATIONS

Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.
1	62° 30′	8° 21′	132	7°2	24	63° 06′	56° 00′	1199	2°4	45	61° 32	9° 43′	643	4°17
2	63° 04′	9° 22′	262	5°3	25	63° 30′	54° 25′	582	3°3	46	61° 32′	11° 36′	720	2°40
3	63° 35′	10° 24′	272	0°5		63° 51′	53° 03′	136		47	61° 32′	13° 40′	950	3°23
4	64° 07′	11° 12′	237	2°5	26	63° 57′	52° 41′	34	0°6	48	61° 32′	15° 11′	1150	3°17
5	64° 40′	12° 09′	155			64° 37′	54° 24′	109		49	62° 07′	15° 07′	1120	2°91
6	63° 43′	14° 34′	90	7°0	27	64° 54′	55° 10′	393	3°8	50	62° 43′	15° 07′	1020	3°13
7	63° 13′	15° 41′	600	4°5	28	65° 14′	55° 42′	420	3°5	51	64° 15′	14° 22′	68	7°32
8	63° 56′	24° 40′	136	6°0	29	65° 34′	54° 31′	68	0°2	52	63° 57′	13° 32′	420	7°87
9	64° 18′	27° 00′	295	5°8	30	66° 50′	54° 28′	22	1°05	53	63° 15′	15° 07′	795	3°08
10	64° 24′	28° 50′	788	3°5	31	66° 35′	55° 54′	88	1°6	54	63° 08′	15° 40′	691	3°9
11	64° 34′	31° 12′	1300	1°6	32	66° 35′	56° 38′	318	3°9	55	63° 33′	15° 02′	316	5°9
12	64° 38′	32° 37′	1040	0°3	33	67° 57′	55° 30′	35	0°8	56	64° 00′	15° 09′	68	7°57
13	64° 47′	34° 33′	622	3°0	34	65° 17′	54° 17′	55		57	63° 37′	13° 02′	350	3°4
14	64° 45′	35° 05′	176	4°4	35	65° 16′	55° 05′	362	3°6	58	64° 25′	12° 09′	211	0°8
15	66° 18′	25° 59′	330	—0°75	36	61° 50′	56° 21′	1435	1°5	59	65° 00′	11° 16′	310	—0°1
16	65° 43′	26° 58′	250	6°1	37	60° 17′	54° 05′	1715	1°4	60	65° 09′	12° 27′	124	0°9
17	62° 49′	26° 55′	745	3°4	38	59° 12′	51° 05′	1870	1°3	61	65° 03′	13° 06′	55	0°4
18	61° 44′	30° 29′	1135	3°0	39	62° 00′	22° 38′	865	2°9	62	63° 18′	19° 12′	72	7°92
19	60° 29′	34° 14′	1566	2°4	40	62° 00′	21° 36′	845	3°3	63	62° 40′	19° 05′	800	4°0
20	58° 20′	40° 48′	1695	1°5	41	61° 39′	17° 10	1245	2°0	64	62° 06′	19° 00′	1041	3°1
21	58° 01′	44° 45′	1330	2°4	42	61° 41′	10° 17′	625	0°4	65	61° 33′	19° 00′	1089	3°0
22	58° 10′	48° 25′	1845	1°4	43	61° 42′	10° 11′	645	0°05	66	61° 33′	20° 43′	1128	3°3
23	60° 43′	56° 00′	Only the Plankton-Net used		44	61° 42′	9° 36′	545	4°8	67	61° 30′	22° 30′	975	3°0

Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.	Station Nr.	Lat. N.	Long. W.	Depth in Danish fathoms	Bottom-temp.
68	62° 06′	22° 30′	843	3°4	92	64° 44′	32° 52′	976	1°4	118	68° 27′	8° 20′	1060	—1°0
69	62° 40′	22° 17′	589	3°9	93	64° 24′	35° 14′	767	1°46	119	67° 53′	10° 19′	1010	—1°0
70	63° 09′	22° 05′	134	7°0	94	64° 56′	36° 19′	204	4°1	120	67° 29′	11° 32′	885	—1°0
71	63° 46′	22° 03′	46			65° 31′	30° 45′	213		121	66° 59′	13° 11′	529	—0°7
72	63° 12′	23° 04′	197	6°7	95	65° 14′	30° 39′	752	2°1	122	66° 42′	14° 44′	115	1°8
73	62° 58′	23° 28′	486	5°5	96	65° 24′	29° 00′	735	1°2	123	66° 52′	15° 40′	145	2°0
74	62° 17′	24° 36′	695	4°2	97	65° 28′	27° 39′	450	5°5	124	67° 40′	15° 40′	495	—0°6
	61° 57′	25° 35′	761		98	65° 38′	26° 27′	138	5°9	125	68° 08′	16° 02′	729	—0°8
	61° 28′	25° 06′	829		99	66° 13′	25° 53′	187	6°1	126	67° 19′	15° 52′	293	—0°5
75	61° 28′	26° 25′	780	4°3	100	66° 23′	14° 02′	59	0°4	127	66° 33′	20° 05′	44	5°6
76	60° 50′	26° 50′	806	4°1	101	66° 23′	12° 05′	537	—0°7	128	66° 50′	20° 02′	194	0°6
77	60° 10′	26° 59′	951	3°6	102	66° 23′	10° 26′	750	—0°9	129	66° 35′	23° 47′	117	6°5
78	60° 37′	27° 52′	799	4°5	103	66° 23′	8° 52′	579	—0°6	130	63° 00′	20° 40′	338	6°55
79	60° 52′	28° 58′	653	4°4	104	66° 23′	7° 25′	957	—1°1	131	63° 00′	19° 09′	698	4°7
80	61° 02′	29° 32′	935	4°0	105	65° 34′	7° 31′	762	—0°8	132	63° 00′	17° 04′	747	4°6
81	61° 44′	27° 00′	485	6°1	106	65° 34′	8° 54′	447	—0°6	133	63° 14′	11° 24′	230	2°2
82	61° 55′	27° 28′	824	4°1		65° 29′	8° 40′	466		134	62° 34′	10° 26′	299	4°1
83	62° 25′	28° 30′	912	3°5	107	65° 33′	10° 28′	492	—0°3	135	62° 48′	9° 48′	270	0°4
	62° 36′	26° 01′	472		108	65° 30′	12° 00′	97	1°1	136	63° 01′	9° 11′	256	4°8
	62° 36′	25° 30′	401		109	65° 29′	13° 25′	38	1°5	137	63° 14′	8° 31′	297	—0°6
84	62° 58′	25° 24′	633	4°8	110	66° 44′	11° 33′	781	—0°8	138	63° 26′	7° 56′	471	—0°6
85	63° 21′	25° 21′	170		111	67° 14′	8° 48′	860	—0°9	139	63° 36′	7° 30′	702	—0°6
86	65° 03′6	23° 47′6	76		112	67° 57′	6° 44′	1267	—1°1	140	63° 29′	6° 57′	780	—0°9
87	65° 02′3	23° 56′2	110		113	69° 31′	7° 06′	1309	—1°0	141	63° 22′	6° 58′	679	—0°6
88	64° 58′	24° 25′	76	6°9	114	70° 36′	7° 29′	773	—1°0	142	63° 07′	7° 05′	587	—0°6
89	64° 45′	27° 20′	310	8°4	115	70° 50′	8° 29′	86	0°1	143	62° 58′	7° 09′	388	—0°4
90	64° 45′	29° 06′	568	4°4	116	70° 05′	8° 26′	371	—0°4	144	62° 49′	7° 12′	276	1°6
91	64° 44′	31° 00′	1236	3°1	117	69° 13′	8° 23′	1003	—1°0					


Davis Stræde
GRÖNLAND
Godhavn
Egedesminde
Holstensborg
Sukkertoppen
Godthaab
Frederikshaab
Julianehaab
C. Farvel
Angmagsalik
Danmarks Stræde
ISLAND
Reykjavik
Jan Mayen
Færöerne
under (below) 0°
over (above) 0°
30° V. f. Greenwich
0 – 100 danske Favne (danish fathoms)
100 – 300
300 – 600
600 – 700
700 – 1000
over above 1000
Grænselinie mellem koldt og varmt Bundvand
(Limit between cold and warm water at the bottom)
AXEL E. AAMODT LITH. ETABL. KJØBENHAVN