

AN ACCOUNT
OF THE
CRUSTACEA
OF
NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

G. O. SARS

VOL. VII

COPEPODA
SUPPLEMENT

PARTS I & II

CALANOIDA, HARPACTICOIDA (part)

WITH 16 AUTOTYPIC PLATES



BERGEN
PUBLISHED BY THE BERGEN MUSEUM

SOLD BY
ALB. CAMMERMEYERS'S FORLAG, CHRISTIANIA
1919



INTRODUCTION.

The considerable number of additional species observed during the latter years has induced me to publish a supplementary Volume to the *Copepoda*, containing descriptions and figures of these species, and embracing all the 3 leading divisions treated of in the 3 preceding Volumes. The far greater number of these species has been derived from the extensive division *Harpacticoida*; but also of *Calanoida* and *Cyclopoida* several interesting forms are added in the present Volume. Most of the species here described have been picket up from bottom-samples taken at different times, and chiefly in 2 localities on our southern coast, viz., Korshavn and Risør, some also from mixed collections of Copepoda made in the same localities. It is evident that the study of the present order of Crustacea still remains to be a very promising one, and I do not doubt that continued investigations in other places of our extensive coast will reveal many additional forms worthy of note.

Calanoida.

Fam. Phaënnidæ.

Gen. *Xanthocalanus*, Giesbr.

Remarks.—Of this genus, in addition to the 2 species originally recorded by Giesbrecht from the Mediterranean, several new forms have been described in recent time from the northern Ocean, some of them being, however, so nearly related, the ones to the others, that they, without a very close examination, may easily be confounded. As moreover, owing to the great brittleness of the appendages, most specimens obtained are more or less defective, the determination of the species belonging to the present genus is connected with no small difficulty. I have myself formerly, under the name *X. borealis*, confounded 3 different species. The one originally described by the present author under that name from the Nansen Expedition is a true arctic form, which does not occur off the coast of Norway. It has recently been identified, though with some doubt, by Mr. With with *X. hirtipes* Vanhoeffen. The Norwegian form recorded in Vol. IV of the present work as *X. borealis* is quite certainly not identical with the arctic species, differing, as it does, both by its much inferior size and by the rather unlike structure of the last pair of legs. I was seduced to this erroneous identification by the occurrence in my material of some few specimens, in which the last pair of legs, by the complete fusion of the 2 outer joints and the presence of only 3 apical spines, exhibited a certain resemblance to these appendages in the arctic form. These specimens I supposed to be young, not yet fully developed females, and that accordingly the last pair of legs changed their character according to age. This supposition has, however, turned out to be quite wrong. I have subsequently found fully adult specimens with the very same structure of the last pair of legs, and I have convinced myself that they are referable to a well defined species, which will be described below. For the other Norwegian species I propose the name

X. fallax. A 3rd Norwegian species has been described in the present work as *X. propinquus*. The most reliable character for distinguishing the species of the present genus is unquestionably the structure of the last pair of legs.

1. *Xanthocalanus minor*, Giesbr.

(Pl. I).

Xanthocalanus minor, Giesbrecht, Fauna und Flora des Golfes von Neapel: Pelagische Copepoden, p. 286 (footnote), Pl. 12, Fig. 32.

Specific Characters.—*Female*. Body moderately slender, with the anterior division oblong oval in form, greatest width not nearly attaining half the length and occurring somewhat behind the middle; dorsal face only slightly vaulted. Cephalosome nearly as long as the exposed part of the trunk, and exhibiting behind the middle dorsally a distinct transverse suture; anterior extremity narrowly rounded. Rostral filaments of moderate length and abruptly reflexed. Last trunkal segment completely coalesced with the preceding one; lateral lobes triangularly produced, and extending somewhat beyond the middle of the genital segment. Urosome comparatively short, scarcely exceeding in length $\frac{1}{4}$ of the anterior division; genital segment only slightly protuberant below, and about the length of the 2 succeeding segments combined; anal segment very small. Caudal rami scarcely longer than they are broad; apical setæ well developed and somewhat divergent, the innermost but one, as usual, considerably longer than the others. Anterior antennæ rather elongated, extending, when reflexed, to the end of the caudal rami. Posterior antennæ and oral parts almost exactly as in *X. fallax*. Natatory legs likewise of a very similar structure, though having the spinules of the inner ramus fewer in number. Last pair of legs, however, rather unlike those in the said species, the outer 2 joints being, as in *X. borealis*, completely coalesced to an elongated somewhat curved piece armed at the end with only 3 comparatively short, subequal spines, edges of the piece nearly smooth, with only a few cilia at the outer curvature.

Body in the living animal highly pellucid, with only a faint rosy pigment at the end of some of the segments.

Length of adult female reaching to 2.70 mm.

Remarks.—The figure given by Giesbrecht of the last pair of leg in his *X. minor* agrees pretty well with those appendages in the above-described form, and I think therefore that I am right in identifying both, though no other figures were given by Giesbrecht, nor any description of the species. The

length of the body is said to be only 1.20 mm.: but I suppose that an exact measurement may have been rendered difficult by the bad condition of the solitary specimen observed by that author.

As above stated, the present species was formerly confounded by me with *X. fallax* (at that time recorded as *X. borealis*), to which species it certainly bears a close resemblance. It is however rather inferior in size and of somewhat more slender form of body, differing moreover in the greater length of the anterior antennæ, and more particularly in the structure of the last pair of legs, which more resembles that in the arctic species, *X. borealis*. In the latter, however, these appendages are everywhere densely hirsute, and the apical spines are much stronger, nearly claw-like.

Occurrence.—Adult female specimens of the present species have been found in 3 different localities of the Norwegian coast, viz., at Risør, Stavanger, and in the upper part of the Trondhjem Fjord. In all 3 localities it occurred only occasionally and in comparatively shallow water.

Distribution.—Mediterranean (Giesbrecht).

Fam. Stepidæ.

Gen. *Stephos*, Scott.

Remarks.—Two well-defined species of this genus have been described in Vol. IV of the present work. A 3rd species is now added, to be described below.

2. *Stephos minor*, Scott.

(Pl. II).

Stephos minor, T. Scott, Tenth Ann. Report of the Fishery Board for Scotland, Part III, p. 245, Pl. VIII, figs. 1—13.

Specific Characters.—*Female.* Body resembling in shape that of *S. Scotti* G. O. Sars, the anterior division being regularly elliptical in outline and evenly vaulted dorsally; greatest width about half the length. Cephalic segment very large, with the front obtusely truncated and exhibiting no trace of rostral filaments. Lateral parts of last trunkal segment perfectly symmetrical and not

lamellarly expanded. Urosome equalling in length about $\frac{1}{3}$ of the anterior division; genital segment somewhat protuberant below, and about the length of the 2 succeeding segments combined. Caudal rami scarcely longer than they are broad; apical setæ rather slender, the innermost but one, as usual, the longest and considerably exceeding the length of the urosome. Anterior antennæ comparatively shorter than in *S. Scotti*, scarcely extending, when reflexed, beyond the genital segment. Posterior antennæ, oral parts and natatory legs of a structure very similar to that in *S. Scotti*. Last pair of legs rather small, with the distal joint conical in form, and only armed with a single denticle inside at some distance from the tip; outer edge with a small bristle opposite the denticle.

Male much smaller than female, with the urosome more slender and 5-articulate. Last pair of legs built on the same type as in the other species, though exhibiting well-marked specific differences, as seen from the figure here given.

Body in both sexes highly pellucid and without any obvious pigment. Length of adult female 0.73 mm., of male 0.60 mm.

Remarks.—The present species, first described by Scott, is nearly allied to *S. Scotti* G. O. Sars, but of much smaller size, and moreover well distinguished by the somewhat stouter anterior antennæ and by the structure of the last pair of legs in both sexes.

Occurrence.—Several specimens of this form were taken in a single place at Korshavn from a depth of about 15 fathoms. I have also found it occasionally at Risør in about the same depth.

Distribution.—Scottish coast (Scott).

Gen. *Parastephos*, G. O. Sars.

Remarks.—This genus was established in the year 1903 by the present author, to include a peculiar Copepod, of which at that time only a solitary male specimen was obtained. Subsequently Mr. Scott found also the female, and the perplexing characters distinguishing this sex fully prove the validity of the present genus. I have been fortunate enough to find a few female specimens off the Norwegian coast, and I am thus enabled to confirm the statements given by Scott about this sex.

3. *Parastephos pallidus*, G. O. Sars.

(Pl. III).

Parastephos pallidus, G. O. Sars, Account of the Crustacea of Norway, Vol. IV, p. 65, Pl. XLIV.

Specific Characters.—*Female.* Body very slender, with the two chief divisions sharply marked off from each other, the anterior one regularly oblong oval in form. Cephalic segment with a faint transverse suture behind the middle dorsally; front blunted, without any traces of rostral filaments. Last truncal segment completely fused with the preceding one, and having the lateral parts only slightly produced. Urosome very powerfully developed, equalling in length about $\frac{2}{3}$ of the anterior division, its 3 anterior segments expanded behind to elevated circular ridges densely clothed with delicate recurved spinules; genital segment scarcely at all protuberant below and, as usual, the largest, though not much exceeding in size the succeeding segment; anal segment well developed and of sub-cylindrical form; without any elevated ridge behind. Caudal rami scarcely longer than they are broad; apical setæ slightly divergent, the innermost but one on left ramus remarkably produced, being nearly twice as long as that on the right ramus. Anterior antennæ of the very same structure as in the male, and extending, when reflexed, to the end of the genital segment. Posterior antennæ and oral parts exactly as in the male. Natatory legs of quite normal structure and resembling those in the genus *Stephos*. Last pair of legs likewise built on the same type as in that genus, but of comparatively much larger size and pronouncedly asymmetrical, the left leg being considerably longer than the right; distal joint in both legs conically produced and armed outside with a row of 12—15 coarse denticles, the proximal of which is somewhat remote from the others and of larger size.

Body in the living animal semipellucid, of an uniform whitish grey colour, without any obvious pigmentation.

Length of adult female reaching to 2.20 mm.

Remarks.—Of this form, as above mentioned, only the male sex was formerly observed by me. The female, as usual, is of considerably larger size, and exhibits a most anomalous appearance by the powerful development and peculiar armature of the urosome. The last pair of leg are also remarkable by their comparatively large size, and more particularly by their conspicuous asymmetry, also observed by Scott. Another asymmetry, not mentioned by that author, is found in the extraordinary length of one of the caudal setæ on left side. On the other hand has the asymmetry described by the present

author in some of the natatory legs of the male specimen at first obtained proved to be quite accidental, as no such asymmetry was found in another male subsequently obtained.

Occurrence.—The originally described male specimen was taken at Skjerjehavn, outside the Sogn Fjord. I have subsequently obtained 3 additional specimens of this remarkable form, 2 adult females and one male. Of these the one female was taken at Kopervik, south west coast of Norway, the other female and the male specimen at Risør, the depth in both localities ranging from 50 to 100 fathoms.

Distribution.—Scottish coast (Scott).

Fam. Pseudocyclopiidæ.

Gen. Pseudocyclopia, Scott.

Remarks.—Only a single species of this genus, *P. stephoides* Thompson, has hitherto been recorded from the Norwegian coast. I am now enabled to add 2 other species, both described at an earlier date by British authors, and it is very probable that also the remaining 2 species, *P. minor* and *P. caudata* Scott, will on a further investigation be found to belong to the fauna of Norway.

4. *Pseudocyclopia Giesbrechti*, Wolfenden.

(Pl. IV, Pl. V, fig. 1).

Pseudocyclopia Giesbrechti, Wolfenden, Journal of the Marine Biological Association, Vol. VI, No. 3, p. 370, Pl. IV.

Specific Characters.—*Female.* Body rather short and stout, with the anterior division considerably vaulted above, and somewhat compressed, exhibiting in the dorsal aspect a narrow oblong form, with the greatest width scarcely attaining half the length. Cephalic segment very large and evenly curved in front; rostral prominence triangular, deflexed. Last truncal segment united with the preceding one and deeply emarginated behind in the middle, lateral parts obtusely rounded. Urosome about equalling in length $\frac{1}{3}$ of the anterior division; genital segment only slightly protuberant below and about the length of the 2 succeeding segments combined. Caudal rami short, being scarcely longer than they are broad, and somewhat obliquely truncated at the

end; apical setæ rather strong and partly exhibiting a dense annulation. Anterior antennæ only slightly exceeding half the length of the cephalic segment, and composed of 17 joints, the 1st of which, apparently formed by the junction of the 6 or 7 proximal joints, is very large, almost occupying half the length of the antenna. Posterior antennæ with the terminal part (inner ramus) comparatively shorter than in *P. stephoides*, though a little longer than the outer ramus; the latter 6-articulate, with the 2nd joint somewhat dilated, oval in form, and provided outside with 3 setæ, the 3 succeeding joints very small. Oral parts of the structure characteristic of the genus. Natatory legs likewise built on the same type as in the other species, though the rami appear somewhat more slender than in *P. stephoides* and more distinctly spinulose at the end of the joints, those of 4th pair being moreover densely covered with small prickles. Last pair of legs rather short and stout, with the last joint scarcely longer than the middle one and somewhat hand-shaped, terminating in 3 strong diverging digitiform spines of equal length, the outermost one distinctly defined at the base, whereas the other 2 form the immediate continuation of the joint; all 3 spines, as also partly the surface of the joint, coarsely spinulose.

Male, as usual, smaller than female and having the urosome more slender and distinctly 5-articulate. Antennæ, oral parts and natatory legs scarcely different from those parts in female. Last pair of legs, however, conspicuously transformed and very asymmetrical; right leg long and slender, terminating in a somewhat flexuous point; left leg much shorter, but with the 1st joint considerably tumefied, nearly globular in form, 2nd joint tapered distally and provided at the end with a well-marked rudiment of an appendicular ramus, 3rd joint very narrow and armed at the end with a slender movable claw, outside which are attached a bundle of 3 delicate and closely superposed lamellæ.

Colour of the living animal not yet ascertained.

Length of adult female reaching to 0.90 mm., that of male to 0.79 mm.

Remarks.—The present species was first described by Mr. Wolfenden from a solitary female specimen taken off the Shetland isles. Subsequently T. Scott found the same species also off the Scottish coast, and has given a figure with some details of a male specimen. It may easily be distinguished from *P. stephoides* by the comparatively shorter and stouter form of the body and more particularly by the structure of the last pair of legs in both sexes. As these appendages were somewhat damaged in the male specimen examined by Scott, the figure he gives of them has turned out to be rather imperfect. Moreover the right leg is described as the left, and vice versa.

Occurrence.—Several specimens of this form have been picked up from bottom-samples taken at Korshavn from a depth of about 60 fathoms muddy sand. It also occurs occasionally at Risør in about the same depth.

Distribution.—Shetland (Wolfenden), Scottish coast (Scott).

5. *Pseudocyclopia crassicornis*, Scott.

(Pl. V, fig. 2).

Pseudocyclopia crassicornis, T. Scott, Tenth Ann. Report of the Fishery Board for Scotland, Part III, p. 246, Pl. VII, figs. 15—29.

Specific Characters.—*Female*. Very like the preceding species, as to the general appearance of the body, but of much smaller size. Anterior antennæ comparatively shorter, scarcely exceeding half the length of the cephalic segment, and rather thick at the base, being composed of 16 joints, the 1st of which is very large, fully as long as the remaining part of the antenna, and, in addition to the usual short marginal setæ, provided with 3 comparatively large æsthetasks. Posterior antennæ with the penultimate joint (1st joint of the inner ramus) somewhat dilated in the middle, subfusiform in shape, outer ramus resembling in structure that of the preceding species and a little shorter than this joint. Oral parts and natatory legs of the usual structure. Last pair of legs with the middle joint very short, nearly circular in form; terminal joint much larger, occupying more than half the length of the leg, and armed at the somewhat obliquely truncated extremity with 3 slender spines, the innermost of which is much the longest and, like the middle one, not defined from the joint at the base. Spermatophore, attached to the genital segment, of unusually large size and curving upwards along the dorsal face of the urosome.

Male of still smaller size than female, and differing from it in a similar manner to that in the preceding species. Last pair of legs, however, of a somewhat simpler structure; the left leg having no trace of an appendicular ramus at the end of the 2nd joint, and only a single lamella outside the apical claw, which is rather small.

Colour in the living animal not yet ascertained.

Length of adult female scarcely exceeding 0.71 mm.; that of male 0.68 mm.

Remarks.—This form was described by T. Scott in the year 1892 as the type of his genus *Pseudocyclopia*. It is of much smaller size than the preceding species, and moreover easily distinguished by the shorter and thicker anterior antennæ and by the somewhat different structure of the last pair of legs in both sexes.

Occurrence.—I have found this form in the same localities and at about the same depth as the preceding species. At Risør only one or two specimens were obtained, whereas at Korshavn this form seems to be rather abundant in some places.

Distribution.—Scottish coast (Scott).

Fam. Platycopeidæ.

Gen. *Platycopeia*, G. O. Sars, 1911.

Generic Characters.—General form of body resembling that of *Pseudocyclopia*. Last trunkal segment, however, well defined from the preceding one, and urosome composed in both sexes of only 4 segments. Anterior antennæ short and stout, though composed of rather a great number of articulations, and only slightly differing in the two sexes. Posterior antennæ with the outer ramus much larger than the inner. Oral parts considerably deviating in structure from the usual Calanoid type. Anterior lip narrowly produced at the end. Mandibles with the masticatory part only slightly expanded, palp comparatively slender, with the outer ramus larger than the inner. Maxillæ with the masticatory lobe very coarsely built, palp comparatively less fully developed than in most other Calanoida. Anterior maxillipeds cyclopoid in structure, the outer joints being armed with stout unguiform spines. Posterior maxillipeds more resembling those in other Calanoids. 1st pair of legs rather unlike the succeeding ones, with both rami imperfectly developed and without true spines; the remaining pairs very strongly built, with the rami broad and flattened, the outer one the larger, and having 2 successive spines outside the 1st joint; natatory setæ for the most part converted to short flattened spines. Last pair of legs built on the very same type as the preceding ones; those of male having the outer ramus slightly transformed and alike on both legs.

Remarks.—This genus was established by the present author in the year 1911, to include a remarkable deep-water Calanoid, *P. perplexa*, the closer examination of which revealed a most perplexing mixture of characters tending on the one side to the genus *Pseudocyclopia*, on the other side to *Pseudocyclops*, though these 2 genera, according to the definition given by Giesbrecht, in reality belong to 2 very different sections of the Calanoida, the

first to the *Amphascandria*, the 2nd to the *Heterarthrandria*. I think that this primary division of the Calanoida proposed by Giesbrecht, and now generally accepted by carcinologists, may turn out to be a less natural one, and I am also now in doubt about the validity of the 3rd intermediate section, *Isokelandria*, added in my earlier account of the Calanoida (Vol. IV of the present work). Indeed, it seems to be very difficult to decide, to which of these 3 sections the present genus should be referred.¹⁾ Two nearly allied species of this remarkable genus will be described below.

6. *Platycopia perplexa*, G. O. Sars.

(Pl. VI, Pl. VII, fig. 1).

Platycopia perplexa, G. O. Sars, Archiv f. Mathem. & Naturvidenskab, Vol. XXXI, No. 7, p. 4, Pl. I & II.

Specific Characters.—*Female.* Body short and stout, with the anterior division greatly vaulted above and somewhat compressed, the greatest width not fully attaining the height and about equalling half the length. Cephalic segment very large, occupying nearly half the length of the whole body, and evenly curved in front; inferior edges somewhat bulging in their anterior part, rostral projection comparatively short and acutely pointed at the end. The 4 succeeding segments densely crowded and of about equal length, though diminishing somewhat both in height and width; last segment deeply emarginated behind in the middle and having the lateral lobes rounded at the end. Urosome scarcely exceeding in length $\frac{1}{3}$ of the anterior division and narrow cylindrical in shape; genital segment comparatively small and only slightly dilated; penultimate segment the longest and produced at the end dorsally to 2 juxtaposed lanceolate lappets superposing the anal segment and apparently replacing the usual anal opercle; last segment much smaller than any of the others. Caudal rami short, being only slightly longer than they are broad; seta of outer edge small and attached somewhat in front of the middle; apical setæ rather unequal in length, the innermost but one being, as usual, the

¹⁾ At this occasion I will mention another instance, which still more seems to debilitate the validity of Giesbrecht's arrangement. On a closer investigation of the Calanoida from the Monaco Expedition instituted in the latter years, I have to my great astonishment found, that in the male of *Bathycalanus Richardi* G. O. Sars, a form unquestionably nearly allied to *Megacalanus*, the right anterior antenna is very distinctly hinged. According to this character the genus *Bathycalanus* should of course, if the primary division proposed by Giesbrecht is accepted, not only be wholly removed from the family *Calanidæ* (in the restriction here adopted), but transferred to quite another section of the Calanoida, the *Heterarthrandria*, an arrangement which in reality would be absolutely unreasonable.

longest. Anterior antennæ scarcely exceeding half the length of the cephalic segment and gradually tapering distally, being composed of 23 well-defined joints, the 1st of which is much the largest, occupying in length about $\frac{1}{3}$ of the antenna, and provided anteriorly, at some distance from the end, with a peculiar strongly developed spiniform appendages curving outwards and terminating in a thin filament; the succeeding joints very short and clothed anteriorly with small bristles; terminal joint longer than the preceding ones and narrow linear in form. Posterior antennæ of an unusually compact structure, with the outer ramus much larger than the inner and 5-articulate, the first 2 joints considerably dilated. 1st pair of legs much smaller than the others, and having the basal part quite naked; both rami short, biarticulate, with the proximal joint small and unarmed, distal joint of outer ramus carrying 6, that of inner ramus 3 curved setæ. The 4 succeeding pairs of essentially equal structure and very coarsely built, though somewhat diminishing in size posteriorly; 2nd basal joint very large and obliquely truncated at the end, being provided outside near the end with a short spine, inside with a coarsely ciliated seta, which however is wanting on the last pair; both rami distinctly 3-articulate in all the pairs and rather unequal, the outer one being much the larger; number of spines and setæ slightly differing in the different pairs.

Male somewhat smaller than female, but very like it in the general outward appearance, though perhaps a little less robust. Anterior antennæ with the number of joints somewhat reduced, being only 16-articulate, and moreover differing in the much fuller development of the aesthetascs, the number of which is about 8. Last pair of legs with the outer ramus slightly transformed, being only composed of 2 joints, the distal one rather elongated and somewhat constricted in the middle, with the inner edge quite smooth, the outer armed with 2 rather distant spines, end of the joint transversely truncated and carrying a thin partly ciliated lamella flanked by 2 unequal spines, the outer one of normal appearance, the inner long, styliform and quite smooth.

Colour of the living animal not yet ascertained.

Length of adult female reaching 0.95 mm., that of male 0.83 mm.

Remarks.—This interesting Calanoid was described and figured by the present author in the above-quoted Journal as the type of a new genus and even of a new family. It is now redescribed and new improved figures given. The resemblance, as to the outward appearance, to the species of the genus *Pseudocyclopia* is rather striking, and may be accounted for as the result of

a convergent evolution caused by the adaptation to similar conditions of life. It is undoubtedly, like the species of the said genus, a true bottom-form.

Occurrence.—Some few specimens of this remarkable form were picked up from a bottom sample taken several years ago at Korshavn from a depth of about 60 fathoms, coarse muddy sand. I have not met with it in any other place of the Norwegian coast.

7. *Platycopia pygmæa*, G. O. Sars, n. sp.

(Pl. VII, fig. 2).

Specific Characters.—*Female.* General form of body resembling that of the preceding species, though comparatively less robust. Anterior division considerably compressed and, viewed dorsally narrow oblong in outline, with the greatest width scarcely exceeding $\frac{1}{3}$ of the length. Urosome very narrow and nearly attaining half the length of the anterior division. Caudal rami much more elongated than in the type species, being more than 3 times as long as they are broad; seta of outer edge attached near the base of the ramus. Antennæ, oral parts, and 1st pair of legs exhibiting a structure very similar to that in the type species. The 4 succeeding pairs of legs likewise built on the very same type, though differing in the imperfect segmentation of the inner ramus, its 2 outer joints being wholly coalesced in the 2nd pair and only slightly indicated in the 3 succeeding pairs.

Male differing from the female in a very similar manner to that found in the preceding species. Anterior antennæ, as in the male of *P. perplexa*, only composed of 16 joints, the outer 2 of which are rather elongated and narrow. Last pair of legs of a comparatively more compact structure than in the male of the preceding species, with both rami only composed of 2 joints, the outer one armed at the end of the broad, spatulate distal joint with 2 large, sabre-like spines, between which a thin hyaline lamella is attached.

Colour of the living animal not yet ascertained.

Length of adult female scarcely exceeding 0.60 mm.; that of male 0.52 mm.

Remarks.—The present form is nearly allied to the type species, but evidently specifically distinct, differing not only in its much inferior size, but also in some of the structural details, as pointed out in the above given diagnosis.

Occurrence.—Only 3 specimens of this form, one female and 2 males, have as yet come under my notice. They were found in a bottom-sample likewise taken at Korshavn, but from somewhat shallower water, viz., about 30 fathoms, muddy bottom.

Fam. Pseudocyclopidae.

Gen. Pseudocyclops, Brady.

Remarks.—Three species of this genus have as yet been recorded, one from the Mediterranean and 2 from the British coast. One of the latter, *P. obtusatus* Brady, is described in the 4th Volume of the present work, and I am now enabled to add to the fauna of Norway also the 2nd British species, to be described below.

8. *Pseudocyclops crassiremis*, Brady.

(Pl. VIII & IX).

Pseudocyclops crassiremis, Brady, Nat. Hist. Trans. Northumberland and Durham, Vol. IV, p. 431, Pl. XVII, figs. 1—8.

Specific Characters.—*Female.* Body rather robust, with the anterior division evenly vaulted above and somewhat compressed, seen dorsally, oblong oval in outline and nearly of equal width throughout. Cephalic segment very large, almost occupying half the length of the body, and obtusely rounded in front, exhibiting behind the middle a rather faintly marked transverse suture, inferior edges somewhat expanded in their anterior part. Rostrum very strong, deflexed, and acutely pointed at the tip. Last trunkal segment deeply emarginated behind in the middle and partly confluent with the preceding one, being only defined from it by a slight sinus of the inferior edges; lateral lobes broadly rounded at the end. Urosome not nearly attaining half the length of the anterior division; genital segment somewhat larger than the succeeding segment and slightly protuberant below; anal segment very small. Caudal rami scarcely longer than they are broad, and somewhat obliquely truncated at the end; apical setæ of moderate length. Anterior antennæ about half the length of the cephalic segment, and composed of 17 joints rather densely clothed with comparatively short curved setæ; 1st joint much the largest and rather broad, carrying, in addition to the setæ, 3 slender æsthetascs. Posterior antennæ and oral parts of essentially same structure as in *P. obtusatus*. Legs likewise rather similar; last pair, however, differing in the shorter and stouter form of the inner ramus, the joints of which, moreover, are almost wholly coalesced.

Male somewhat smaller than female and easily recognisable by the more slender and distinctly 5-articulate urosome. Rostrum, as in the male of

P. obtusatus, sharply defined at the base, and somewhat smaller than in female. Right anterior antenna conspicuously hinged, with the middle joints rather tumefied, terminal movable part only composed of 3 joints, the 1st of which is produced at the end anteriorly to a slender spiniform process. Last pair of legs exceedingly strong and massive, being built on a similar type to that in the male *P. obtusatus*, though exhibiting some minor differences, as seen from the figure here given.

Body in the living animal highly pellucid and nearly colourless; eye very conspicuous and of a light red colour.

Length of adult female amounting to 0.86 mm., that of male to 0.80 mm.

Remarks.—This form was first described by Prof. Brady in the above quoted journal, and was subsequently briefly recorded by the same author in his well-known Monograph of British Copepoda. It is nearly allied to *P. obtusatus*, but of somewhat larger size and more robust form of body, differing moreover in some of the anatomical details, as pointed out in the above diagnosis.

Occurrence.—I have only met with this form in a single locality of the Norwegian coast, viz., at Korshavn, where some few specimens were taken from a depth of about 30 fathoms, muddy bottom.

Distribution.—British Isles (Brady).

Fam. Acartiidæ.

Gen. *Paracartia*, Scott, 1894.

Generic Characters.—General appearance somewhat resembling that of *Acartia*; sexual differences, however, much more conspicuously marked. Last trunkal segment in both sexes wholly coalesced with the preceding segment, and in female expanded on each side to a broad wing-like lappet; in male simple, not expanded. Urosome in female short, and composed of only 3 segments, the 1st of which (the genital segment) is much the largest and lamellarly expanded laterally; caudal rami broad, with one of the apical setæ converted to a strong spine. Urosome of male slender and composed of 4 well-defined segments, the 1st of which is rather small; none of the caudal

setæ spiniform. Front in both sexes provided with 2 slender recurved filaments. Anterior antennæ in female resembling in structure those in *Acartia*; right antenna in male conspicuously transformed and strongly hinged. Posterior antennæ, oral parts, and natatory legs nearly as in *Acartia*. Last pair of legs in female comparatively large and confluent at the base, terminal joint claw-like; those in male powerfully developed and very asymmetrical; right leg much the larger and terminating in a slender incurved claw. Spermatophore affixed to the genital segment of the female, accompanied by a thin plate folding upwards on each side of the segment.

Remarks.—The name *Paracartia* was proposed in 1894 by Scott merely to designate a sub-genus of *Acartia*. I think, however, that the differences are great enough to warrant this sub-genus to be raised to a true genus associated with *Acartia* in the family *Acartiidae*, as defined by the present author (see Vol. IV, p. 147). Scott records 2 supposed species of this genus, both found together in a plankton-sample taken in the bay of Guinea; but, as suggested by Giesbrecht, there can be no doubt that *P. spinicaudata* is the female and *P. dubia* the male of one and the same species, to which the latter name has been assigned by Giesbrecht. The *Acartia latisetosa* of Kriczagin (= *A. verrucosa* Thompson) is apparently referable to the present genus, though differing in some particulars conspicuously from the species observed by Scott. On the other hand, is the Norwegian form described below very closely allied to that species.

9. *Paracartia Grani*, G. O. Sars.

(Pl. X & XI).

Paracartia Grani. G. O. Sars, Bergens Museums Aarbog 1904, No. 4, p. 3, Pl. I—IV.

Specific Characters.—*Female*. Body comparatively slender, with the anterior division gradually narrowed in front. Wing-like expansions of last trunkal segment very large, triangular, each terminating in an acute point. Urosome scarcely exceeding in length $\frac{1}{4}$ of the anterior division, and somewhat constricted in the middle; genital segment fully twice as broad as it is long, forming on each side a lamellar expansion obliquely truncated at the end. Caudal rami conspicuously asymmetrical, the right ramus being considerably broader than the left; marginal setæ comparatively short, 2 of them attached to the outer edge; middle apical seta on both rami spiniform, that on right ramus much stronger than that on left. Anterior antennæ not fully attaining the length of the anterior division of the body, and apparently composed of 17 or 18 joints, some of the proximal ones being however less distinctly

defined. Last pair of legs comparatively strongly built, with the proximal parts completely coalesced in the middle, terminal parts claw-like and coarsely denticulated in their outer part, that on right side conspicuously larger than that on left side.

Male of somewhat smaller size than female and very unlike it in its outward appearance. Anterior division regularly oblong oval in outline, with the last segment quite simple, without any lateral expansions. Urosome much more slender and narrow, cylindrical in form, with the 2nd segment the largest. Caudal rami comparatively small and quite symmetrical, marginal setæ quite normally developed, none of them being spiniform. Right anterior antenna very strongly hinged and somewhat resembling in structure that in male *Pontellidæ*; proximal part of the middle section considerably tumefied and composed of 4 firmly connected joints, distal part of that section formed by a single elongated and highly chitinised joint movably articulated both with the proximal part and with the succeeding terminal section; the latter composed of 4 joints, the 1st of which is the largest and armed in front with a long, dark-coloured claw-like spine. Last pair of legs powerfully developed and very asymmetrical, the right leg being more than twice as long as the left and exhibiting inside 2 differently shaped lappets, apical claw very slender and abruptly curved inwards; left leg provided at the end with 2 peculiar appendages, the outer one somewhat lamellar and densely ciliated outside, the inner terminating in a styliiform point.

Colour of the living animal not yet ascertained.

Length of adult female only slightly exceeding 1 mm.; that of male about the same.

Remarks.—This form has been fully described and figured by the present author in the above-quoted journal, and its close relationship to the tropical species recorded by Scott pointed out. Indeed, after having had the opportunity of examining some specimens of the latter species kindly sent to me from Scott, I am now much inclined to regard it as merely a somewhat depauperated form of that species left behind from a far remote period, in which a considerably warmer climate and a more southern fauna prevailed in our country.

Occurrence.—The present interesting form was found by Prof. H. Gran very abundantly in an oyster-bed (Espevigpollen) located at Tysnes, south of Bergen. It also occurred, though more sparingly, in another neighbouring bed (Seløpollen). In both these beds the water holds during the summer a very high and uniform temperature amounting to no less than $+ 30^{\circ}$ C., and also

in winter the temperature is comparatively high (up to $+10^{\circ}$ C.). It is evident, that by this exceptional temperature, in connection perhaps with the chemical constitution of the water, quite particular conditions of life are created, which may have favoured the continued existence of the present southern form in the above mentioned isolated basins.

Harpacticoida.

Fam. Longipediidæ.

Gen. *Sunaristes*, Hesse.

10. *Sunaristes paguri*, Hesse.

(Pl. XII).

See Vol. V, p. 15, Pl. VI & VII.

Specific Characters.—*Male.* Body still more slender than in female, with no sharp demarcation between the two chief divisions, the posterior segments of the trunk being scarcely wider than those of the urosome and of simple cylindrical form, without any distinct epimeral plates. Urosome composed of 5 well defined segments, the 1st of which (the genital segment) is only slightly larger than the succeeding one, and somewhat protuberant at the end below; last segment, as in the female, much smaller than the others. Caudal rami of same appearance as in the female. Anterior antennæ very strongly built, and pronouncedly subcheliform, each terminating in a powerfully developed hand, with a well-marked projecting angle in front defining the palmar edge, against which the clawshaped terminal joint, or dactylus, admits of being impinged. Posterior antennæ and oral parts exactly as in the female. Natatory legs likewise very similar, with the exception of the 2nd pair, the inner ramus of which is conspicuously transformed, its 1st joint being produced at the end outside to a very strong mucroniform process extending beyond the middle of the terminal joint. Last pair of legs still more rudimentary than in female, all the setæ arising immediately from the corresponding segment, without any intervening lamella. Genital lobes closely approximate and of obtusely triangular form, each carrying outside near the end a slender seta.

Length of the specimen examined 2.15 mm.

Remarks.—Of this peculiar Copepod only the female sex was described in Vol. V. I now add the above short diagnosis of the male, and on Pl. XII

give figures of the whole animal in dorsal and lateral aspects, and of some of the appendages more highly magnified.

Occurrence.—The male specimen here described was kindly sent to me from Dr. Jules Richard. I have myself not met with this Copepod since I observed the solitary female specimen described in Vol. V and taken at Hvalør, outside the Christiania Fjord.

Fam. Cerviniidæ.

Gen. *Cerviniopsis*, G. O. Sars.

11. *Cerviniopsis clavicornis*, G. O. Sars.

(Pl. XIII, fig. 1).

Cfr. Vol. V, p. 22, Pl. XII, Pl. XIII, fig. 1.

Specific Characters.—*Male.* General form of body closely resembling that of female. Rostral plate, however, comparatively larger and more prominent, and the 2 anterior caudal segment more sharply marked off from each other. Anterior antennæ only slightly transformed, and scarcely at all prehensile, being apparently composed of 8 joints, the outer 4 of which, however, are less perfectly defined and together form a thinner terminal part bent backwards at an angle to the proximal part; 2nd, 3rd, 4th and 6th joints each with a well-developed æsthetask; last joint very small and armed at the tip with a minute claw-like spine accompanied by some unequal setæ. Posterior antennæ, oral parts, and natatory legs exactly as in the female. Last pair of legs, however, conspicuously transformed, each leg being composed of 3 well-defined joints, the 1st of which, as in female, is quite short and produced outside to a digitiform process carrying a slender seta; middle joint armed at the end outside with a slender spine and about of same size as the terminal one, which carries 5 spines, one outside, 2 inside and 2 on the tip. Genital lobes rather remote, the one from the other, and of very small size, knob-like, each lobe carrying on the tip 2 slender setæ.

Length of the specimen examined 1.13 mm.

Remarks.—Of this form also only the female sex has been described in Vol. V. The male, of which I now am enabled to give a diagnosis, is so very like the female in its outward appearance, that it easily may escape

attention. It is however of somewhat inferior size and moreover, on a closer examination, exhibits some well-marked sexual differences, especially as regards the structure of the anterior antennæ and the last pair of legs. The imperfect prehensile nature of the former appendages is very remarkable.

Occurrence.—The present peculiar Copepod was formerly only known from the Lofoten islands. I have in the latter years taken it rather abundantly at Risør, South coast of Norway, in depths ranging from 60 to 100 fathoms, muddy bottom. Among the numerous specimens collected only very few males were detected.

Gen. **Zosime**, Boeck.

Remarks.—Two well defined species of this genus, *Z. typica* Boeck and *Z. incrassata* G. O. Sars, have been described in Vol. V. In the present Volume 2 other species are added, both of which are closely allied to the typical one, though apparently distinct.

12. **Zosime major**, G. O. Sars, n. sp.

(Pl. XIII, fig. 2).

Specific Characters.—*Female.* Very like *Z. typica* in its outward appearance, but of considerably larger size and comparatively more slender form of body. Anterior segments of urosome, as in that species, expanded laterally to triangular recurved lamellæ finely spinulose at the edges; penultimate segment simple, cylindrical in form, and armed along the hind edge dorsally with a dense and regular row of rather coarse denticles. Caudal rami rather produced, being fully 3 times as long as they are broad, and somewhat constricted at the base; anterior half of the outer edge finely spinulose, seta of same edge of moderate size and attached near the end of the ramus; apical setæ only 3 in number on each ramus, that usually attached to the outer corner being wholly absent; innermost seta comparatively small, the other 2 rather strong and clothed in their outer part with small prickles instead of the usual cilia. Antennæ, oral parts, and natatory legs of a structure very similar to that in the type species. Last pair of legs, however, differing in the much larger size of the inner expansion of the proximal joint, which is broadly rounded at the end and provided with 4 strong marginal setæ; distal joint comparatively small, but well defined at the base.

Colour whitish grey.

Length of adult female amounting to 0.70 mm.

Remarks.—The present species is closely allied to the typical one, but of considerably larger size and somewhat more slender form of body, differing moreover conspicuously in the more produced caudal rami and in the structure of the last pair of legs. It is very probable, that the form recorded by British authors as *Z. typica* Boeck is more properly referable to the present species.

Occurrence.—I have met with this form occasionally in 2 different localities on the southern coast of Norway, viz., at Korshavn and Risør. It occurred in both places together with the typical species in depths ranging from 20 to 50 fathoms, muddy bottom. Only female specimens have as yet come under my notice.

Distribution.—? British Isles (Brady & Scott).

13. *Zosime valida*, G. O. Sars, n. sp.

(Pl. XIV).

Specific Characters.—*Female.* Body of a more robust and compact form than in the preceding species, with the 2 chief divisions less sharply marked of from each other and nearly of equal length. Rostral plate rather prominent and sub-triangular in form, tip narrowly truncated and carrying the 2 usual sensory hairs. Lateral lobes of the anterior caudal segments far less prominent than in the preceding species; penultimate segment, as in that species, armed along the hind edge dorsally with a row of denticles, which however are much stronger and of a somewhat flattened form. Caudal rami comparatively broad, sub-lamellar, the greatest width considerably exceeding half the length; seta of outer edge remarkably strong and attached to a sharply defined ledge somewhat remote from the end; apical setæ present in the usual number, that of the outer corner longer than that of the inner; the 2 middle setæ well developed and of quite normal appearance. Anterior antennæ apparently composed of 7 joints densely clothed with setæ, most of which are coarsely ciliated. Posterior antennæ, oral parts, and natatory legs exhibiting the structure characteristic of the genus. Last pair of legs with the distal joint wholly confluent with the proximal one; inner expansion of the latter comparatively small, and only provided with 2 slender setæ, both issuing from the narrowly truncated tip.

Colour whitish grey.

Length of the specimen examined 0.70 mm.

Remarks.—This form also is closely allied to the type species, though easily distinguishable both from it and from the preceding species by the comparatively more compact form of the body, and more particularly by the structure of the caudal rami and of the last pair of legs.

Occurrence.—Only a solitary female specimen of this form has hitherto come under my notice. It was taken last summer at Hvalør, outside the Christiania Fjord, from a depth of about 20 fathoms, muddy bottom.

Fam. Ectinosomidæ.

Gen. *Ectinosoma*, Boeck.

Remarks.—This genus seems to be exceedingly rich in species. To the 13 species described in Vol. V I am now enabled to add 8 more, the number of Norwegian species thus arising to no less than 21 in all. The determination of these species is, however, in some cases not easy on account of the rather uniform outward appearance of the body, and the anatomical examination is moreover rendered rather difficult by the glossy and tough integuments and by the smallness and fragility of some of the appendages. The most reliable distinguishing character is derived from the structure of the last pair of legs, which is perfectly constant and in nearly every case exhibits some peculiarity characteristic of the species.

14. *Ectinosoma proximum*, G. O. Sars, n. sp.

(Pl. XV, fig. 1).

Specific Characters.—*Female.* Very like *E. neglectum* G. O. Sars, as to the general form of the body, but of somewhat smaller size. Rostral plate slightly prominent and, as seen dorsally, obtusely truncated at the end. Urosome somewhat shorter than the anterior division and gradually tapered behind; anal segment scarcely more than half as long as the preceding segment and deeply incised behind in the middle. Caudal rami somewhat divergent, and almost twice as long as they are broad at the base; apical setæ of moderate length. Anterior antennæ comparatively rather short and stout, being apparently only composed of 5 joints densely clothed with strong curved setæ. Posterior antennæ, oral parts, and natatory legs exhibiting a structure very similar to

that in *E. neglectum*. Last pair of legs, however, differing conspicuously in the shape of the distal joint, the outermost lobe of which is narrow digitiform and defined from the remaining part of the joint by a deep and narrow incision extending almost to the base of the joint; inner expansion of proximal joint comparatively shorter than in *E. neglectum*, extending scarcely beyond the middle of the distal one; marginal setæ of both joints coarsely ciliated and rather unequal in length, that issuing from the middle lobe of the distal joint being the longest and extending about to the end of the genital segment.

Colour of the living animal not yet ascertained.

Length of adult female scarcely exceeding 1 mm.

Remarks.—The outward appearance of the present form looks so very like that of *E. neglectum* G. O. Sars, that at first I was inclined to regard it as merely an accidental variety of that species. Having however subsequently obtained several specimens of this form from widely distant localities, and in all of them found the very same characteristic structure of the last pair of legs, I am now of opinion that it more properly ought to be regarded as specifically distinct.

Occurrence.—I have found this form in 2 widely distant localities on the Norwegian coast, viz., at Bejan, outside the Trondhjem Fjord, and at Risør, in depths ranging from 20 to 50 fathoms. All the specimens obtained were of the female sex.

15. *Ectinosoma angulifrons*, G. O. Sars, n. sp.

(Pl. XV, fig. 2).

Specific Characters.—*Female.* Body comparatively slender, with the anterior division only slightly dilated. Rostral plate not much prominent and, as seen from above, terminating in an acute angle. Urosome much shorter than the anterior division and only slightly tapered behind; anal segment scarcely exceeding half the length of the preceding segment, and slightly incised behind in the middle. Caudal rami small, about as long as they are broad, and somewhat divergent; apical setæ of moderate length. Anterior antennæ resembling in structure those in the preceding species, though comparatively a little more slender. 1st pair of legs with the inner ramus, as usual, much larger than the outer, which scarcely extends beyond the middle joint of the former. Last pair of legs resembling in structure those in *E. propinquum* Scott, the distal joint being subquadrangular in form and somewhat unequally trilobed at the end; inner expansion extending beyond the middle

Copepoda

Supl. Volume

Phaënnidæ

Pl. I



G. O. Sars, del.

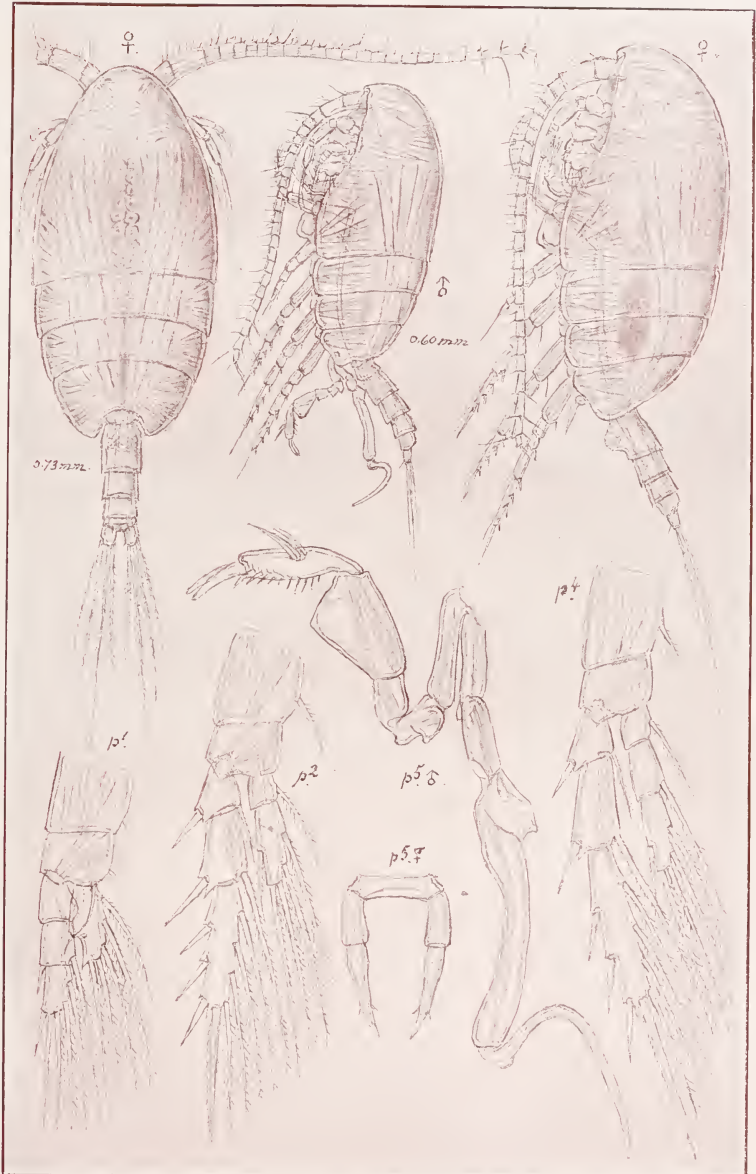
Xanthocalanus minor, Giesbrecht.

Copepoda

Suppl. Volume

Stephidæ

Pl. II



G. O. Sars, del.

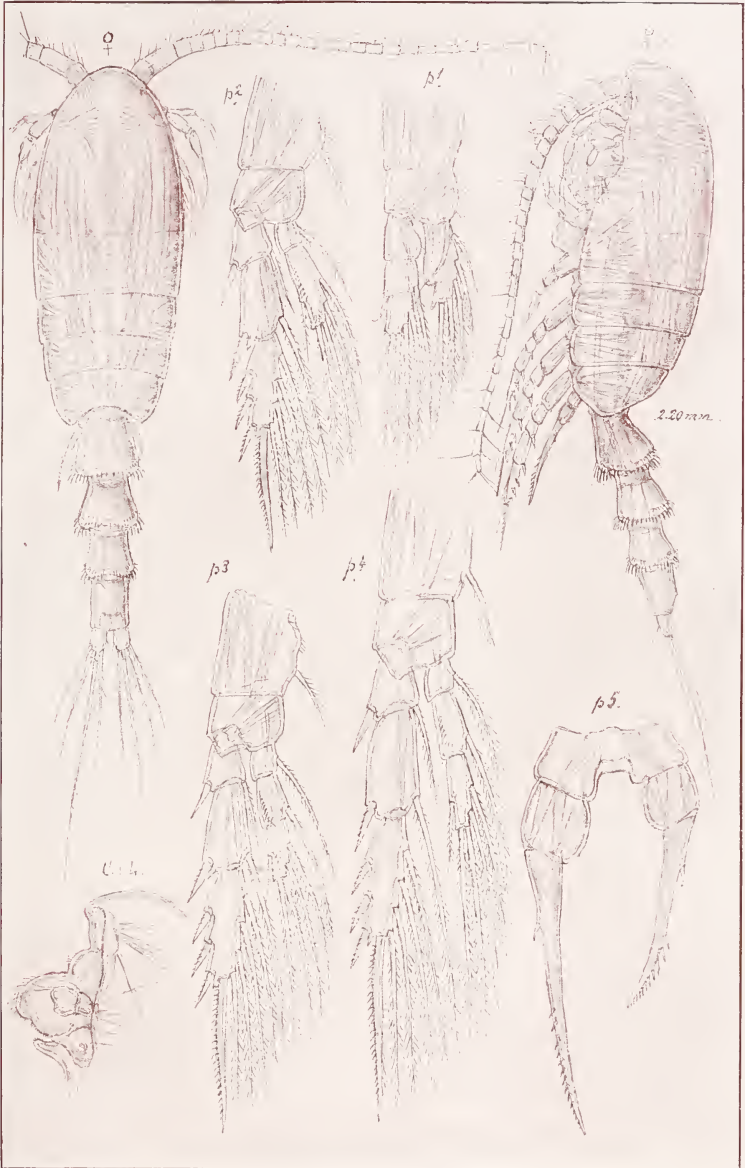
Stephos minor, Scott

Copepoda

Suppl. Volume

Stephidæ

Pl. III



G. O. Sars, del.

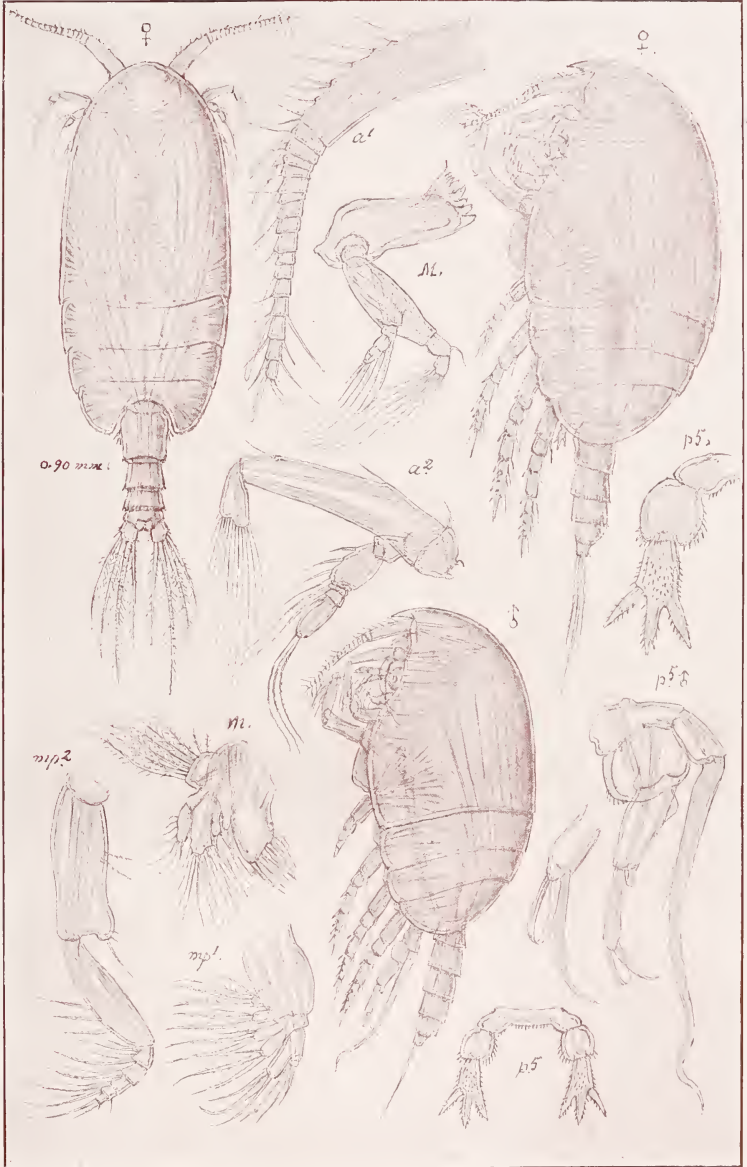
Parastephos pallidus, G. O. Sars

Copepoda

Pseudocyclopiidæ

Suppl. Volume

Pl. IV



G. O. Sars, del.

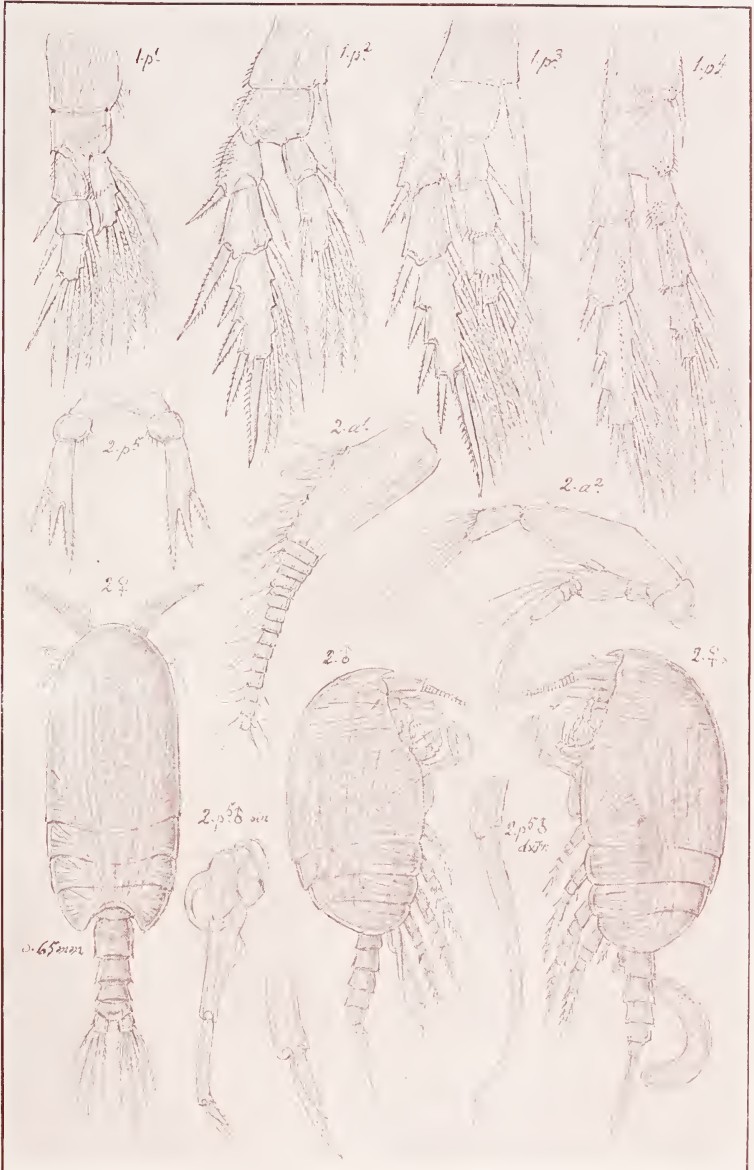
Pseudocyclopia Giesbrechti, Wlfend.

Copepoda

Pseudocyclopiidæ

Suppl. Volume

Pl. V



G. O. Sars, del.

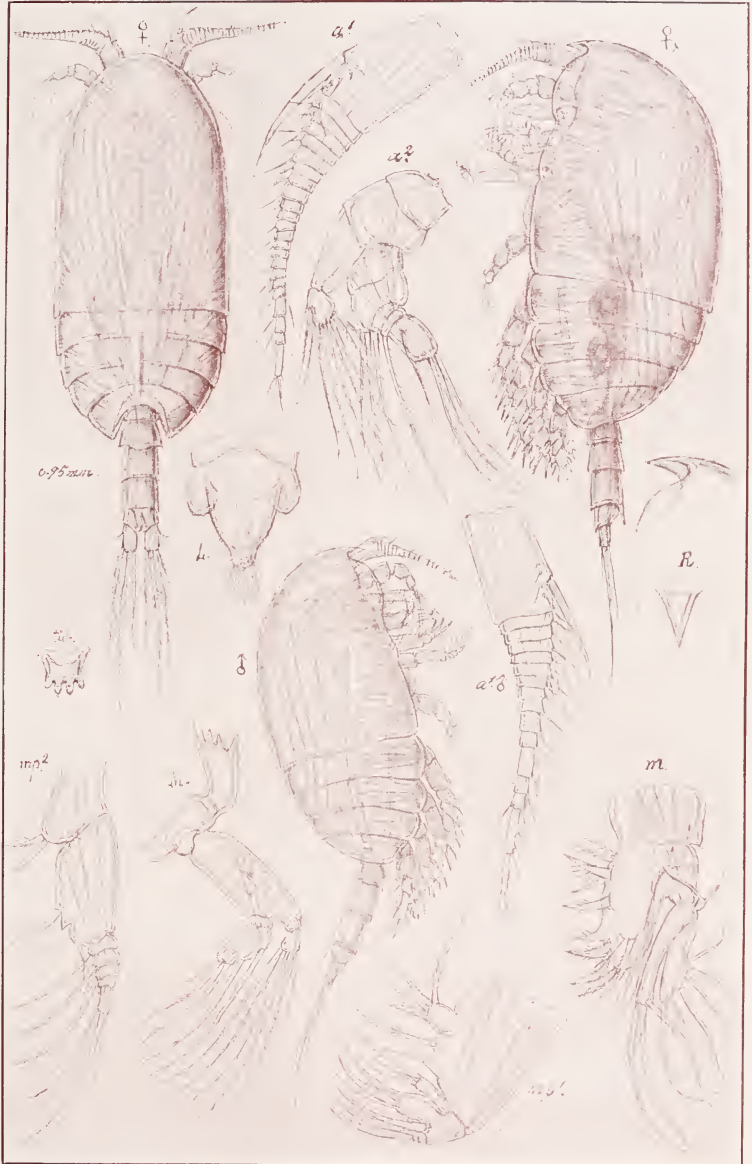
1. *Pseudocyclopia Giesbrechti*, Wifend.
(continued)
2. *Pseudocyclopia crassicornis*, Scott

Copepoda

Suppl. Volume

Platycopiidæ

Pl. VI



G. O. Sars, del.

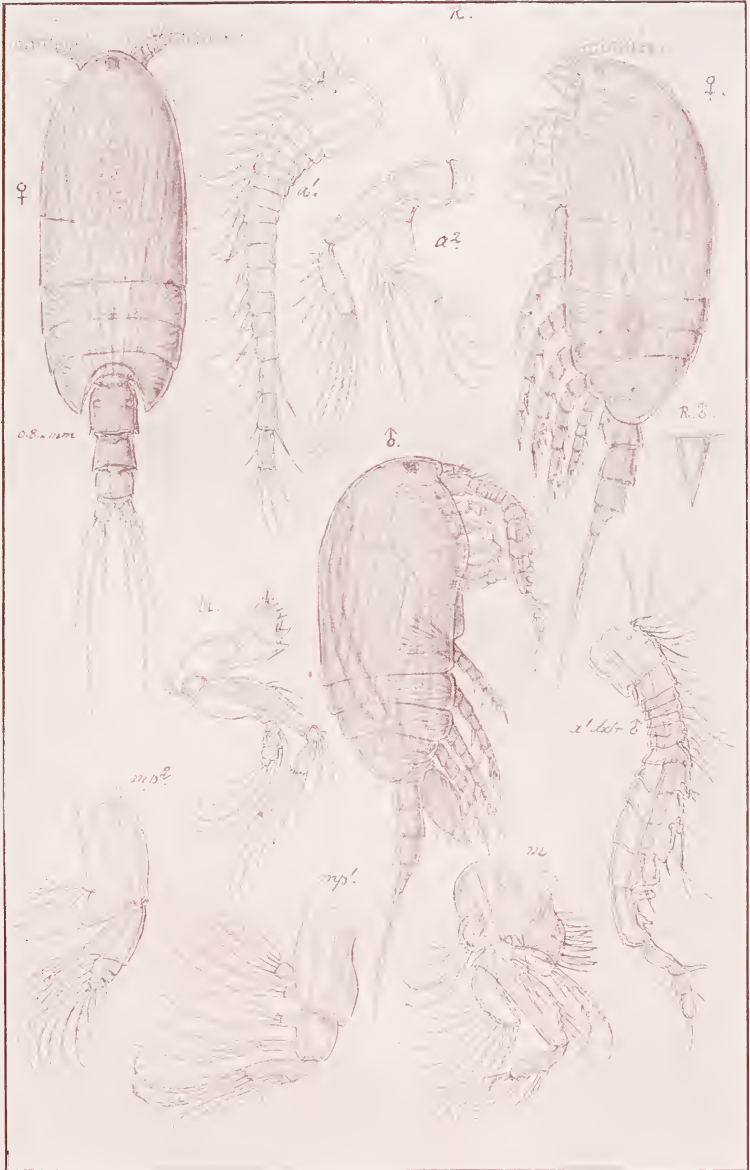
Platycopia perplexa, G. O. Sars

Copepoda

Suppl. Volume

Pseudocyclopidae

Pl. VIII



G. O. Sars, del.

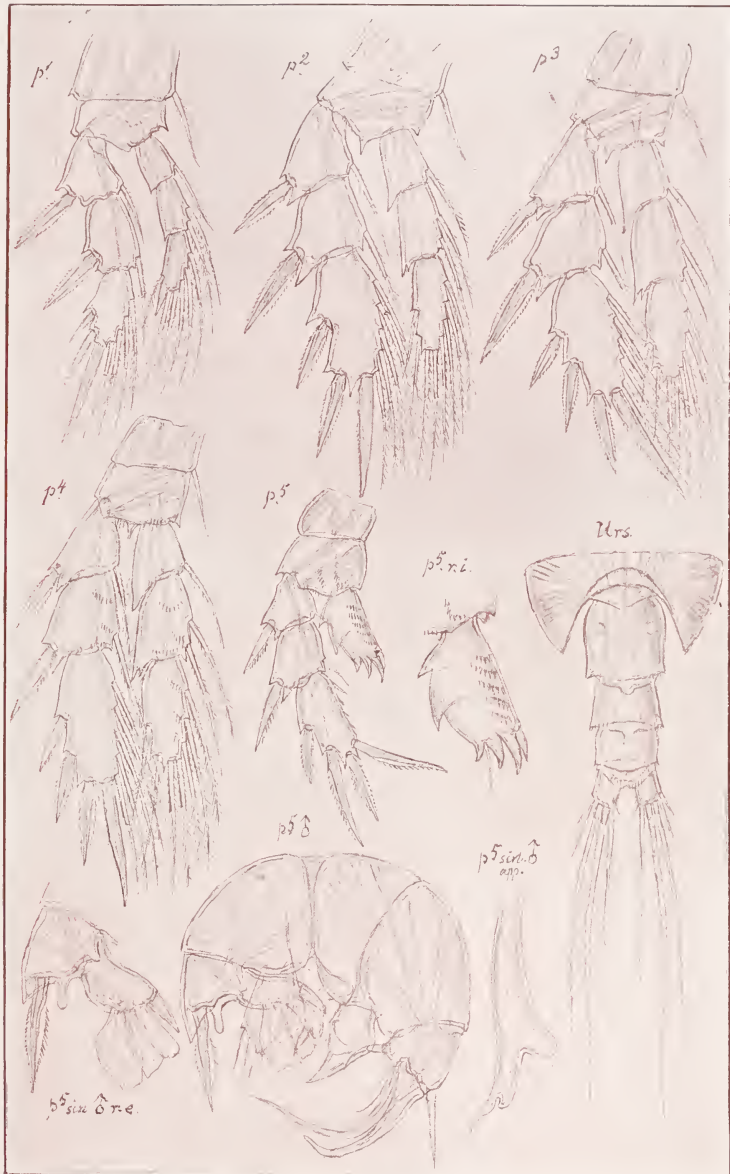
Pseudocyclops crassiremis, Brady

Copepoda

Suppl. Volume

Pseudocyclopidae

Pl. IX



G. O. Sars, del.

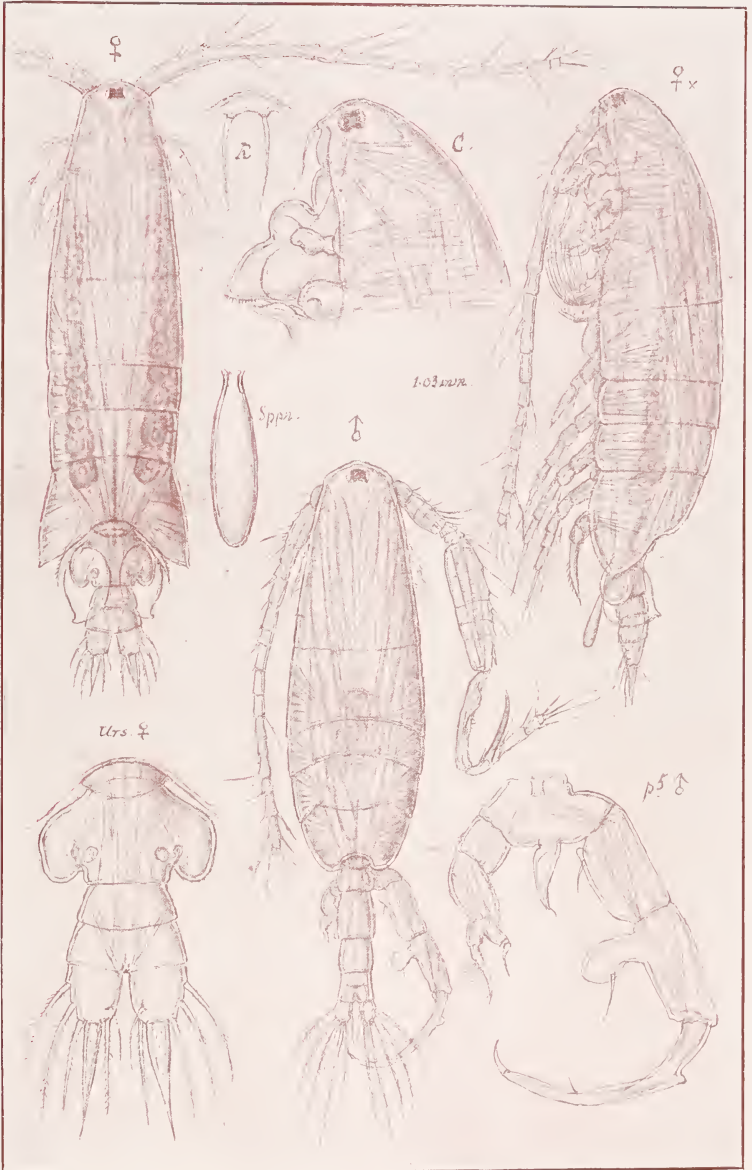
Pseudocyclops crassiremis Brady,
(continued)

Copepoda

Suppl. Volume

Acartiidae

Pl. X



G. O. Sars, del.

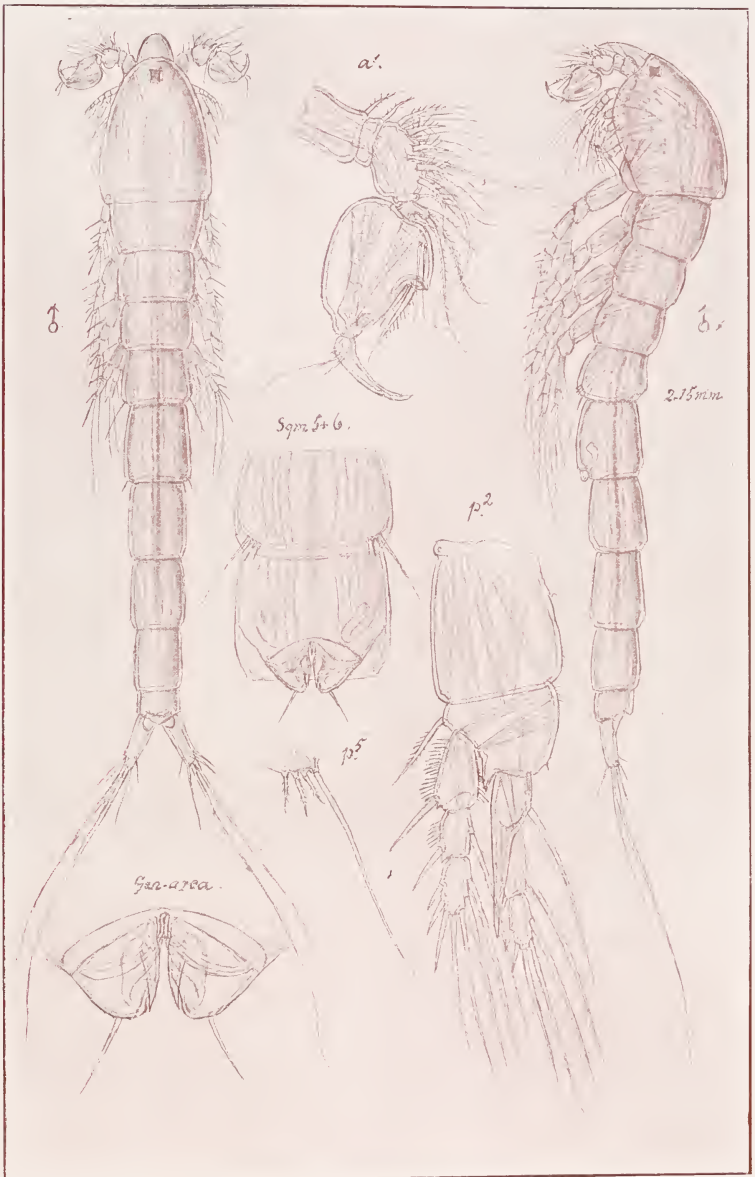
Paracartia Grani, G. O. Sars

Copepoda

Suppl. Volume

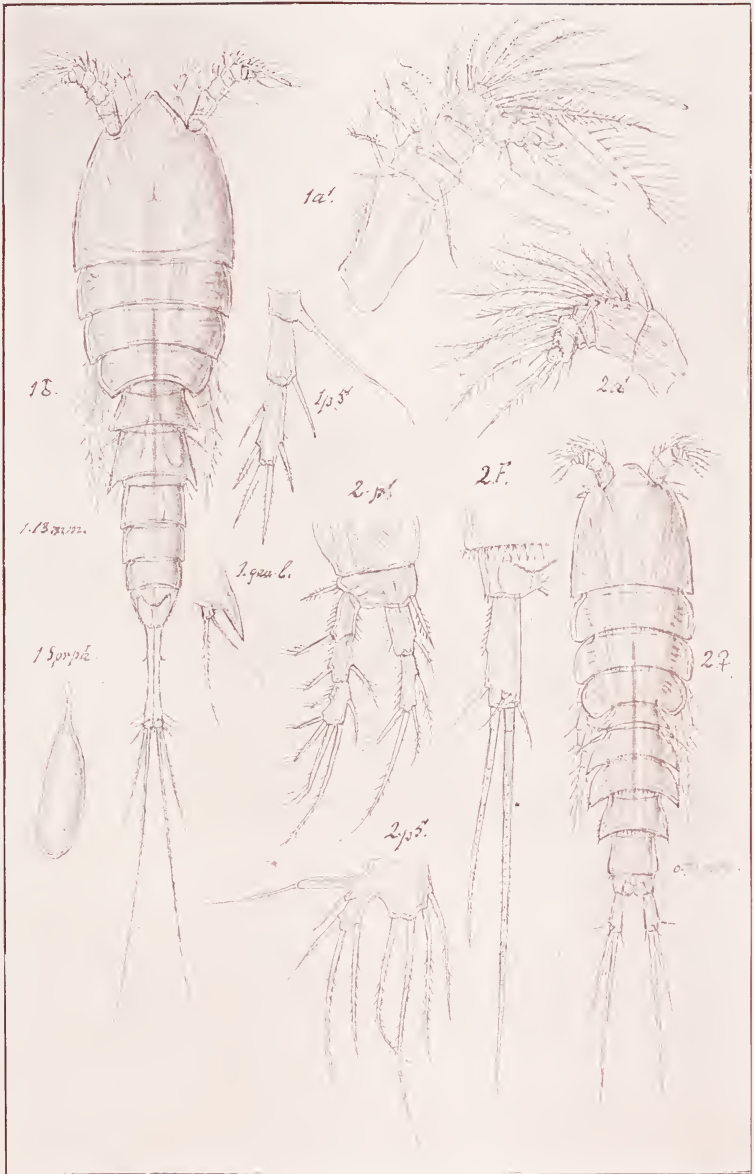
Långpediidæ

Pl. XII



G. O. Sars, del.

Sunaristes paguri, Hesse
(male)



G. O. Sars, del.

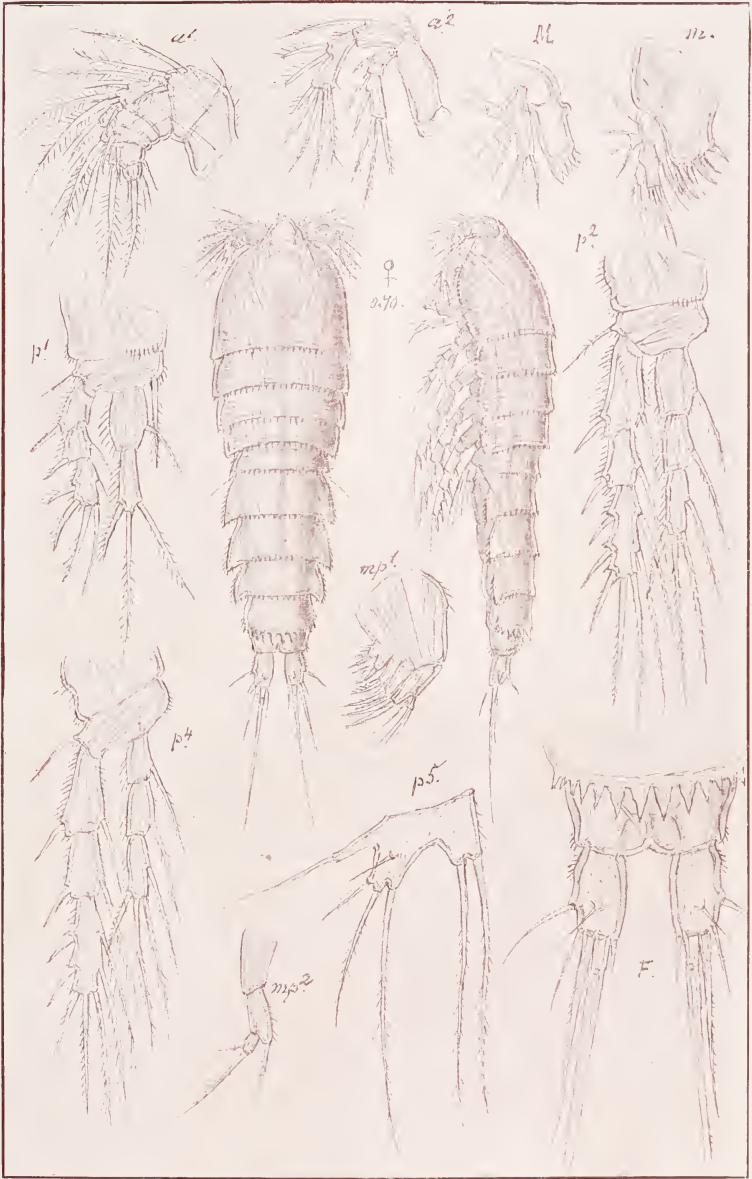
1. *Cerviniopsis clavicornis*, G. O. Sars (male)
2. *Zosime major*, G. O. Sars

Copepoda

Suppl. Volume

Cerviniidæ

Pl. XIV



G. O. Sars, del.

Zosime valida, G. O. Sars

Copepoda

Ectinosomidæ

Suppl. Volume

Pl. XV



G. O. Sars, del.

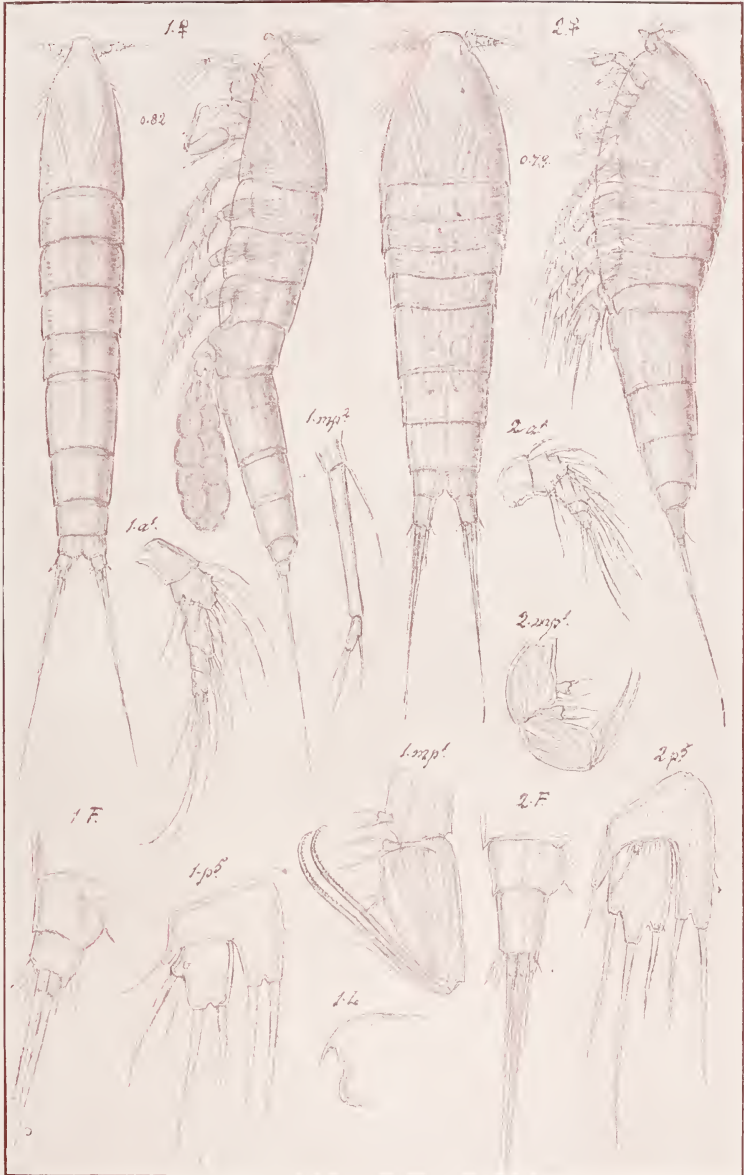
1. *Ectinosoma proximum*, G. O. Sars
2. " *angulifrons*, G. O. Sars

Copepoda

Ectinosomidæ

Suppl. Volume

Pl. XVI



G. O. Sars, del.

1. *Ectinosoma tenerum*, G. O. Sars
2. " *clavatum*, G. O. Sars