

AN ACCOUNT
OF THE
CRUSTACEA
OF
NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY
G. O. SARS

VOL. V
COPEPODA
HARPACTICOIDA

PARTS I & II
MISOPHRIIDÆ, LONGIPEDIIDÆ, CERVINIIDÆ, ECTINOSOMIDÆ
(PART)

WITH 16 AUTOGRAPHIC PLATES



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INTRODUCTION.

Of all the groups of the Copepoda, that of the *Harpacticoida* is undoubtedly the most extensive, and at the same time the most difficult to examine, on account of the generally very small size of the forms comprised within it, some of them being indeed almost undistinguishable to the naked eye. The most prominent character whereby the present group is distinguished from that of the *Calanoida* is, as clearly shown by Dr. Giesbrecht, the very movable articulation of the last segment of the metasome with the preceding segment, and its firm connection with the 1st segment of the urosome, giving it the appearance of more properly belonging to that section of the body. Thus far this group perfectly agrees with that of the *Cyclopoida*, and indeed Dr. Giesbrecht comprised both in his division *Podoplea*. I find it, however, more appropriate to keep these 2 groups apart, as in other respects they differ from each other rather materially. By most authors, the group here in question is regarded only as a family, *Harpacticidæ*; and the numerous genera comprised within it have of course been arranged under a series of subfamilies. In accordance with the arrangement adopted by the present author, as regards the *Calanoida*, these subfamilies are here recorded as true families, and their number has been considerably augmented. Moreover an attempt has been done to group these families under a few sections, as will be shown farther on.

The type of the present group is the genus from which its name is derived, viz., *Harpacticus* Milne-Edwards; and indeed this genus seems to combine some of the most characteristic features of the group, and in all probability constitutes a very primitive form. The difference, both as regards the external appearance and the structural details, between this genus and those of the *Calanoid* and *Cyclopoid* groups is very conspicuous; yet we find many deviations from this type, tending partly towards that of the *Calanoida*, partly towards that of the *Cyclopoida*, and in most cases a very gradual change in one or other direction may be easily demonstrated.

As regards the general shape of the body, in the greater number of the forms it is very slender and more or less cylindrical, with no very pronounced demarcation between the anterior and posterior divisions. In some cases, however, the posterior division, including the last segment of the metasome, appears abruptly much narrower than the anterior, which may be more or less expanded, as in the *Cyclopoida*, for instance, in the genera *Misophria*, *Pseudotachidius*, *Idya*, etc. In some forms both the anterior and posterior divisions appear greatly expanded, whereby the body acquires a pronouncedly depressed, even leaf-like form, as in the genera *Zaus*, *Peltidium*, *Porcellidium*. In other cases, quite contrary to this, the body is found to be highly compressed, for instance in the genus *Amymone*.

The cephalosome is generally coalesced with the 1st segment of the metasome, though in some few forms a well-marked demarcation between them may be found to exist. The lateral parts of this section are more or less expanded, being so deep in some forms, e. g. the genus *Longipedia*, that they wholly include between them the oral appendages. It projects in front in a more or less distinct, generally lamellar rostrum, which in most cases is movably connected with the cephalic shield. The 3 succeeding segments of the metasome are always well defined, and are provided with more or less distinct epimeral plates. The last segment of the metasome, as stated above, has always a very movable articulation with the preceding segment, whereas it is firmly connected with the 1st segment of the urosome. Its epimeral plates are generally obsolete, or at any rate much smaller than on the preceding segments. The urosome is composed of 5 segments, the first 2 of which, however, in the female are more or less completely coalesced, though in some forms a distinct suture between them is seen dorsally. In the male these 2 segments are always distinctly separated, and the 1st of them projects at the end, on each side of the ventral face, to a small setiferous process. The caudal rami are in most cases short, and firmly connected with the last caudal segment. Of the apical setæ, as a rule, only the 2 middle ones are well developed, the others being more or less rudimentary. A single eye is generally present, though in some forms, especially in those from deep water, no trace of such an organ is to be found.

The anterior antennæ are, as a rule, of inferior size and composed of a limited number of articulations, rarely (as in the genus *Misophria*) exceeding 8 in all. One of the articulations, generally the 3rd or 4th, exhibits at the end anteriorly a projecting knob, to which a slender sensory appendage is attached, and the succeeding portion of the antenna is generally abruptly narrowed, forming a well-defined terminal part. In the male both these antennæ are prehensile, and often greatly swollen in their outer part. The

posterior antennæ are on the whole more strongly built than in the *Calanoida*, and are generally tipped with coarse denticulated spines. They always carry a secondary appendage (outer ramus); but in most cases this appendage is of rather inferior size as compared with the chief stem (the inner ramus). The mandibles carry outside a more or less developed palp, and this is also generally the case with the maxillæ. The anterior maxillipeds are short and stout, with several digitiform processes, the number of which may however be considerably reduced. The posterior maxillipeds in the majority of forms are pronouncedly prehensile, terminating in a powerful clawed hand. There are, however, a number of forms in which these appendages are of a very different structure, and not prehensile at all. The 1st pair of legs are in some instances of a structure similar to that of the succeeding pairs; but in the majority of cases they differ rather conspicuously, being more or less transformed into grasping organs. The 3 succeeding pairs are always natatory and generally have both rami 3-articulate, though the inner one may sometimes be much reduced in size. The last pair of legs are very unlike the others, and are never natatory. They are generally lamellar in structure, biarticulate, and edged with strong setæ or spines.

The ova are in most cases carried within a single ovisac attached to the ventral face of the 1st caudal segment. More rarely 2 ovisacs are present, which likewise are appended to the ventral face, never, as in the *Cyclopoida*, laterally or subdorsally.

With regard to the inner organisation, it may be noted that, unlike what is the case in the *Calanoida*, no heart is present (except in the genus *Misophria*), and that the male genital apparatus is always perfectly symmetrical.

By far the greater majority of forms belonging to the present group are marine, only a very limited number of genera being represented in fresh water. Some species seem, however, to prefer brackish water, and so far cannot properly be said to be either true marine or true fresh-water forms. Contrary to what is generally the case with the *Calanoida*, the *Harpacticoida* are, as a rule, true bottom forms, to be sought for among algæ near the shores, in tidal pools, or in mud brought up from various depths. But in this respect also there are some exceptions. Thus the species of the genera *Setella*, *Eutерpe*, *Clytemnestra*, *Miracia*, lead a true pelagic life. Some few forms are known to be commensal with other Crustacea (*Sumaristes*), or even with Vertebrates (*Balanophilus*); but no true parasites are as yet known among the *Harpacticoida*.

The several families comprised within the present group may be arranged under 2 chief sections. In the one, *Achirota*, the posterior maxillipeds are of weak consistency and not prehensile; in the 2nd, *Chirognatha*, these appendages

are pronouncedly prehensile, terminating in a more or less powerful, clawed hand. The latter section may again be conveniently divided into 2 subsections, according to the structure of the 1st pair of legs. In the one subsection, *Chirognatha pleopoda*, these legs are of a structure similar to that of the succeeding pairs and, like them, natatory; in the other sub-section, *Chirognatha dactylopoda*, they are rather unlike the succeeding pairs, and more or less distinctly transformed into grasping organs.

Section I. Achirota.

Remarks.—This section is far less extensive than the next. It comprises, however, as yet, 4 different families, each of which, except the 1st, contains several well-defined genera. The chief characters common to all of them is the non-prehensile structure of both the posterior maxillipeds and the 1st pair of legs. In the latter character they agree with those belonging to the 1st subdivision of the next section.

The greater number of species are true deep-water forms, and it is very probable therefore, that on a future closer examination of deep-water deposits, several additional forms will be detected, requiring perhaps the establishment of both new genera and new families.

Fam. 1. Misophriidæ.

Characters.—Body *cyclopoid* in shape, the posterior division (including the last segment of metasome) being abruptly much narrower than the anterior. Anterior antennæ unusually prolonged, and consisting of numerous articulations; both antennæ in male, as usual, prehensile. Posterior antennæ and oral parts of a structure rather similar to that in the *Calanoida*. Natatory legs more *cyclopoid* in shape, and rather powerful, with both rami triarticulate. Last pair of legs 3-articulate, and of same appearance in both sexes. Ovisac single, ventral. A heart present, as in the *Calanoida*. Male genital apparatus symmetrical, like that in the other *Harpacticoida*.

Remarks.—This family, established by Prof. Brady, has generally been placed between the *Calanoida* and *Cyclopoida*, being regarded by some authors as more nearly related to the former group, by others as nearer to the latter. In my opinion, it ought more properly to be included in the *Harpacticoid* group,

though in some respects it certainly exhibits an apparent resemblance both to the *Calanoida* and to the *Cyclopoida*. That at any rate the typical genus *Misophria* cannot be referred to the former group, has been clearly shown by Dr. Giesbrecht; and he also finds it impossible to class it among the *Cyclopoida*, because the posterior antennæ have a well-developed outer ramus, wholly absent in all known forms of that group. So far I fully agree with that author; but, on the other hand, I cannot concur in his opinion that the difficulties in referring this form to the *Harpacticoida* are equally great. True, the anterior antennæ look rather different from their comparatively greater length and more numerous articulations; but this character is evidently of far less importance than those referred to as distinguishing the genus from the *Calanoida* and *Cyclopoida*. There is another character, to which Dr. Giesbrecht has called attention, and which, indeed, seems to be of much greater importance, viz., the presence in *Misophria* of a distinct, though rather small and imperfectly developed heart. Such an organ, as is well known, is wholly absent in both the *Cyclopoida* and the *Harpacticoida*, whereas in the *Calanoida* it is always present. As, however, several other important features (for instance, the mode of articulation of the last segment of the metasome, and the symmetrical structure of the male genital apparatus) make it quite unreasonable to place the genus in that group, we must set aside this peculiarity, and otherwise decide to which of the 2 groups, *Cyclopoida* or *Harpacticoida*, it should rightly be referred. For my own part, I consider a character, not found out by Dr. Giesbrecht, to be quite conclusive, viz. the presence in *Misophria* of only a single ventral ovisac.

In addition to the typical genus, Prof. Brady refers 2 other genera to the family *Misophriidae*, viz., *Pseudocyclops* and *Cerrinia*, and to the same family Mr. Th. Scott subsequently referred another genus, *Paramisophria*. All these 3 genera must, however, be discarded from the present family, 2 of them, *Pseudocyclops* and *Paramisophria* being, as shown by Dr. Giesbrecht, true *Calanoids*, whereas the 3rd belongs to a very different family of the *Harpacticoida*, viz., *Cerviniidae*, to be treated of below. Of course the present family as yet comprises only a single genus.

Gen. 1. *Misophria*, Boeck, 1864.

Generic Characters.—Body comparatively robust, sub-depressed, with the anterior division considerably expanded. Cephalosome wholly confluent with the

1st segment of the metasome, and produced in front to an immobile rostrum. Last segment of metasome abruptly much narrower than the preceding ones, and without any distinct epimeral plates. Urosome rather narrow, and subcylindric in form; genital segment in female with a well-defined transversal suture dorsally in the middle. Caudal rami short, with the innermost apical seta well developed, though considerably shorter than the 2 middle ones. Eye wholly absent. Anterior antennæ slender, attenuated, many-jointed, those in male distinctly geniculate, with all 3 sections well defined. Posterior antennæ with the inner ramus distinctly 3-articulate, and carrying on the tip slender curved setæ, outer ramus well developed, though smaller than the inner, and 6-articulate. Mandibles with the masticatory part lamellarly expanded, and divided into several denticulated teeth, palp large, biramous, with both rami biarticulate and carrying slender setæ. Maxillæ very fully developed, and exhibiting all the parts found in those of the *Calanoida*, inner ramus of palp greatly elongated, biarticulate. Anterior maxillipeds robust, with the normal number of digitiform lobes, the outermost being produced to a strong claw. Posterior maxillipeds more slender, and resembling in structure those in the *Calanoida*, terminal part 5-articulate. Natatory legs with comparatively broad, flattened rami, those of 1st pair of about equal size, those of the 3 succeeding pairs somewhat unequal, the outer one being the larger. Last pair of legs consisting each of 3 flattened joints carrying scattered setæ.

Remarks.—This genus, established by Boeck, was placed by that author, with some hesitation, among the *Cyclopoida*, and indeed its external appearance is pronouncedly cyclopoid. There is also in this respect a perplexing similarity between this genus and some calanoid genera, viz., *Pseudocyclops* and *Parasiphria*. On a closer comparison, it may, however, at once be distinguished from these genera by the very different mode of articulation of the last segment of the metasome, and from the *Cyclopoida* by the single ventral ovisac. The genus as yet comprises only a single species, to be described below.

1. *Misophria pallida*, Boeck.

(Pl. I & II).

Misophria pallida, Boeck, Oversigt over de ved Norges Kyster indtagne Copepoder. Chr. Vid. Selsk. Forhandl. 1864, p. 248.

Specific Characters.—*Female.* Anterior division of body rounded oval in form, with the dorsal face evenly vaulted. Cephalosome (including the 1st segment of metasome) occupying about $\frac{2}{3}$ of that division, rostral projection very strong, acute at the tip, and pointing straight downwards. Penultimate segment of meta-

some deeply emarginated behind, and almost wholly encompassing laterally the small last segment. Urosome not attaining half the length of the anterior division, genital segment slightly dilated in its anterior part, and exceeding in length the remaining segments combined. Caudal rami broader than they are long, and transversely truncated at the tip, apical setæ rather elongated and densely plumous, the innermost but one fully half as long as the whole body. Anterior antennæ about the length of the cephalic segment, and consisting of 16 articulations, the 3 proximal of which are considerably dilated and densely clothed with partly ciliated setæ. Last pair of legs with the 1st joint conically produced at the end inside, and carrying on both edges a ciliated seta, that of the inner corner rather elongated and deflexed; 2nd joint somewhat smaller, and obliquely produced outside, with a long seta at the outer corner; last joint oval in form and carrying on the tip a lanceolate, denticulated spine and a slender seta, outer corner produced to a small dentiform projection. Ovisac small, rounded, and containing a very limited number of large globular ova.

Male considerably smaller than female, with the anterior division of the body less expanded. Genital segment considerably dilated, and generally containing on each side a large, oval spermatophore. Anterior antennæ composed of only 13 articulations, basal section considerably dilated and 5-articulate, with several well-developed sensory appendages in front; middle section very sharply defined from the basal one, narrow fusiform, and consisting of 6 articulations; terminal section biarticulate. Last pair of legs scarcely different from those in female.

Colour whitish, with a pale reddish tinge.

Length of female 0.70 mm., of male 0.55 mm.

Remarks.—This peculiar Copepod may be easily recognized from any of the other *Harpacticoida*, its external appearance deviating, indeed, considerably from the ordinary type, and more resembling that in forms belonging to quite different divisions of the Copepoda. It is unquestionably the most anomalous form of the whole group.

Occurrence and Habits.—I have found this interesting form occasionally in several places off the west coast of Norway, in depths varying from 20 to 50 fathoms, sandy bottom. Last summer, a single female specimen was captured in the Trondhjem Fjord, near Agdenæs, in about 50 fathoms. The solitary specimen examined by Boeck, was taken at Skudsnæs, west coast of Norway.

The animal moves in a manner very similar to that observed in some of the deep-sea Calanoids, for instance *Stephus* and *Pseudocyclops*, now proceeding quite slowly in a somewhat rotatory manner produced by rapid vibrations of the

posterior antennæ and oral parts, now with quick leaps effected by powerful strokes of the natatory legs and the urosome. It keeps constantly close to the bottom.

Distribution.—English and Scottish coasts (Brady, Scott), Gulf of Naples (Giesbrecht).

Fam. 2. Longipediidæ.

Characters.—Body of normal appearance, more or less cylindrical in form, with no sharp demarcation between the anterior and posterior divisions. Cephalosome in some cases distinctly defined from the 1st pedigerous segment; rostrum lamellar and movably articulated to the cephalic shield. Eye well developed. Anterior antennæ short and stout, consisting of a very limited number of articulations densely clothed with partly spiniform setæ. Posterior antennæ with the outer ramus very fully developed, cylindrical, 6- or 7-articulate. Mandibles and maxillæ with well-developed and abundantly setiferous palps. Anterior maxillipeds calanoid in structure; posterior ones very delicate, lamellar, and fringed with densely plumous setæ. Natatory legs with both rami 3-articulate and rather narrow, being armed outside with strong spines, inside and at the tip with long, partly spiniform setæ; 1st pair not differing greatly from the others. Last pair of legs with the inner expansion of the proximal joint very small, distal joint well-developed or rudimentary. Ovisac single or double.

Remarks.—In this family I propose to comprise the 3 genera *Longipedia* Claus, *Sanaristes* Hesse and *Canuella* Scott, which are undoubtedly closely allied, and together form a natural group of the *Achirota*. It does not answer to the subfamily *Longipediinae* of Brady, to which a much wider range is given, also comprising, as it does, the genera *Zosime*, *Ectinosoma* and *Bradya*, which in my opinion ought to be referred to other families. The most characteristic features of the present family are the unusually full development of the outer ramus of the posterior antennæ, the likewise largely-developed palps on the mandibles and maxillæ, and, finally, the peculiar, delicate structure of the posterior maxillipeds. In all these characters there is a great similarity between the 3 above-named genera, whereas in other respects well-marked differences between them are found to exist.

Gen. 2. **Longipedia**, Claus, 1863.

Generic Characters.—Body more or less slender, with the anterior division conspicuously compressed. Cephalic segment comparatively large and confluent with the 1st segment of metasome, its lateral parts very deep, forming broad vertical lamellæ, finely ciliated below, and wholly including between them the oral parts; rostrum well developed, narrow linguiform. Epimeral plates of the 3 succeeding segments large, vertical, angularly produced behind, and including between them the bases of the natatory legs. Last segment of metasome not much narrower than the preceding one, but without distinct epimeral plates. Urosome gradually attenuated behind, genital segment in female with a very distinct transverse suture in the middle dorsally, and exhibiting at the end of the suture, on each side, a strong recurved dentiform projection; last 2 caudal segments comparatively short. Anal opercle produced at the tip to a spiniform process and generally having a number of smaller denticles on each side. Caudal rami short, with the apical setæ more or less spreading. Anterior antennæ rather robust and much curved, consisting of 5 imperfectly-defined articulations thickly beset with strong setæ, some of which are plumose, others spiniform and strongly pectinate; those in male terminating in a clawed hand. Posterior antennæ with the outer ramus fully as long as the inner and very flexible, 6-articulate. First pair of natatory legs considerably smaller than the succeeding ones, with the spine outside the 2nd joint of the outer ramus remarkably slender and upturned; 2nd pair with the inner ramus greatly elongated, baculiform, the last joint being much produced and armed with 3 thick apical spines and 3 marginal ones. Last pair of legs with the distal joint well developed, lamellar, proximal joint carrying outside a long digitiform process, tipped by a delicate seta, its inner expansion very narrow and terminating in a slender curved seta. A single ovisac present in female.

Remarks.—This genus, established by Claus, is easily distinguished from any of the other *Harpacticoida* by the peculiar transformation of the inner ramus of the 2nd pair of legs to a kind of leaping-pole, a character, indeed, which has given rise to the generic name proposed by Claus. It moreover differs materially from the 2 other genera included in the present family in the presence of only a single ovisac. Off the Norwegian coast occur 4 different, though very nearly allied species, to be described below.

2. *Longipedia coronata*, Claus.

(Pl. III & IV).

Longipedia coronata, Claus, Die freilebenden Copepoden, p. 111, Pl. XIV, figs 14—24.

Specific Characters.—*Female.* Body moderately slender, with the anterior division, seen dorsally, of nearly uniform width throughout, the posterior one gradually attenuated. Caudal segments with the posterior edge perfectly smooth, without the slightest trace of denticles. Anal opercle with 2 subequal denticles on each side, terminal spine rather elongate. Caudal rami a little longer than they are broad, and somewhat divergent, apical setæ apparently quite smooth and considerably spreading, the innermost but one slightly exceeding half the length of the body. Inner ramus of 2nd pair of legs with the terminal joint almost 3 times as long as the first 2 combined, proximal spine of inner edge placed in front of that of the outer, the latter occurring at about the middle of the joint. Last pair of legs with the distal joint oblong quadrangular in form, being scarcely at all expanded distally, inner expansion of proximal joint with a slender denticulated spinule inside the base of the terminal seta.

Male not differing much in external appearance from female, but of considerably smaller size, and easily recognizable by the strongly-hooked anterior antennæ and the distinctly 5-articulate urosome. Genital segment exhibiting at the end on each side a small 3-setose lappet. Last pair of legs slightly differing from those in female.

Colour yellowish gray, with a slight greenish tinge, caudal setæ dark brown.

Length of adult female 1.30 mm., of male 1.08 mm.

Remarks.—It seems to me beyond doubt that the above-described form is that originally examined by Claus, and named as above. On the other hand, scarcely any of the forms recorded by other authors under that name are identical with Claus's species, but belong to one or other of the 2 nearly-allied species described below as *L. Scotti* and *L. minor*. The present species may be easily distinguished from these 2 forms by the total absence of any denticles on the posterior edge of the caudal segments. In the structure of the inner ramus of the 2nd pair of legs, it agrees with *L. minor*; but the last pair of legs are rather unlike in the 2 forms, as also the size of the animal.

Occurrence and Habits.—This form is very common in the upper part of the Christiania Fjord in depths varying from 6 to 30 fathoms, muddy bottom. I have also taken it abundantly in the Trondhjem Fjord, and more rarely off the west coast of Norway. It may be easily obtained by placing the muddy deposits taken up by the aid of the dredge in a shallow vessel with a small amount of

water. The specimens will then at once make their appearance, owing to a peculiarity which they have in common with some other Copepoda, namely, that on touching the surface, they remain floating upon it. The swimming movements of the animal are rather rapid, and constitute an even progress through the water. When keeping to the bottom, it may, however, propel itself in a more abrupt, jerky manner, by employing the long inner rami of the 2nd pair of legs like a pair of leaping-poles.

Distribution.—Heligoland, Gulf of Naples (Claus).

3. *Longipedia Scotti*, G. O. Sars, n. sp.

(Pl. V, fig. 1).

Syn: *Longipedia coronata*, Brady, Scott (not Claus).

Specific Characters.—*Female*. Very like the preceding species, but of somewhat larger size, and perhaps more robust form of body. Posterior edge of caudal segments fringed throughout with delicate denticles. Anal opercle with one large and 4 smaller denticles on each side, terminal spine very strong. Caudal rami about as in *L. coronata*, the apical setæ being very strong and dark-coloured, though perhaps somewhat shorter than in that species. Inner ramus of 2nd pair of legs with the inner proximal spine of the terminal joint placed behind the spine of the outer edge, the latter occurring in front of the middle; distal inner spine generally turned outwards. Last pair of legs with the distal joint sub-spatulate in form, gradually widening towards the tip, inner expansion of proximal joint with a very small hair-like spinule inside the base of the terminal seta.

Colour yellowish gray.

Length of adult female reaching 1.50 mm.

Remarks.—This is the form recorded by Brady¹⁾ and Scott as *L. coronata* Claus. In one of his numerous papers, Th. Scott has called attention to a character in which the present form differs conspicuously from another smaller form, at first only regarded by him as a variety (var. minor) of Claus's species. This character consists in the different position of the inner proximal spine on the terminal joint of the inner ramus of the 2nd pair of legs. The author seems, however, to have been unaware of the fact that in Claus's species this spine has

¹⁾ As first pointed out, however, by Th. Scott, Brady has under this name confounded 2 very different Copepods, not even belonging to the same genus, only that regarded by him as the male being referable to the present species.

a very different position from that in the present form. Another character by which the present species may be easily distinguished from *L. coronata* Claus, is the dense fringe of delicate denticles, with which the posterior edges of the caudal segment are ornamented. Moreover the last pair of legs exhibit some well-marked differences.

Occurrence.—I have found this form occasionally at Aalesund, west coast of Norway, as also in the Trondhjem Fjord just beneath steep cliffs, in depths ranging from 6 to 10 fathoms. In habits it exactly agrees with the preceding species.

Distribution. English and Scottish coasts (Brady, Scott).

4 *Longipedia minor*, Scott.

(Pl. V, fig. 2).

Longipedia coronata, var. *minor*, Th. Scott, Additions to the Fauna of the Firth of Forth. 11th Report of the Fishery Board for Scotland, p. 200, Pl. 11, figs. 14—20.

Syn: *Longipedia coronata*, Boeck, Giesbrecht (not Claus).

Specific Characters.—*Female*. Body of the usual form, the anterior division being considerably compressed, the posterior slightly attenuated. Posterior edges of last segment of metasome and those of urosome fringed throughout with delicate denticles. Anal opercle about as in *L. Scotti*. Caudal rami short, scarcely longer than they are broad, apical setæ strong and very much elongated, the innermost but one almost attaining the length of the whole body. Inner ramus of 2nd pair of legs much elongated, inner proximal spine of terminal joint placed in front of that of the outer edge, the latter occurring behind the middle. Last pair of legs with the distal joint much narrower and more elongated than in any of the other species, inner expansion of proximal joint with a slender smooth spinule inside the base of the terminal seta.

Colour light yellow, mottled with brown.

Length of adult female scarcely exceeding 0.80 mm.

Remarks.—This form was at first regarded by Th. Scott as merely a variety of *L. coronata* Claus; but subsequently it has been recorded by that author as a distinct species under the above name. It is unquestionably identical with the form described in detail by Dr. Giesbrecht as *L. coronata* Claus; and the form observed by Boeck also seems to belong to the same species, to judge from the drawings he has left behind. Indeed, the present form is closely allied to Claus's species, though at once distinguishable from it by the finely denticulated

posterior edges of the caudal segments, and the slender form of the distal joint of the last pair of legs. It is moreover of much inferior size.

Occurrence.—This form is found rather abundantly along the whole south and west coast of Norway, from the Christiania Fjord at least as far as the Trondhjem Fjord. It generally occurs in a few fathoms' depth among algæ, and thus seems to be a more sub-littoral form than the other species of the genus.

Distribution.—Kieler Förde (Giesbrecht), Scottish coast (Scott), ? coast of France (Canu).

5. *Longipedia rosea*, G. O. Sars, n. sp.

(Pl. V, fig. 3).

Specific Characters.—*Female.* Body less compressed than in the other species and more abruptly attenuated behind; integuments unusually thin and pellucid. Rostral plate comparatively broader and more obtuse at the tip. Genital segment with the lateral denticles rather small; posterior edge of this and the succeeding segments with only very slight traces of spinules. Anal opercle with 3 very small denticles on each side near the base, terminal spine comparatively shorter than in the other species. Caudal rami short and thick, rounded at the tip, each with an oblique series of small denticles dorsally; apical setæ of moderate length, and very conspicuously ciliated, especially the 2 middle ones. Inner ramus of 2nd pair of legs comparatively shorter than in the other species, inner proximal spine of last joint at about the same level as the outer spine. Last pair of legs with the distal joint of about the same appearance as in *L. coronata*, proximal joint with the outer digitiform process comparatively short and thick, inner expansion with a very small spinule inside the base of the terminal seta.

Body semipellucid, of a whitish colour, and variegated with irregular patches of a bright rosy hue.

Length of adult female 1.20 mm.

Remarks.—In the living state, this form is at once recognized from any of the other species by its peculiar and beautiful colouring; but, as usual, this character is lost in preserved specimens, which very soon assume a uniformly whitish colour. On a closer examination, however, the present species may be easily distinguished by the more slender form of the body, and especially by the very distinct ciliation of the caudal setæ, which, moreover, are not dark-coloured as in the other species.

Occurrence.—Only a very limited number of specimens of this remarkable form have hitherto come under my notice. They were taken at different times, some off the west coast of Norway (Aalesund), some in the Trondhjem Fjord, from rather considerable depths, down to 100 fathoms. Some apparently immature specimens were also picked out of a plankton-sample taken from deep water, a fact that seems to prove that this form is not so absolutely confined to the bottom, as is the case with the other species of this genus.

Gen. 3. **Sunaristes**, Hesse, 1867.

Syn: *Longipedia*, W. Müller.

Generic Characters. Body very slender in form, with the anterior division scarcely at all compressed, posterior cylindrical in shape. Cephalosome confluent with the 1st pedigerous segment, lateral parts not completely obtecting the oral parts at the sides. Epimeral plates of the succeeding segments small, rounded. Genital segment in female without any trace of a transversal subdivision, and without lateral denticles. Anal opercle smooth. Caudal rami somewhat produced and slightly divergent, apical setæ about as in *Longipedia*. Anterior antennæ less robust and less arcuate than in that genus, 6-articulate, and clothed with very slender, partly ciliated setæ; those in male terminating in a very strong clawed hand. Posterior antennæ and oral parts very similar in structure to those in *Longipedia*. Natatory legs, however, somewhat different. 1st pair of nearly the same size and structure as the 2nd, inner ramus of the latter quite normal in female, slightly transformed in male, the 2 posterior pairs of somewhat simpler structure than the 2 anterior, and provided with unusually long and slender setæ. Last pair of legs in both sexes quite rudimentary. Ovisac double.

Remarks.—This genus was established in the year 1867 by the French naturalist, Hesse, to include a peculiar Copepod found by him as a commensal in the same shell with a kind of hermit crab. The genus *Longipedia* of W. Müller is unquestionably identical with that of Hesse. As indicated by the name proposed by the former author, this genus is, indeed, nearly allied to *Longipedia*, exhibiting, as it does, a very similar structure of both the antennæ and the oral parts. In other respects, however, it differs rather materially, as for instance in the altogether normal appearance of the inner ramus of the 2nd pair of legs, the rudimentary condition of the last pair of legs, and the presence in the female of

2 ovisacs. Moreover the genital segment in the female does not exhibit any trace of a subdivision, no transversal suture existing dorsally. The genus as yet only comprises a single species, to be described below¹⁾.

6. *Sunaristes paguri*, Hesse,

(Pl. VI & VII).

Sunaristes paguri, Hesse, Ann. d. Sc. Nat., Ser. V, Vol. VII, p. 205.

Syn: *Longipodina paguri*, W. Müller.

Specific Characters.—*Female.* Body extremely slender and elongated, with very thin and flexible integuments. Anterior division slightly widening in front, cephalic segment rather large, exceeding in length the 3 succeeding segments combined, rostral plate broad and obtusely truncated at the tip. Last segment of metasome of about the same width as the preceding one. Urosome occupying more than half the length of the whole body, genital segment very large, about equaling in length the 2 succeeding segments combined, and scarcely at all dilated in front; genital region with 2 unequal setiform appendages on each side. Last segment much shorter than the preceding ones. Caudal rami about twice the length of that segment, rather narrow and somewhat attenuated distally, apical setæ slender and indistinctly ciliated, one of them attached to the outer edge at some distance from the tip. Anterior antennæ of moderate length and somewhat attenuated, with the apical filaments very slender. Posterior antennæ with the outer ramus somewhat shorter than the inner. The 2 anterior pairs of natatory legs with both rami of about equal size, the 2 posterior pairs with the inner ramus shorter than the outer, and carrying on the tip 2 setæ and a short spine. Legs of last pair consisting each of only a very small lamella edged with 4 setæ, the outermost one very slender. Ovisacs (according to Hesse) narrow fusiform and greatly diverging.

Body semipellucid, of a whitish colour with a yellowish tinge.

Length of adult female reaching 3 mm.

Remarks.—As above stated, this form was first described by Hesse under the above name. Subsequently the same form was observed by W. Müller, who, being unaware of the earlier description of Hesse, regarded it as new, and recorded it under the name of *Longipodina paguri*. It is an easily recognizable form, and perhaps the largest of all known *Harpacticoida*.

Occurrence.—Only a solitary female specimen of this interesting form has hitherto come under my notice. It was taken up in the dredge, together with

¹⁾ In a just received paper Mr. A. Scott describes 3 additional species from the Indian Ocean.

some gravelly sand, at Hvalör, outside the Christiania Fjord, from a few fathoms' depth. According to the statements of both M. Hesse and W. Müller, this form is generally found in shells occupied by the common hermit-crab, *Eupagurus bernhardus*. I have myself, however, failed to detect any specimens under such circumstances, nor has this been done by Th. Scott.

Distribution.—French coast (Hesse), Scottish coast (Scott).

Gen. 4. **Canuella**, Scott, 1893.

Generic Characters.—Body nearly cylindrical in form, with very thin and flexible integuments. Cephalosome distinctly defined from the 1st segment of the metasome, its lateral parts not very deep, rostrum well developed, narrow linguiform. Epimeral plates of the pedigerous segments small, rounded. Genital segment in female exhibiting in the middle dorsally a well-marked transversal suture, lateral denticles wanting; that in male conspicuously dilated, and produced at the end below to 2 acute projections comprising between them a somewhat hollowed area. Anal opercle simple, rounded. Caudal rami more or less elongated and greatly divergent, apical setæ of moderate length, outer edge with a small seta about in the middle. Anterior antennæ resembling in structure those in *Sanaristes*, though somewhat more robust; those in male less dilated at the end. Posterior antennæ with the outer 2 joints of the inner ramus imperfectly defined, outer ramus very powerful, 7-articulate. Oral parts on the whole built upon the same type as in the 2 preceding genera. Natatory legs rather strongly built, with the outer corner of the joints more or less produced; inner ramus of 2nd pair of normal appearance in both sexes. Last pair of legs, as in *Sanaristes*, rudimentary. Ovisac double.

Remarks.—As observed by Th. Scott, this genus is closely related to *Sanaristes*, though exhibiting some differences, which make it advisable to keep it apart. One of these differences, not referred to by that author, though indicated in the figure of the animal given, consists in the complete separation of the 1st pedigerous segment from the cephalosome, a character very rarely found in the group in question. Among other differences may be named the distinct transversal suture occurring in the middle of the dorsal face of the genital segment in the female, and the somewhat different structure of the posterior antennæ, natatory legs and caudal rami. Two nearly-allied species of this genus occur off the Norwegian coast.

7. *Canuella perplexa*, Scott.

(Pl. VIII & IX).

Canuella perplexa, Th. Scott, Notes on Copepoda from the Firth of Forth. Ann. of Scottish Nat. Hist. 1893, p. 92, Pl. II, figs. 1—3.

Syn: *Longipedia coronata* ♀ Brady (not Claus).

Specific Characters.—*Female.* Body of almost uniform width throughout, or very slightly attenuated behind, with rather deep and conspicuous constrictions between the segments. Cephalic segment comparatively small, somewhat vaulted above, and with the lateral parts but slightly expanded; rostral plate narrowly rounded at the tip. 1st segment of metasome well defined, though much shorter than the others; last segment scarcely narrower than the preceding one. Urosome much shorter than the anterior division of the body, genital segment but slightly dilated in its anterior part; the 3 posterior segments gradually diminishing in size. Caudal rami scarcely twice as long as the last segment, greatly divergent, and gradually tapering distally; apical setæ minutely ciliated, the middle one about twice as long as the outer, and equalling in length the urosome. Anterior antennæ rather robust, and consisting of 5 articulations, some of the setæ very strong and coarsely pectinate. Posterior antennæ with the outer ramus fully as long as the inner, some of the setæ very strong, almost spiniform. 1st pair of natatory legs considerably shorter than the succeeding ones, spines of outer ramus rather elongated; 2nd pair with the first 2 joints of the inner ramus considerably produced at the inner corner. Last pair of legs extremely minute, each forming a thin plate edged with 4 setæ, the innermost but one the longest and distinctly plumous. Ovisacs large, rounded oval in form.

Body semipellucid, of whitish colour, with a faint yellowish tinge.

Length of adult female 1.30 mm., of male 1.25 mm.

Remarks.—Mr. Th. Scott first called attention to the fact that Prof. Brady, in his Monograph of the British Copepoda, has, under the name of *Longipedia coronata* Claus, confounded 2 entirely different Copepoda, the one, regarded by him as the male sex, being in reality a female *Longipedia* (= *L. Scotti* G. O. Sars), whereas that recorded as the female of *Longipedia coronata* is the form here under discussion. This form was then described by Th. Scott as the type of a new genus under the above name, and its differences from *Longipedia* were pointed out. The most conspicuous of these differences is unquestionably the presence of 2 diverging ovisacs, a feature, indeed, very seldom met with in the *Harpacticoid* group; and it is apparently this anomalous character which has given rise to the specific name *perplexa* proposed by that author.

Occurrence.—The only place on the Norwegian coast where I have met with this form, is at Fredriksvårn, outside the Christiania Fjord. It there occurred not unfrequently in a few fathoms depth, on a sandy bottom partly overgrown by algæ.

Distribution.—English coast (Brady), Scottish coast (Scott).

8. *Canuella fureigera*, G. O. Sars, n. sp.

(Pl. X).

Specific Characters.—*Female*. Very like the preceding species, but with less deep indentations between the segments and with the urosome more abruptly, attenuated. Genital segment with 2 small juxtaposed lanceolate lappets below. Caudal rami much larger than in *C. perplexa*, equalling in length the 3 posterior caudal segments combined, and generally greatly divergent, each with a well-marked carina along the dorsal face, middle apical seta more than twice as long as the outer one, both very indistinctly ciliated. Structure of the several appendages almost exactly as in *C. perplexa*.

Male resembling that of the typical species, though having the genital segment comparatively more expanded, and the caudal rami much larger.

Colour yellowish gray, with a few interrupted transversal bands of a deep ochraceous hue.

Length of female 1.40 mm., of male 1.25 mm.

Remarks.—Though very closely allied to the typical species, this form may at once be recognized by the much fuller development of the caudal rami, which to some extent seem to be mobile, as in some specimens they are found to be greatly divergent, in others pointing more backwards. Moreover the indentations between the segments are less conspicuous than in *C. perplexa*, and the urosome, at any rate in the male, is more abruptly attenuated.

Occurrence.—I have not infrequently found this form in the upper part of the Christiania Fjord, not far from the town, in depths ranging from 2 to 7 fathoms, muddy bottom.

Fam. 3. Cerviniidæ.

Characters.—Body more or less slender, with the anterior and posterior divisions generally well marked off from each other. Cephalosome in some cases distinctly defined from the 1st segment of the metasome, rostral plate quite immobile, forming the immediate continuation of the cephalic shield. Caudal rami, as a rule, much elongated, though scarcely divergent. Eye wholly absent. Anterior antennæ comparatively short and robust, 6—7-articulate, and more or less densely clothed with partly ciliated setæ. Posterior antennæ with the outer 2 joints of the inner ramus confluent, outer ramus less fully developed than in the *Longipediidæ*. Mandibles very strong, with the palp generally large, biramous. Maxillæ with the outer appendages (exopodite and vibratory plate) more or less rudimentary. Anterior maxillipeds short and compact; posterior ones of less delicate structure than in the *Longipediidæ*, and scarcely at all lamellar. Natatory legs of somewhat varying structure in the different genera. Last pair of legs small, biarticulate. Ovisac simple.

Remarks.—The type of this family is the remarkable genus *Cervinia* of Norman, the systematic position of which has been much disputed by carcinologists. Closely allied to it is a new genus, *Cerviniopsis*, to be treated of below, as also the genus *Eucanuella* of Scott. Finally, I am of opinion that the genus *Zosime* of Boeck, though in some points differing conspicuously from the 3 above-mentioned genera, ought more properly to be included in the present family. All the species belonging to this family, are true deep-water forms; and in accordance therewith are quite devoid of visual organs. They moreover differ materially from those of the *Longipediidæ* in the fact that the rostral plate is quite immobile and continuous with the cephalic shield, as also in the very different structure of the posterior maxillipeds.

Gen. 5. *Cervinia*, Norman, 1878.

Generic Characters.—Body slender, attenuated, with very thin and flexible integuments. Cephalosome distinctly defined from the 1st segment of metasome, lateral parts but slightly expanded, wholly exposing the oral appendages. Epimeral plates of the pedigerous segments small, rounded; last segment rather narrow. Urosome comparatively large, genital segment in female without any

transversal suture dorsally. Caudal rami long and narrow, discontinuous, each with a small seta in the middle of the outer edge, the 2 middle apical setæ of a peculiar soft consistency. Anterior antennæ consisting of 7 well-defined articulations, none of which are particularly expanded; those of male imperfectly prehensile (?). Posterior antennæ with the inner ramus very strong, outer comparatively small, 4-articulate. Mandibles with the masticatory part very massive, palp comparatively large, with both rami somewhat lamellar, and carrying thick plumose setæ. Maxillæ without any trace of either exopodite or vibratory plate. Anterior maxillipeds with the 1st basal joint gibbously expanded behind; posterior ones 4-articulate, last 2 joints (constituting the terminal part) comparatively small and armed with spiniform setæ. 1st pair of natatory legs with both rami 3-articulate and of normal appearance, the 3 succeeding pairs with the inner ramus more or less transformed. Last pair of legs very small, with no inner expansion of the proximal joint.

Remarks.—This genus was established by Canon A. M. Norman, to include a peculiar deep-water Copepod found by him off the English coast. The specimens were sent to Prof. Brady for examination, and in the well-known Monograph of the latter author, the genus is recorded as a member of the family *Misophriidae*. This arrangement is unquestionably incorrect, as the genus does not exhibit any very close affinity to *Misophria*; and Dr. Giesbrecht has also subsequently called attention to the unreasonableness of Brady's classification as regards this genus. We do not know at present with certainty more than a single species belonging to this genus.

9. *Cervinia* Bradyi, Norman.

(Pl. XI).

Cervinia Bradyi Norman, in Brady's Monograph of the British Copepoda, Vol. I, p. 86, Pl. XXIV A, figs. 3–13.

Specific Characters.—*Female.* Body slender and elongated, with the anterior division somewhat depressed and gradually widening in front. Cephalosome comparatively short and broad, almost truncated in front, with the rostral plate very small, triangular. Last segment of metasome much narrower than the preceding segment. Urosome (comprising the caudal rami) fully as long as the anterior division of the body, genital segment very large, equalling in length the 3 remaining segments combined, and slightly dilated in its anterior part, but without any lateral projections; the succeeding segments finely hairy on the ventral and lateral faces, last segment longer than the preceding one and tapering dis-

tally; anal opercle somewhat projecting, but perfectly smooth. Caudal rami narrow linear, about equalling in length the last 2 segments combined, and everywhere minutely hairy, the 2 middle apical setæ slightly unequal and much stronger than the others, having the outer part minutely annulated and thickly covered with delicate cilia. Anterior antennæ almost attaining the length of the cephalosome, and slightly attenuated, carrying strong curved setæ along the anterior edge and on the tip, the outer 4 articulations somewhat narrower than the 3 proximal ones. Posterior antennæ with remarkably strong and densely ciliated spines at the tip, outer ramus not even attaining $\frac{1}{3}$ of the length of the inner, and much narrower. Inner ramus of the 3 posterior pairs of natatory legs (in the adult animal) consisting of only 2 joints, the proximal of which, especially in the 2nd pair, is greatly expanded, and produced at the inner corner to a strong deflexed spiniform process, in front of which a similarly strong curved spine is attached; distal joint in this pair produced at the tip, between the 2 innermost spines, to a similar, but smaller process. Last pair of legs extremely small, with the distal joint scarcely longer than the proximal one, and provided with one apical seta and 2 small lateral spines.

Body semipellucid, with a pale yellowish tinge.

Length of adult female 1.45 mm.

Remarks.—I have been in some doubt about the correctness of my identification of the above-described form with Norman's species, because the inner ramus of the 3 posterior pairs of natatory legs in that species is described by Brady as 3-articulate, whereas in the Norwegian form it consists of only 2 joints; but in all other respects it so closely agrees with Brady's description, that I have not felt justified in establishing a new species on account of this apparent difference, which may perhaps be due to the circumstance that the specimen dissected by Brady had not attained its full development. On the other hand, I am of opinion that the solitary male specimen described by Dr. Giesbrecht from the Gulf of Naples may more properly be referable to a distinct species, differing, as it does, very conspicuously in the large size of the rostral plate.

Occurrence.—Only a very limited number of specimens of this form, all of the female sex, have hitherto come under my notice. They were taken at different times, some off the west coast of Norway, some off the Lofoten Islands, from considerable depths amounting to 100 fathoms.

Distribution.—English and Scottish coasts (Brady, Scott).

Gen. 6. **Cerviniopsis**, G. O. Sars, n.

Generic Characters.—General form of body about as in *Cervinia*. Cephalosome, however, comparatively larger and imperfectly defined from the 1st pedigerous segment, its lateral parts rather deep, partly including between them the oral appendages; rostral plate large and broad at the base. Epimeral plates of the 3 succeeding segments slightly angular. Genital segment in female with a well-marked transversal suture in the middle dorsally, and produced on each side of the suture to a recurved spiniform projection. Caudal rami very narrow, linear, and contiguous along their whole length, apical setæ of normal appearance. Anterior antennæ very robust, clavate, 6-articulate, and clothed with strong, partly spiniform setæ, one of them, issuing from the end of the 4th joint, being transformed in to a large, almost fusiform appendage curving backwards and clothed along one of the edges with long cilia, this joint and the 2 outer ones very short and less distinctly defined. Posterior antennæ less robust than in *Cervinia*, outer ramus of larger size, 4-articulate. Oral parts on the whole resembling in structure those in *Cervinia*. Natatory legs with both rami 3-articulate and of about equal size. Last pair of legs with the distal joint slender, linear, proximal joint quite short and without any inner expansion. Male unknown.

Remarks.—This new genus is somewhat intermediate in character between *Cervinia* and *Eucanuella*, agreeing in some points more closely with the former, in others with the latter. From both of them it differs conspicuously in the structure of the anterior antennæ, and the peculiar appearance of the caudal rami, which are so closely squeezed together, that they look like a single appendage. Off the Norwegian coast occur 2 closely allied species, to be described below.

10. **Cerviniopsis elavicornis**, G. O. Sars, n. sp.

(Pl. XII & XIII, fig. 1).

Specific Characters.—*Female*. Body moderately slender, with the anterior division somewhat depressed behind and widening in front. Cephalic segment rather large and deep, exceeding in length the 4 succeeding segments combined; rostral plate broadly triangular and slightly deflexed. Last segment of metasome with a distinct dentiform projection on each side. Urosome (including the caudal rami) not quite as long as the anterior division; genital segment with the lateral spiniform projections very strong and prominent. Last caudal segment abruptly contracted towards the end, anal opercle semilunar. Caudal rami slightly exceeding

in length the last 2 segments combined, each carrying in front of the middle outside a very small, hair-like bristle and another stronger one at some distance from the tip, the 2 middle apical setæ very unequal, the inner one more than twice the length of the outer, both very minutely denticulate. Anterior antennæ pronouncedly claviform in shape, the 3rd joint being considerably expanded, and arching over the short recurved terminal part. Posterior antennæ with the outer ramus about the length of the 2 outer confluent joints of the inner. Natatory legs with both rami of normal structure. Last pair of legs with the distal joint about 4 times as long as the proximal one, narrow linear in form, and carrying on the tip 2 unequal spines and between them a slender seta. Ovisac of moderate size, oval in form, and containing a rather limited number of large globular ova.

Colour whitish gray.

Length of adult female 1.60 mm.

Remarks.—In its general appearance, this form bears an unmistakable resemblance to *Eucanuella spinifera* Scott, to be described farther on, and indeed, I was at first inclined to refer it to that genus. On a closer examination, however, it is found to differ in some points rather materially, the most conspicuous difference being the peculiar structure of the caudal rami, also shown in the succeeding nearly-allied species.

Occurrence.—Several specimens of this peculiar form, all of the female sex, were found many years ago in the Østnæs Fjord, Lofoten Islands. The specimens were obtained by examining the loose muddy deposits taken up by the aid of a light dredge from a depth of about 100 fathoms.

11. *Cerviniopsis longicaudata*, G. O. Sars, n. sp.

(Pl. XIII, fig. 2).

Specific Characters.—*Female.* Very like the preceding species, but of somewhat smaller size and more slender form of body. Anterior division, seen dorsally, of almost uniform width throughout, rostral plate less broad. Last segment of metasome without any lateral projections. Urosome (including the caudal rami) fully as long as the anterior division, lateral projections of genital segment much smaller than in *C. clavicornis*. Caudal rami exceedingly slender and elongated, exceeding in length the 3 last segments combined, hair-like bristle of the outer edge occurring behind the middle. Antennæ and oral parts of much the same structure as in the preceding species. Natatory legs, however, slightly

differing, 1st joint of inner ramus in the 2nd and 3rd pairs exhibiting an appearance similar to that in *Cerrinia*, the inner corner being greatly produced, and the natatory seta transformed in to a strong spine. Last pair of legs with the distal joint comparatively less slender than in *C. claricornis*, middle apical seta quite short.

Colour whitish gray.

Length of adult female 1.30 mm.

Remarks.—Though very closely allied to the preceding species, this form is unquestionably specifically distinct, differing not only in the greater length of the caudal rami, but also in the smaller size of the lateral projections of the genital segment, and partly also in the structure of the legs.

Occurrence.—Only 2 female specimens of this form have hitherto come under my notice. They were taken from great depths off the west coast of Norway, the exact locality not being stated.

Gen. 7. **Eucanuella**, Scott, 1901.

Generic Characters.—General form of body about as in *Cerciniopsis*. Cephalosome imperfectly defined from the 1st segment of metasome, and projecting in front to a conically-pointed rostrum. Epimeral plates of the 3 succeeding segments well developed, acutely pointed behind. Genital segment in female with a well-marked transversal suture in the middle dorsally, and produced on each side to a strong spiniform projection. Caudal rami somewhat lamellar, non contiguous, tapering distally. Anterior antennae distinctly 7-articulate, and edged with ciliated setae, one of them, issuing from the 4th joint, being much larger than the others, the 3 outer joints abruptly much narrower than the preceding ones. Posterior antennae comparatively feebler in structure than in the 2 preceding genera, outer ramus well developed, 4-articulate. Oral parts on the whole resembling those in *Cerrinia* and *Cerciniopsis*. Natatory legs comparatively slender, with both rami 3-articulate, outer ramus of 1st pair unusually strong and much longer than the inner. Last pair of legs about as in *Cerciniopsis*. Male unknown.

Remarks.—This genus, established by Th. Scott, ought undoubtedly to be referred to the family *Cerciniidae*, as here defined. In several respects it exhibits, indeed, a close resemblance to the genus *Cerciniopsis*, but differs in some other points so materially, that it ought more properly to be kept apart. The chief

differences from that genus refer to the structure of the anterior antennæ and the caudal rami, partly also to that of the natatory legs. We do not know at present of more than a single species, to be described below.

12. *Eucanuella spinifera*, Scott.

(Pl. XIV).

Eucanuella spinifera, Th. Scott in 19th Report of the Fishery Board for Scotland, Part III, Scientific Investigations, p. 245, Pl. XVIII, figs. 1—10.

Specific Characters.—*Female.* Body moderately slender and conspicuously attenuated behind. Cephalic segment comparatively large, exceeding in length the 4 succeeding segments combined, and evenly vaulted above, lateral parts rather deep, partly including between them the oral appendages, rostrum projecting considerably. Epimeral plates of the 3 succeeding segments projecting behind in a somewhat spiniform corner. Last segment of metasome slightly produced on each side, but without any distinct dentiform projection. Urosome (including the caudal rami) shorter than the anterior division, genital segment rather broad, with the lateral projections very prominent. Last caudal segment longer than the preceding one, and gradually tapering distally; anal opercle somewhat prominent, semilunar. Caudal rami conspicuously asymmetrical, the right one projecting considerably beyond the left, and nearly as long as the last 2 segments combined, both gradually tapering distally, and exhibiting outside, at some distance from the base, a small spinule; dorsal face with 3 delicate bristles, 2 of which occur near the tip, the 3rd in front of the middle; tip with only 2 setæ, the inner of which is more than twice as long as the outer. Anterior antennæ with the 4 proximal joints considerably expanded, 2nd joint armed with a strong spiniform projection issuing from the upper face and pointing backwards. Outer ramus of 1st pair of legs scarcely inferior in size to that of the succeeding pairs, and fully twice as long as the inner. Last pair of legs with the outer digitiform process of the proximal joint rather thick, distal joint narrow linear, with one apical and 2 lateral setæ. Ovisac comparatively small, rounded.

Colour whitish gray.

Length of adult female 1.30 mm.

Remarks.—The above-described form is unquestionably identical with that recorded by Th. Scott under the above name. It may at once be recognized from any of the other *Cerviniidae* by the characteristic structure of the caudal rami, as also by the conically-produced rostral plate.

Occurrence.—Some few specimens of this form, all of the female sex, have been taken at different times, from depths of 50—60 fathoms. One of the specimens was found at Hankö, lower part of the Christiania Fjord, the others off the west coast of Norway.

Distribution.—Scottish coast (Scott).

Gen. 8. **Zosime**, Boeck, 1872.

Generic Characters.—Body of comparatively robust form, with the anterior and posterior divisions, at any rate in female, well marked off from each other. Cephalosome confluent with the 1st pedigerous segment, and produced in front to a short and broad rostral plate. Epimeral plates of the 3 succeeding segments well developed, sub-angular. Last segment of metasome abruptly narrower than the preceding one. Urosome in female somewhat flattened, with the segments more or less expanded laterally, in male more cylindrical in form. Genital segment in female with a very distinct transversal suture in the middle dorsally. Caudal rami of moderate length, discontinuous, the 2 middle apical setæ of a soft consistency similar to those in *Cervinia*. Anterior antennæ short and stout, densely setiferous, 6-articulate. Posterior antennæ with the outer 2 joints confluent, outer ramus 3-articulate. Oral parts differing somewhat in structure from those in the other *Cerviniidæ*. Mandibles with the palp tri-lobate, inner lobe confluent with the basal part, the other 2 constituting the 2 rami. Maxillæ with 2 small knob-like projections outside the palp. Anterior maxillipeds short and compact, with 4 digitiform lobes; posterior ones of comparatively simple structure, 3-articulate. First pair of natatory legs much smaller than the others, with the inner ramus bi-articulate; the 3 succeeding pairs with both rami slender, 3-articulate. Last pair of legs somewhat resembling those in the *Ectinosomidæ*, proximal joint exhibiting inside a well-marked setiferous expansion, distal joint imperfectly defined.

Remarks.—This genus, established by Boeck, was considered by that author, as also by Prof. Brady, to be most nearly related to the genus *Ectinosoma*, which in the present Account is regarded as the type of a distinct family, *Ectinosomidæ*. On a closer examination, however, I find that it should more properly be referred to the family *Cerviniidæ*, as here defined. True, the last pair of legs, as also the posterior maxillipeds, exhibit some resemblance to those in the genus

Ectinosoma; but in all other respects this genus is very different, and apparently more nearly related to the 3 preceding genera. We do not know at present with certainty more than a single species belonging to this genus.

13. *Zosime typica*, Boeck.

(Pl. XV).

Zosime typica, Boeck, Nye Slægter og Arter af Saltvandscopepoder. Chr. Vid. Selsk. Forhandl. 1872, p. 46.

Specific Characters.—*Female.* Body rather short and stout, somewhat depressed, with a very conspicuous constriction in the middle. All segments having the posterior edge distinctly denticulate dorsally, the denticles of the penultimate caudal segment being in particular very coarse and partly bifid at the tip. Cephalic segment rather large, considerably exceeding in length the 3 succeeding segments combined, rostral plate short and broad, blunt at the tip, and carrying 2 small apical bristles; the 3 succeeding segments with the epimeral plates somewhat exstant laterally. Last segment of metasome abruptly much narrower than the preceding ones, and produced on each side to a slight dentiform corner. Urosome (including the caudal rami) about the length of the anterior division, its 3 anterior segments forming on each side well-marked lamellar expansions each terminating in an acute recurved corner; last segment very small. Caudal rami about 3 times as long as they are broad, slightly constricted at the base, and transversely truncated at the end, outer edge finely denticulate and carrying, at some distance from the tip, a small bristle; the 2 middle apical setæ rather coarse and very unequal, the inner one twice as long as the outer, and exhibiting near the base a peculiar angular bend. Anterior antennæ with the 2nd joint much the largest, and equal in length to the succeeding 4 joints combined. Posterior antennæ with the outer ramus somewhat shorter than the inner. Last pair of legs with the inner expansion triangular and carrying 3 slender setæ, distal joint not distinctly defined from the proximal one, truncated at the tip and provided with 3 apical and one lateral seta.

Colour whitish gray.

Length of adult female 0.55 mm.

Remarks.—It seems to me somewhat questionable, whether the form described under this name by British authors (Brady, Scott) is in reality identical with Boeck's species. Prof. Brady, for instance, indicates the length of the animal to be 0.80 mm., whereas the largest of my Norwegian specimens only measures

0.55 mm. in length; and further the figures of the animal given by that author and by Th. Scott do not fully agree with the form examined by me. Finally, on comparing my drawings with those given by the above-named authors, I also find some differences in the structural details.

Occurrence.—I have found this form occasionally in the upper part of the Christiania Fjord in depths of about 16 fathoms, muddy bottom. The specimen examined by Boeck was likewise from that locality.

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

Fam. 4. Ectinosomidæ.

Characters.—Body of a peculiarly smooth appearance, and more or less fusiform in shape, with no very conspicuous demarcation between the anterior and posterior divisions. Cephalosome wholly confluent with the 1st pedigerous segment, and produced in front to a more or less prominent rostral plate continuous with the cephalic shield. Epimeral plates of the 3 succeeding segments well developed. Last segment of metasome without such plates. Urosome consisting in female of 4, in male of 5 segments, the last one generally small and more or less cleft at the end. Caudal rami discontiguous, divergent, with the 2 middle apical setæ more or less elongated. No true eye present. Anterior antennæ comparatively small, and composed of a limited number of articulations. Posterior antennæ with strong denticulated spines at the tip, outer ramus slender, 2- or 3-articulate. Oral parts differing rather greatly in their structure from those in the preceding families. Natatory legs powerfully developed, with both rami 3-articulate and densely spinous. Last pair of legs lamellar and edged with strong spiniform setæ. Ovisac single.

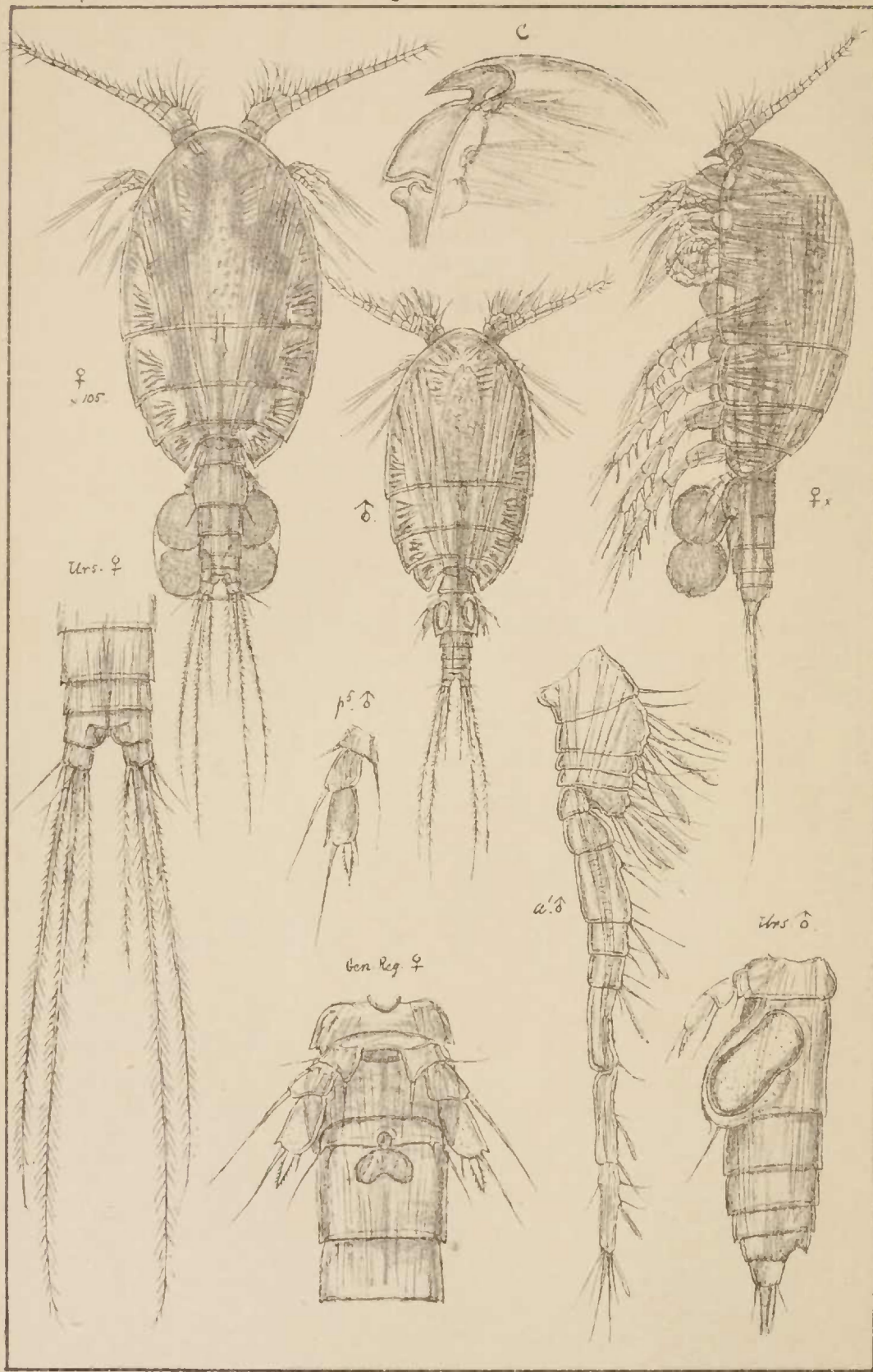
Remarks.—This family, the type of which is the genus *Ectinosoma* of Boeck, exhibits several well-marked differences from the preceding ones, both as regards the external appearance and the structural details; and as there are several genera which so far closely agree with each other, the establishment of this new family may be fully justified. It comprises as yet 4 genera, all of which are represented in the fauna of Norway.

Copepoda

Misophriidæ

Harpacticoida

Pl. I.



G.O. Sars autogr.

Tryktil den private Opmaaling. Chra

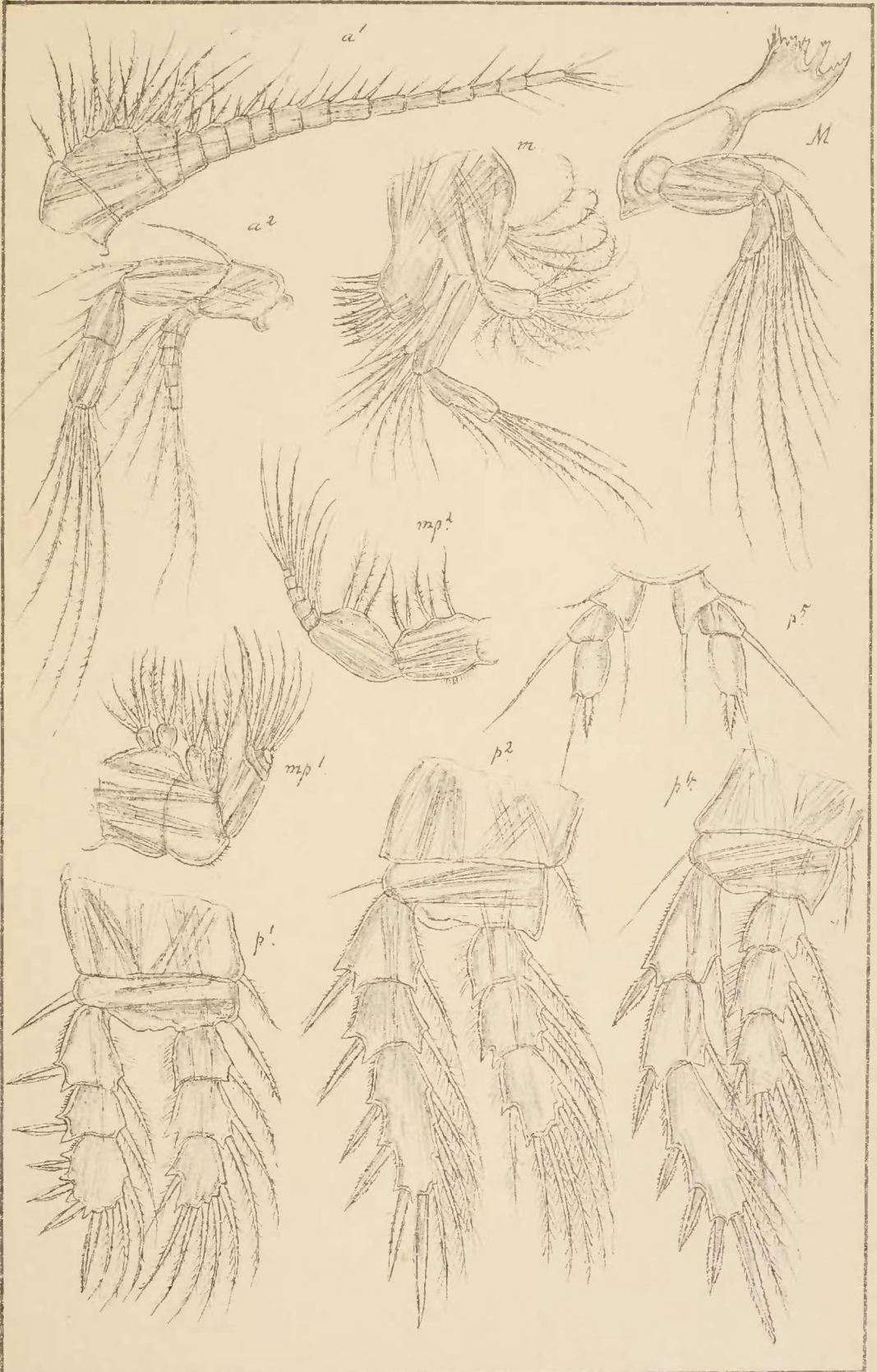
Misophria pallida, Boeck

Copepoda

Harpacticoida

Misophriidæ

PLII.



G.O. Sars autogr.

Trykt i den private Opmaalings Chrs

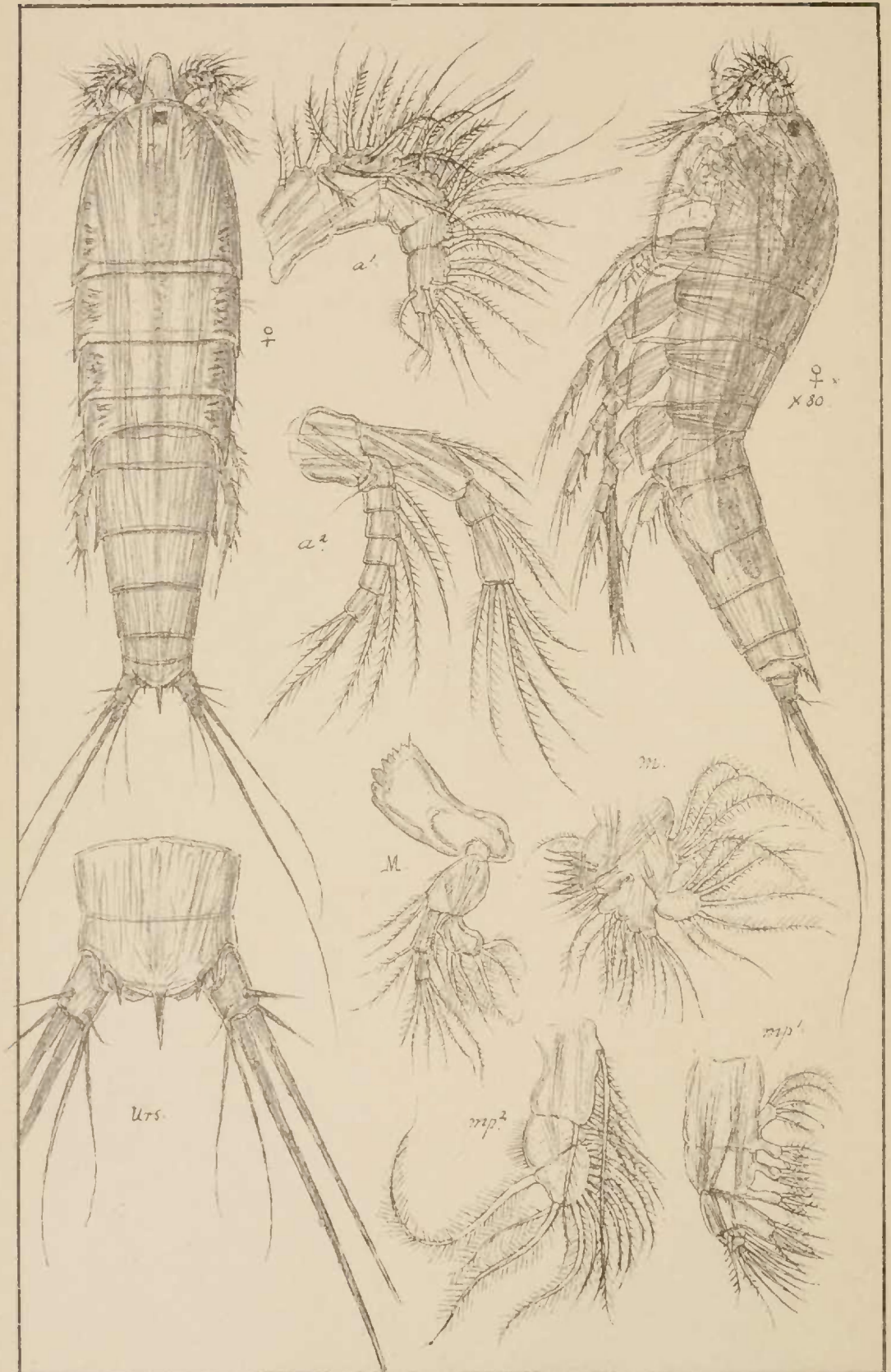
Misophria pallida, Boeck
(continued)

Copepoda

Harpacticoida

Longipediidæ

PLIII.



G.O. Sars autogr.

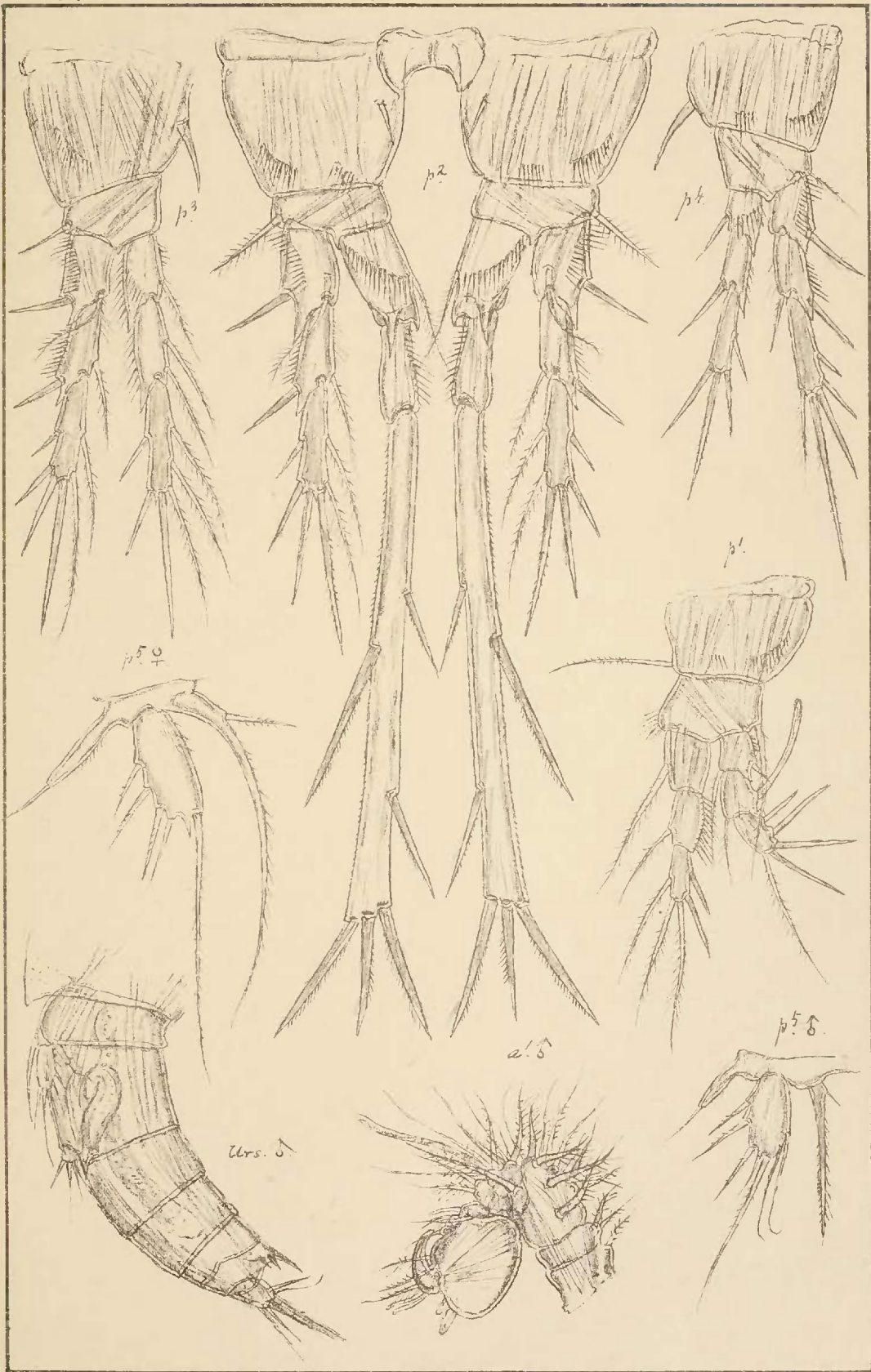
Tryktil den private Opmaaling Chro

Longipedia coronata, Claus

Harpacticoida

Longipediidae

Pl.IV.



G.O. Sars autogr.

Longipedia coronata, Claus
(continued)

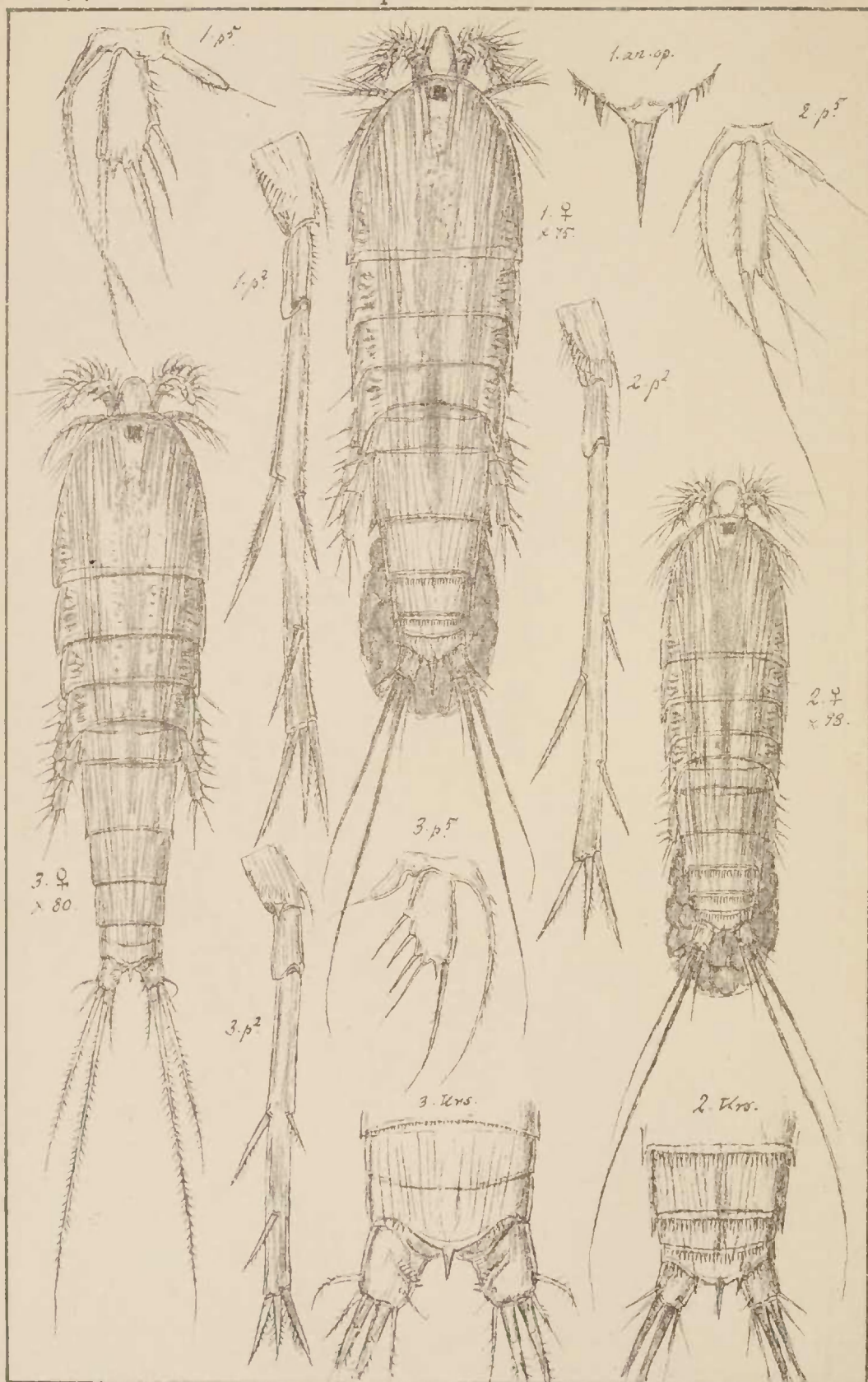
Tryk i den private Opmaaling Chra

Copepoda

Longipediidae

Harpacticoida

Pl. V.



G.O. Sars autogr.

Tryktil den private Opmaaling Chrs

1 *Longipedia Scotti*, G.O. Sars

2 *Longipedia minor*, Scott

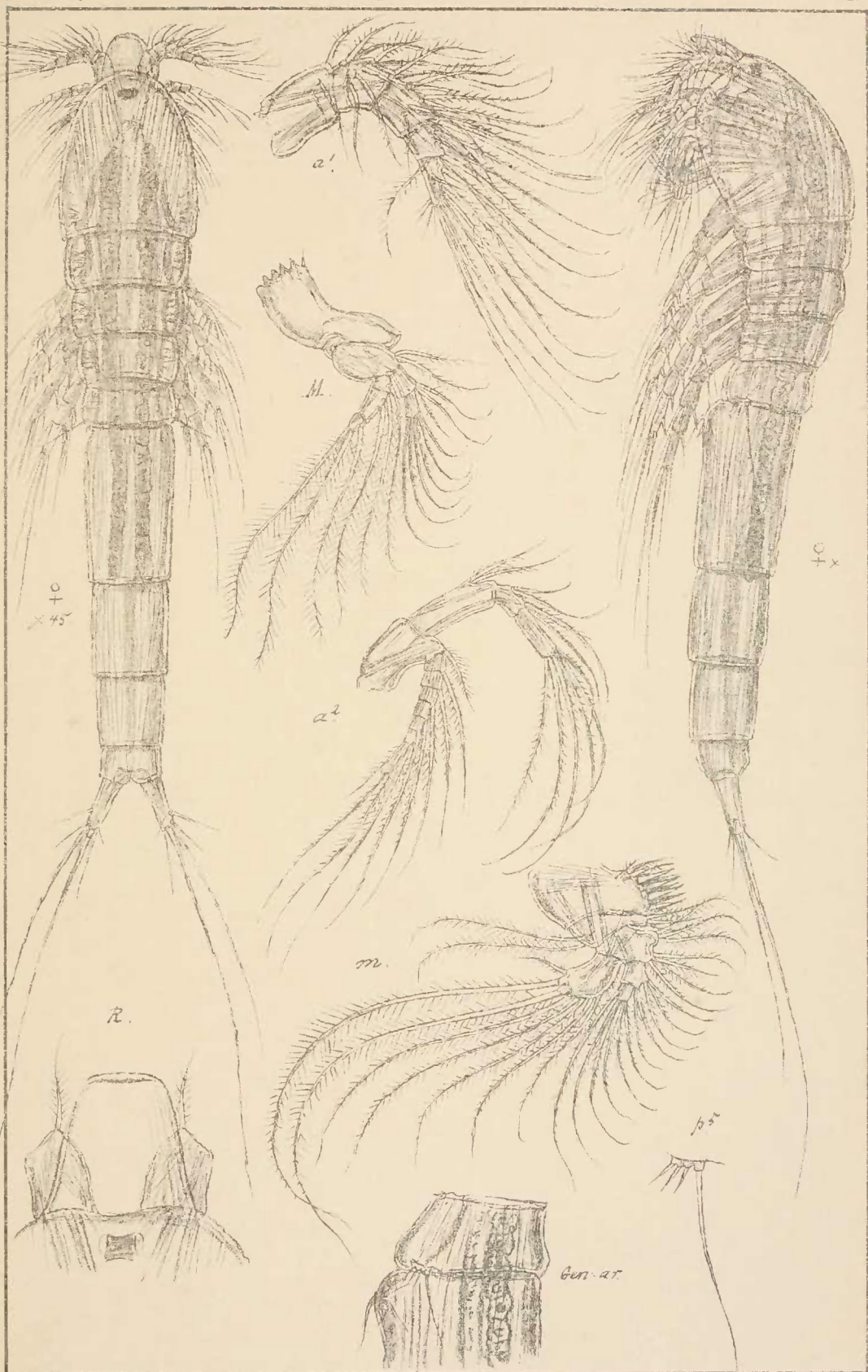
3 *Longipedia (Longipedia) minor*, G.O. Sars

Copepoda

Harpacticoida

Longipediidæ

Pl. VI.



G O Sars autogr

Sunaristes paguri, Hesse

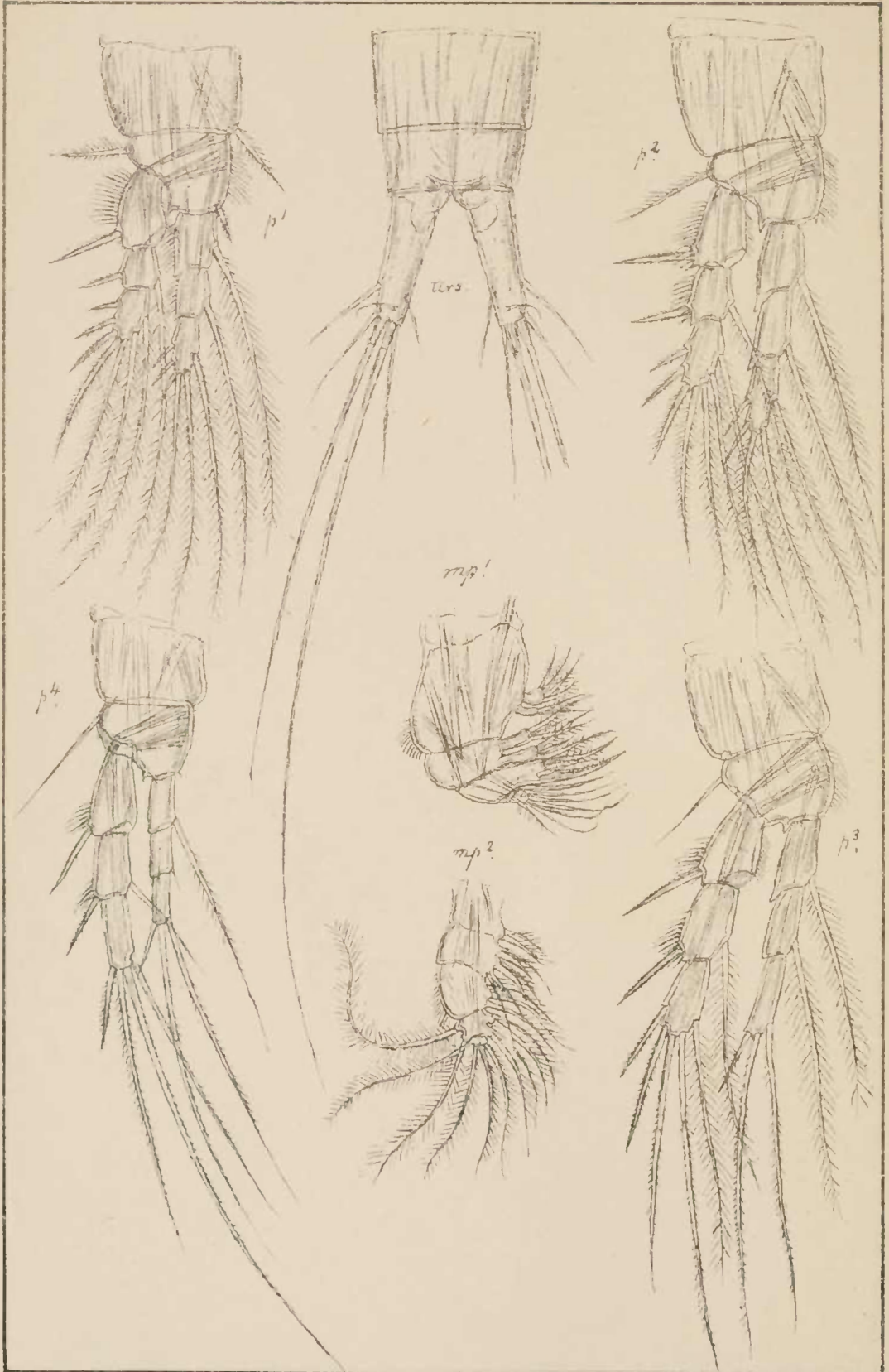
Trykt i den private Opmaaling Chra

Copepoda

Harpacticoida

Longipediidae

Pl. VII.



60 Sars autogr

Trykt i den private Opmaaling Chrs

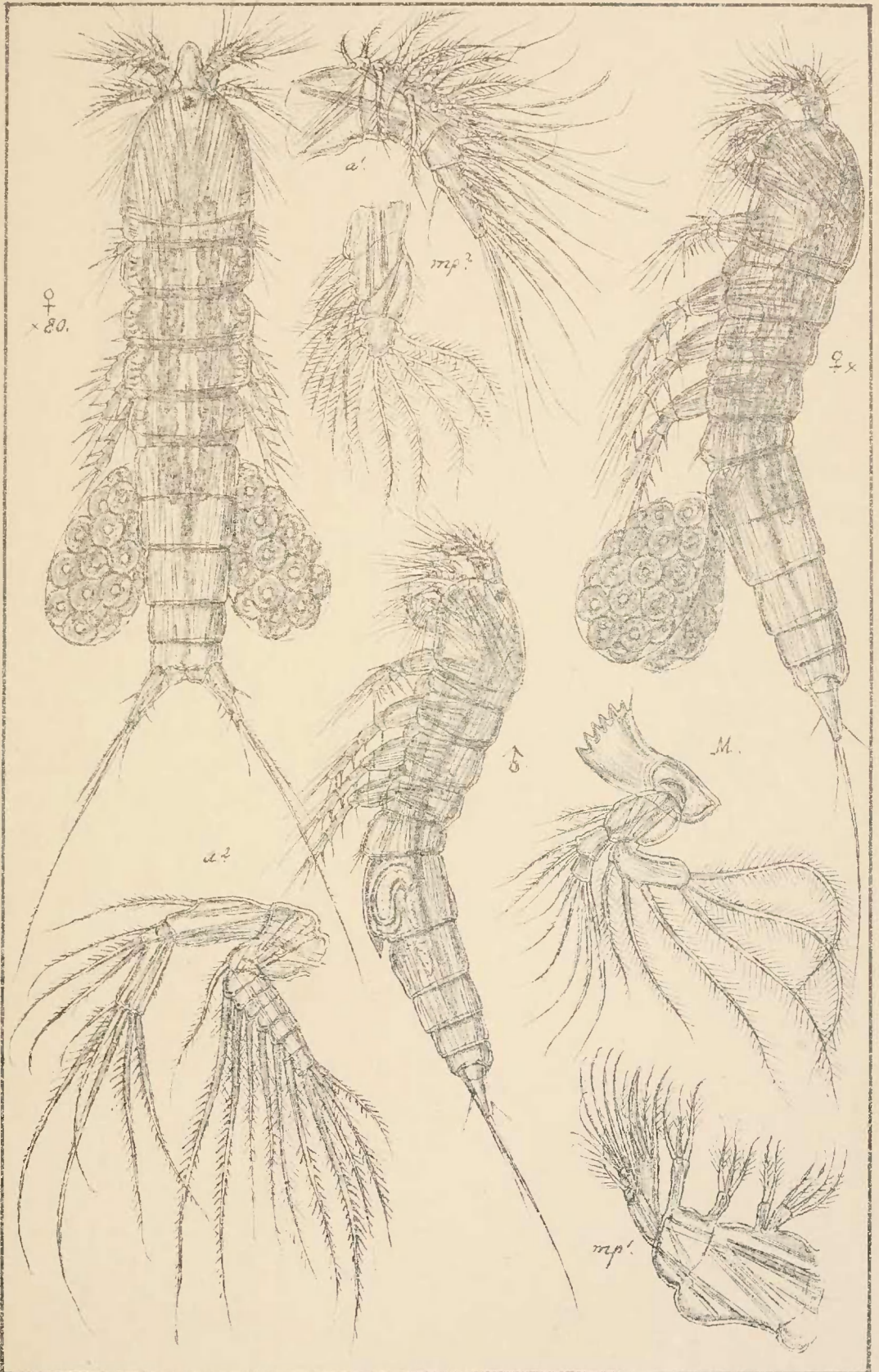
Sunaristes paguri, Hesse
(continued)

Copepoda

Harpacticoida

Longipediidae

Pl. VIII.



G. O. Sars autogr.

Canuella perplexa, Scott.

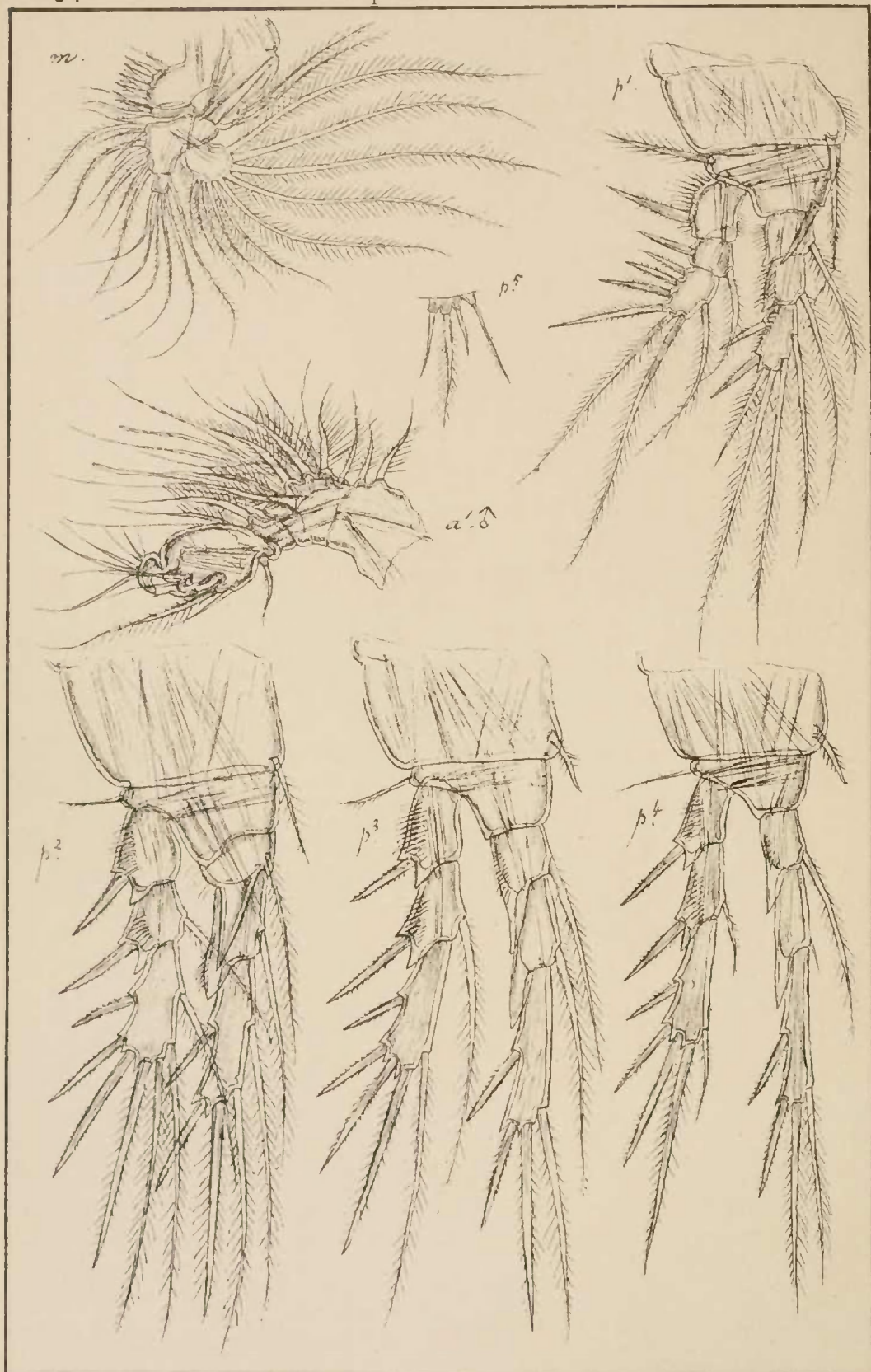
Trykt i den private Opmaaling, Chro

Copepoda

Longipediidæ

Harpacticoida

Pl IX



G.O. Sars autogr.

Canuella perplexa, Scott.
(continued)

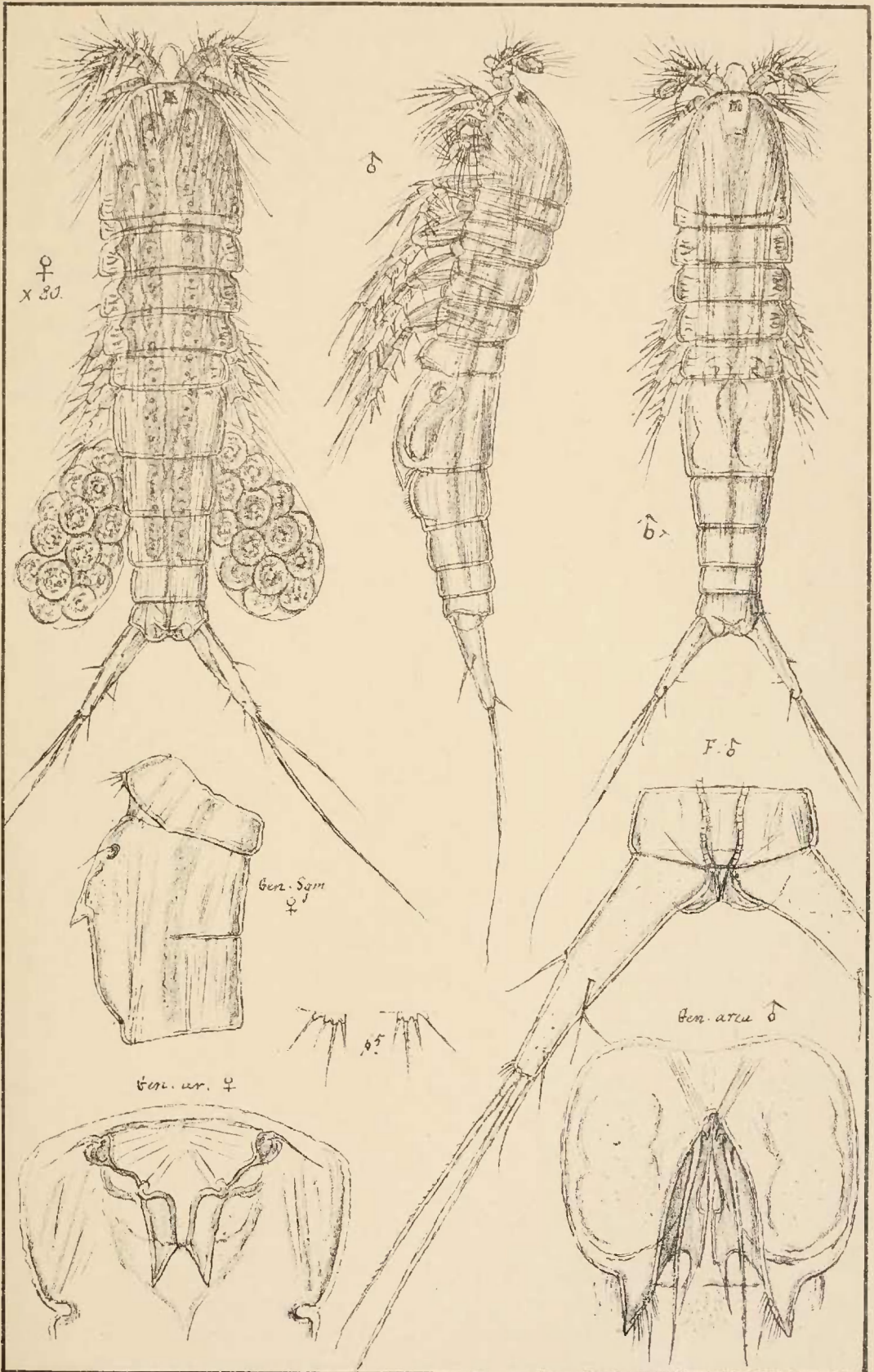
Trykliden private Opmaaling, Chra.

Copepoda

Harpacticoida

Longipediidæ

PIX



G.O. Sars autogr.

Trykt i den private Opmaaling, Chra

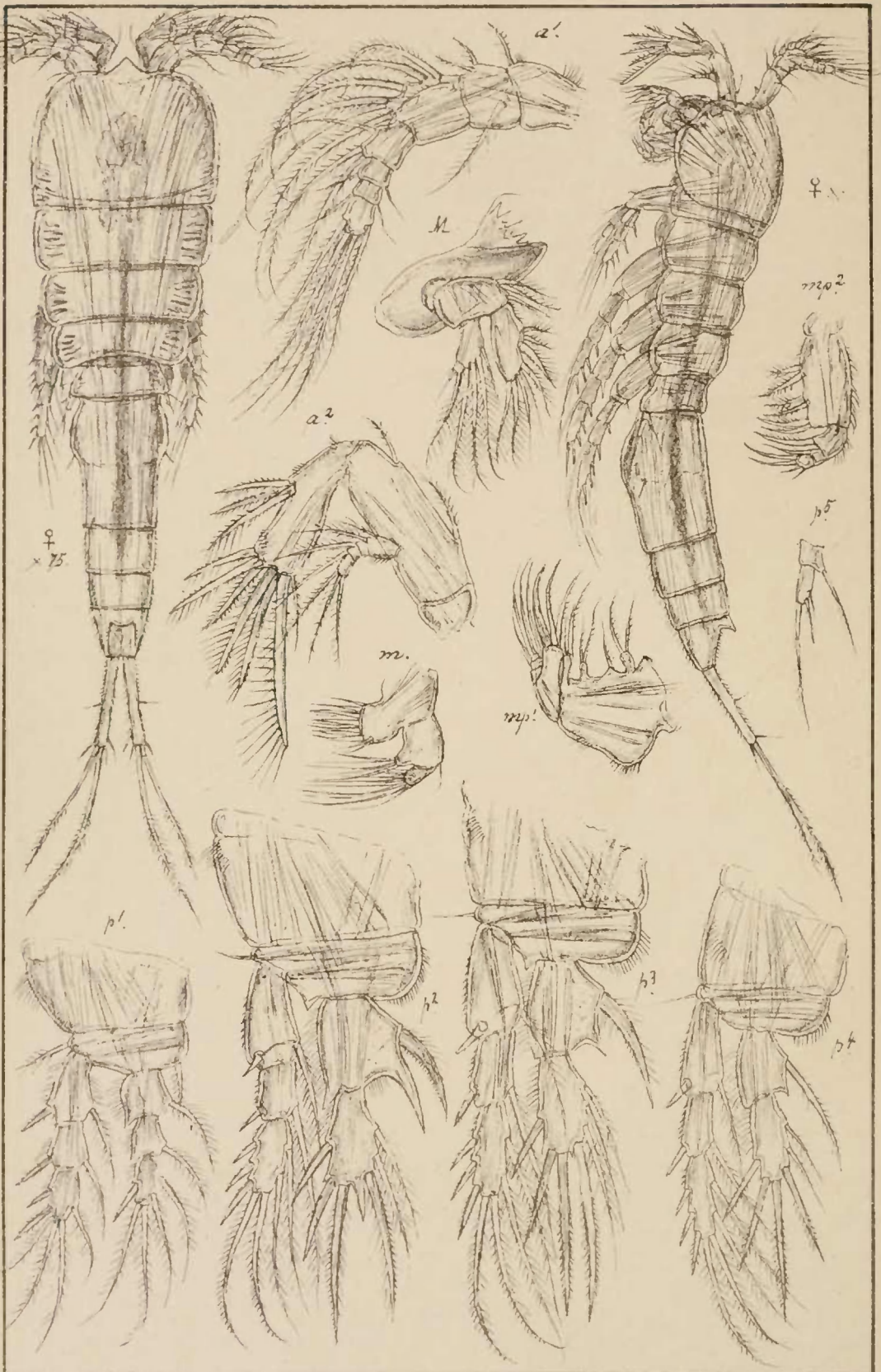
Canuella furcigera, G.O. Sars

Copepoda

Harpacticoida

Cerviniidæ

P XI



G.O. Sars autogr.

Tryk i den private Opmaalings, Chrs

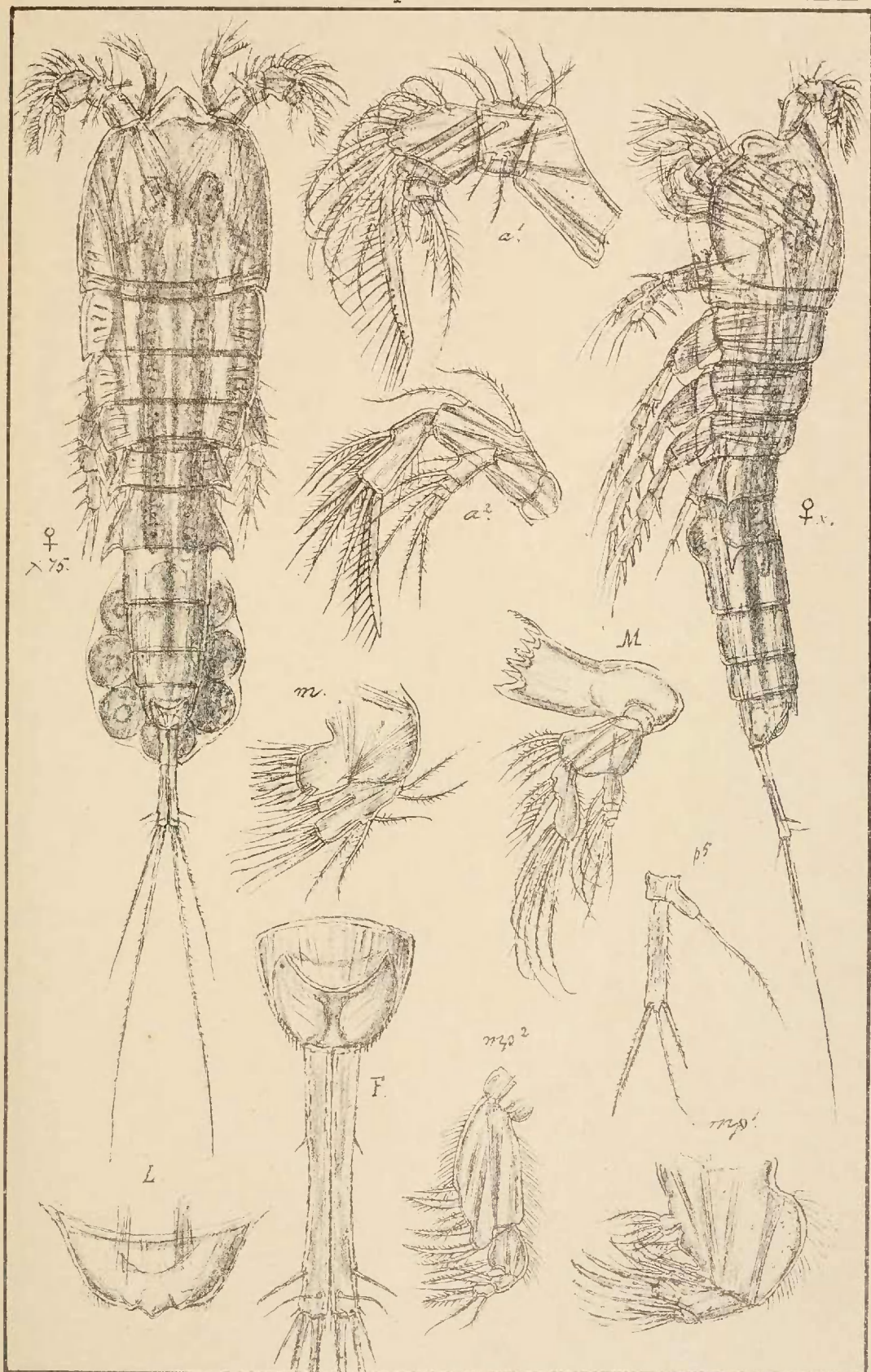
Cervinia Bradyi, Norman

Copepoda

Harpacticoida

Cerviniidæ

FLXII



G.O. Sars autogr.

Trykt i den private Opmaaling, Chra

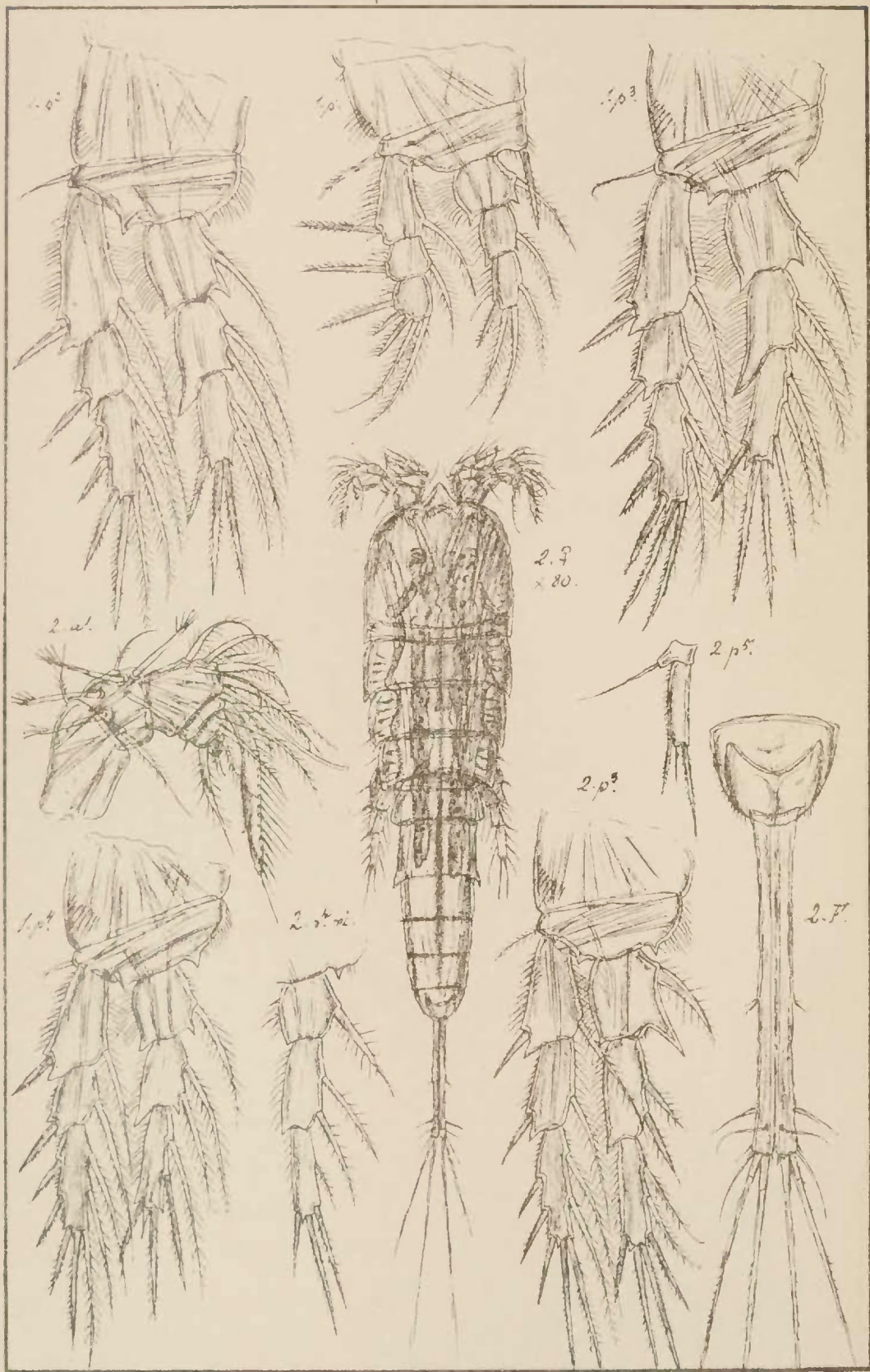
Cerviniopsis clavicornis, G.O. Sars

Copepoda

Cerviniidæ

Harpacticoida

PlXIII



G.O. Sars autogr.

Tryktil den private Opmaaling, Chra

1 *Cerviniopsis clavicornis*, G.O. Sars

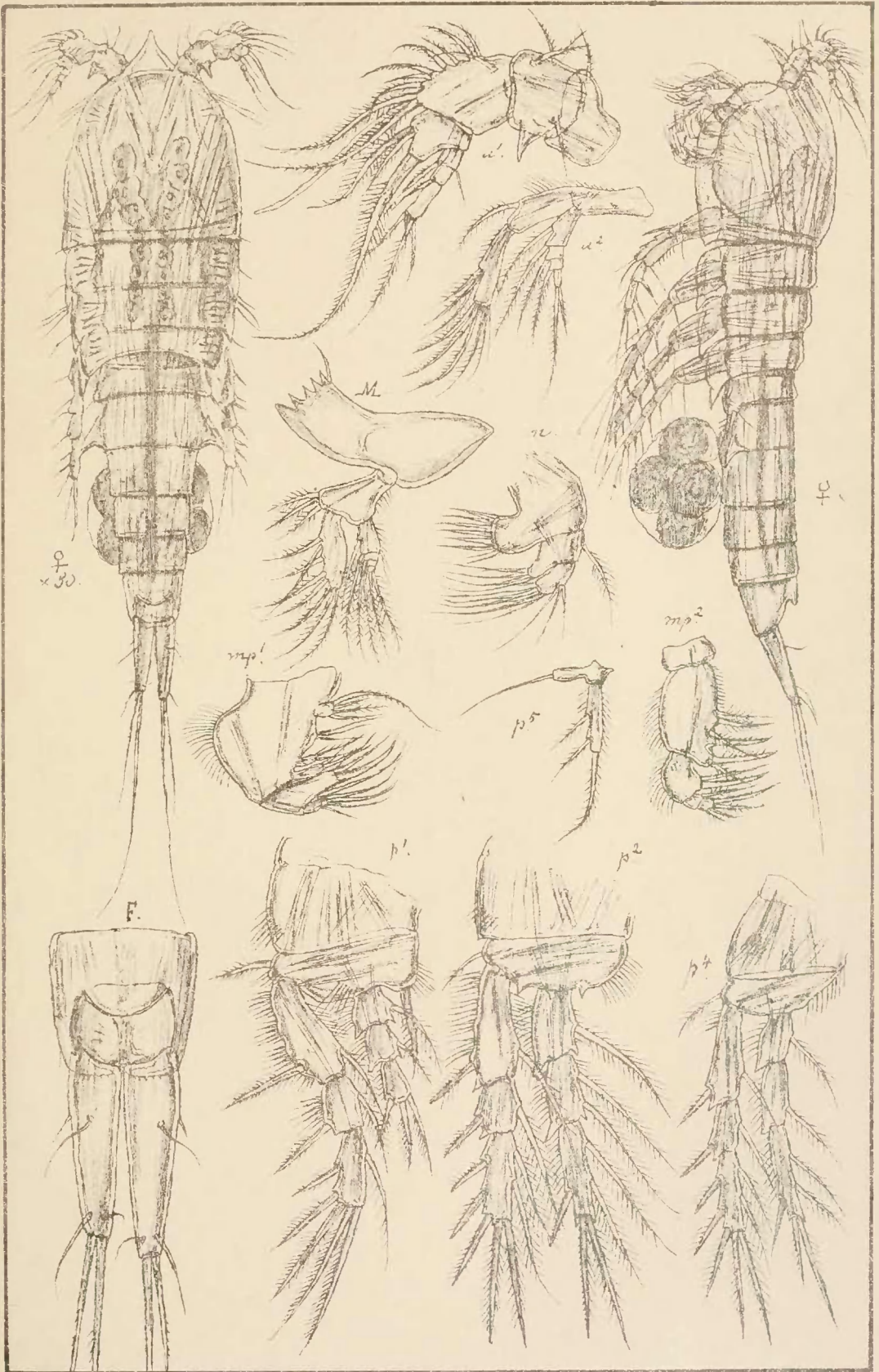
(continued)

Copepoda

Harpacticoida

Cerviniidae

PIXIV



G.O. Sars autogr.

Eucanuella spinifera, Scott.

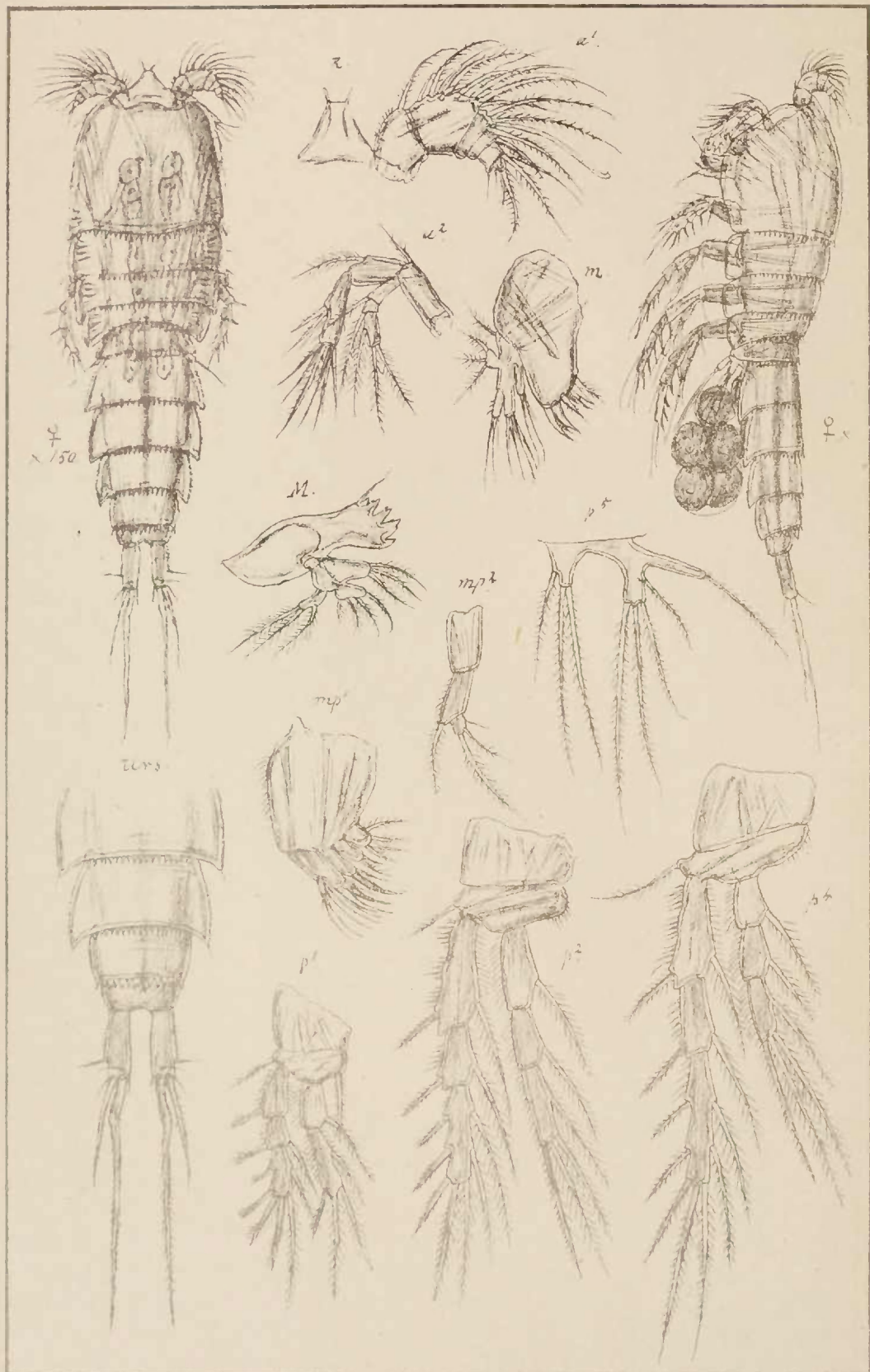
Tryktil den private Opmaaling, Chre

Copepoda

Cerviniidæ

Harpacticoida

PLXV



Copepoda

Harpacticoida

Ectinosomidæ

PLXVI

