

AN ACCOUNT
OF THE
CRUSTACEA
OF
NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

G. O. SARS

VOL. IV

COPEPODA
CALANOIDA

PART III & IV

ÆTIDEIDÆ (concluded), *EUCHÆTIDÆ*, *PHAËNNIDÆ*

WITH 16 AUTOGRAPHIC PLATES



BERGEN
PUBLISHED BY THE BERGEN MUSEUM

SOLD BY

ALB. CAMMERMEYER'S FORLAG, CHRISTIANIA

1902

abundance in almost all our deep fjords, from the Christiania Fjord up to the Vestfjord, but only in greater depths than 100 fathoms. It is accordingly, at any rate off the coast of Norway, a pronounced deep-water form, though it is very probable that in more northern latitudes it may ascend nearer to the surface.

Distribution.—Though I am much inclined to believe that this form is of arctic origin, the statements about its occurrence in the Arctic Ocean cannot be regarded as fully reliable, as it may very easily be confounded with the succeeding species. In the Polar basin investigated by Nansen, the present species did not occur.

10. *Chiridius obtusifrons*, n. sp.

(Pl. XVII.)

Chiridius armatus, G. O. Sars. The Norw. North Polar Expedition. Crustacea, p. 64, Pl. XVII (not Boeck.)

Specific Characters.—*Female.*—Very like the preceding species, though perhaps a little more slender of form. Front without any trace of a rostrum. Lateral corners of last segment of metasome, as in *C. armatus*, drawn out to comparatively short and slightly divergent acute projections. Urosome rather slender, attaining almost half the length of the anterior division; caudal rami somewhat more produced, exceeding in length the anal segment, and but slightly diverging. Anterior antennæ scarcely longer than the anterior division of the body. Posterior antennæ with the inner ramus rather short and stout, outer one fully twice its length. First pair of legs about as in *C. armatus*. Inner ramus of 2nd pair uniaarticulate, of 3rd and 4th pairs imperfectly 3-articulate, the 2 basal joints being partly confluent. *Male* much smaller than the female, but otherwise resembling that of *C. armatus*. Last pair of legs, however, much more slender, and without any trace of an inner appendage to the 2nd joint. Length of adult female 4.20 mm., of male 2.90 mm.

Remarks.—As stated above, this form was at first regarded by the present author as identical with Boeck's species, to which it certainly bears a perplexing resemblance. On a closer comparison, I have however found that in reality it differs in some points so very markedly, that it ought more properly to be regarded as a distinct species, for which the specific name *obtusifrons* is here proposed, derived from the fact of the total absence of any rostral projection on the front. Moreover, the urosome appears considerably more elongated in the female, and the caudal rami are likewise somewhat more produced. On the other hand, the anterior antennæ are comparatively shorter, and in the 2nd pair of legs the inner ramus is uniaarticulate, as in the 1st pair, without any trace of a subdivision.

The male, too, differs conspicuously not only in its small size, but also in the much more feeble and simple structure of the last pair of legs.

Occurrence.—Specimens of this arctic species were found in some of the plankton-proofs taken last year during the cruise of the "Michael Sars". It occurred at 2 different Stations (Nos. 8 & 9), located in the open sea, about midway between Iceland and Norway, the depth being recorded to be from 200 to 800 metres. Considering these finding-places, I feel justified in referring the present species to the fauna of Norway, though it has not as yet been found in the immediate vicinity of the coast.

Distribution.—The Polar basin crossed by Nansen, in many places rather abundantly, from the surface down to a depth of 300 metres.

11. *Chiridius tenuispinus*, G. O. Sars.

(Pl. XVIII.)

Chiridius tenuispinus, G. O. Sars, The Norw. North Polar Expedition. Crustacea, p. 67, Pl. XVIII.

Specific Characters.—*Female.*—Body comparatively less slender than in the 2 preceding species, with the urosome much shorter, scarcely exceeding in length $\frac{1}{4}$ of the anterior division. Front projecting below in a sharply-pointed, but short rostrum. Last segment of metasome produced on each side to a very slender spiniform process pointing straight behind. Caudal rami comparatively short, only slightly longer than they are broad, and rounded at the tip. Anterior antennæ, when reflexed, reaching about to the end of the 2nd caudal segment. Posterior antennæ with the inner ramus rather produced and very narrow, though shorter than the outer. Posterior maxillipeds still more slender than in the 2 preceding species. First pair of legs having the 1st joint of the outer ramus confluent with the 2nd, and without any spine outside. Inner ramus of 2nd pair distinctly biarticulate, that of the 2 succeeding pairs 3-articulate, with all the joints well defined. *Male* unknown. Length of adult female 3.80 mm.

Remarks.—This species, first described by the present author from Nansen's Polar Expedition, is closely allied to a form recorded by Dr. Giesbrecht from the Pacific under the name of *Gaidius pungens*, and both these forms are unquestionably congeneric. The northern form differs, however, in the more slender form of the spiniform projections issuing from the last segment of the metasome, and more especially in the fact, that the inner ramus of the 2nd pair of legs is distinctly biarticulate, whereas in the Pacific species it is uniarticulate. In my opinion the genus *Gaidius* can scarcely be supported, as the characters upon which it is founded, have proved to vary in different species of the present genus. I have

hitherto only seen female specimens of this form. The male may undoubtedly be assumed to exhibit some difference from those of the 2 preceding species, at least in the structure of the last pair of legs.

Occurrence.—Some specimens of this form were found in the same plankton-proofs in which *C. obtusifrons* occurred (Stats. 8 & 9 of the cruise of the "Michael Sars"), and moreover at Stat. 34, located considerably farther north, at some distance east of Jan Mayen, the depth at the last-named Station being recorded to be from 500 to 1000 metres. Judging from the above-mentioned occurrences, I think that the present species ought to be referred to the fauna of Norway, an opinion which has been still further confirmed by recent investigations of Mr. Nordgaard, who has found a solitary specimen in a plankton-proof taken in the year 1899 in the Ofoten Fjord.

Distribution.—Not unfrequent at 6 different Stations in the Polar basin explored by Nansen. At one of the Stations it occurred at the very surface of the sea, at the others at some depth below the ice.

Gen. 8. **Undinopsis**, G. O. Sars, 1884.

Syn: *Bradyidius*, Giesbrecht, Scott.

Generic Characters.—Body in female comparatively robust, in male somewhat more slender. Cephalosome, as in the other forms of this family, coalesced with the 1st segment of metasome, front terminating below in a distinctly bifurcate rostrum. Last segment of metasome produced on each side to a strong, posteriorly-pointing projection. Urosome in female comparatively short, in male more slender, with shortened anal segment. Caudal rami likewise short and of a structure similar to that in *Chiridius*. Eye distinct, longitudinal. Anterior antennæ in female not very slender, 24-articulate, with the last articulation well defined, bristles of the anterior edge unusually strong, partly annulated, and curved in different directions, those at the tip more or less distinctly ciliated; same antennæ in male comparatively more slender, with band-like sensory appendages on the proximal part. Posterior antennæ with the rami not very unequal in length. Oral parts on the whole resembling those in *Chiridius*; posterior maxillipeds, however, considerably more robust. Natatory legs very strongly built, inner ramus of 1st pair uniarticulate, of 2nd pair biarticulate, of the 2 succeeding pairs 3-articulate. Last pair of legs in male slender, more or less asymmetrical.

Remarks.—This genus was proposed many years ago by the present author,

to include the form erroneously identified by Brady with *Pseudocalanus armatus*, Boeck. As, however, no description was given, the generic name *Undinopsis* was overlooked, and replaced in 1897 by Dr. Giesbrecht with that of *Bradyidius*. I think, however, that I am justified in maintaining the name at first given by me to this genus. In most of the anatomical details it agrees rather closely with the genus *Chiridius*, although differing rather markedly in a few points. The anterior antennæ in the female, for instance, are of a very different appearance, owing to their much coarser structure and the dense supply of unusually strong bristles, which give them a peculiar hirsute appearance. In the relative length of the rami of the posterior antennæ, and in the robust form of both the posterior maxillipeds and the natatory legs this genus also differs conspicuously from *Chiridius*. The genus comprises 2 nearly-allied species, both of which exactly agree in habits, and, unlike what is generally the case with the Calanoida, are true bottom-forms, never found except close to the ground.

12. *Undinopsis Bradyi*, G. O. Sars.

(Pl. XIX, XX).

Undinopsis Bradyi, G. O. Sars, in Sp. Schneider's Report of Invertebrata from the Kvænangen Fjord, 1884.

Syn: *Pseudocalanus armatus* Brady (not Boeck).

" *Bradyidius armatus*, Giesbrecht, Scott.

Specific Characters.—*Female.* Anterior division of body, seen dorsally, oval fusiform in shape, greatest width considerably exceeding $\frac{1}{3}$ of the length, and occurring in the middle, both extremities about equally narrowed; seen laterally, moderately vaulted above, frontal part obtusely truncated anteriorly, and projecting below to a small, but highly chitinised and distinctly bifurcate rostrum. Lateral projections of last segment of metasome very strong, mucroniform, and slightly divergent, reaching beyond the genital segment. Urosome not nearly attaining $\frac{1}{3}$ of the length of the anterior division, genital segment slightly incrasated, though not very protuberant below. Caudal rami scarcely longer than they are broad, and rounded at the tip, apical setæ distinctly biarticulate and very much elongated, especially the innermost but one. Eye in the living animal very conspicuous, bright red, and oblong in form. Anterior antennæ about the length of the anterior division of body, all articulations very sharply defined, with the bristles strongly developed, especially the distal ones, which form together a dense brush. Posterior antennæ with the outer ramus scarcely longer than the inner. Inner ramus of 2nd to 4th pairs of legs with scattered small spinules on the posterior face.

Male considerably more slender than female, with the lateral corners of last segment of metasome far less produced. Urosome very narrow, with the last segment much shortened; caudal rami generally spread to each side. Anterior antennæ rather slender, with the number of articulations considerably reduced. Last pair of legs simple, without any trace of an inner ramus, left leg very slender, right leg rudimentary, scarcely more than $\frac{1}{3}$ as long as the left, and 3-articulate, last joint conically produced at the tip.

Colour. Body pellucid, with a faint yellowish tinge, and in female variegated with scattered light red patches, partly confluent into transverse bands; intestine translucent with a dark ochraceous hue; ovaries purple-coloured.

Length of adult female 2.65 mm., of male 2.20 mm.

Remarks.—This is unquestionably the form described by Brady as *Pseudocalanus armatus*, Boeck. Since this identification of Brady has turned out to be wrong, another specific name should of course have been assigned to the present species, the more so as the name *armatus* has been used for two other forms belonging to the present family, viz., *Etideus armatus* and *Chiridius armatus*. I therefore think that the name *Undinopsis Bradyi*, long ago proposed by the present author for this form, ought to be preferred to that of *Bradyidius armatus* used by most other authors.

Occurrence.—I have met with this form in several places on the Norwegian coast, from the Christiania Fjord to Vardø. It is only found close to the ground in depths ranging from 20 to 40 fathoms, muddy bottom, and accordingly cannot, as a rule, be taken with the ordinary surface-net, but only by the aid of the dredge. In order to get specimens in uninjured condition, the dredge must, however, be of a very light kind and so constructed, that it only sweeps the bottom, without being filled up with mud. By the aid of such a dredge I have succeeded in obtaining this form rather abundantly in some places, and have not infrequently had the opportunity of examining it in the living state. Like most other Calanoids, it moves in two different manners, now proceeding quite slowly by rapid vibrations of the posterior antennæ and the mandibular palps, now making abrupt bounds by energetic strokes of the powerful natatory legs. When kept for observation in a glass bottle with a small quantity of mud, it is always found to keep close to the bottom, moving about along the mud in a horizontal direction. By far the greater number of specimens obtained are of the female sex. Male specimens are extremely rare, and seem only to occur at certain seasons.

Distribution.—British Isles (Brady, Scott), Greenland (Vanhöffen).

13. *Undinopsis similis*, G. O. Sars, n. sp.

(Pl. XXI).

Specific Characters.—*Female.* Very like the preceding species in external appearance, though perhaps somewhat more robust of form. Lateral projections of last segment of metasome comparatively short, scarcely reaching beyond the middle of the genital segment. Anterior antennæ likewise shorter than in *U. Bradyi*, not nearly attaining the length of the anterior division, otherwise of a structure very similar to that of the said species. Posterior antennæ with the outer ramus distinctly longer than the inner. Inner ramus of 2nd to 4th pairs of legs without any spinules on the hind face.

Male resembling that of the type species; the anterior antennæ, however, less slender, and with all the articulations well defined. Both legs of 5th pair well developed, and having at the end of the 2nd joint inside a styliiform appendage (inner ramus), right leg considerably stronger than left, and terminating in an incurved claw.

Colour about as in *U. Bradyi*, though with less distinct pigmentation.

Length of adult female 3.00 mm., of male 2.40 mm.

Remarks.—This form so very closely resembles the type species in its external appearance, that it may easily be confounded with it, and, indeed, it is only quite recently that I have been aware of its specific distinctness. On a closer examination, however, several well-marked differences are found to exist in both sexes, proving it to be in reality a well-defined species. Thus in the female the lateral projections of the last segment of the metasome are far less produced, and the anterior antennæ comparatively shorter. In the male these antennæ are also less slender than in the male of *U. Bradyi*, differing, moreover, in the fact that all the articulations are well defined, whereas in the type species some of them are coalesced. Finally, the last pair of legs in the male exhibit a very different appearance from those in *U. Bradyi*, the right leg, which in that species is rudimentary, being here considerably stronger than the left, both legs having, moreover, a well-marked rudiment of an inner ramus that is wholly wanting in the type species.

Occurrence.—I have found this form not unfrequently in the inner part of the Stavanger Fjord, at Jelsö and Sunde. Like the preceding species, it only occurred close to the ground, and was accordingly captured by the aid of the dredge, the depth ranging from 50 to 100 fathoms. It is very probable, that this form also occurs in other places upon our coast; but having formerly confounded it with *U. Bradyi*, I am unable at present to state the localities with certainty.

Gen. 9. **Bryaxis**, Boeck, M. S.

Generic Characters.—Body short and robust, with the anterior division considerably tumefied. Cephalosome wholly confluent with the 1st pedigerous segment, and having the lower edges deeply insinuate at the oral region, front without any trace of a rostrum below. Lateral corners of last segment of metasome produced to acute lappets. Urosome nearly as in *Undinopsis*. Eye wholly absent. Anterior antennæ comparatively short and robust, 24-articulate, and densely clothed with ciliated bristles. Posterior antennæ with the outer ramus poorly developed. Mandibles with the palp exceedingly large, rami very unequal. Maxillæ and anterior maxillipeds about as in *Undinopsis*. Posterior maxillipeds very largely developed, with a peculiar sensory appendage at the end of the 1st basal joint. Legs of a structure similar to that in *Undinopsis*. Male unknown.

Remarks.—This genus, to which the M. S. name *Bryaxis* had been applied by Boeck, is allied to *Undinopsis*, although it differs rather markedly in the absolute absence of both rostrum and eye, as also in the structure of the posterior antennæ, mandibles and posterior maxillipeds. It contains as yet only a single species, to be described below.

14. **Bryaxis brevicornis**, Boeck, M. S.

(Pl. XXII, XXIII).

Specific Characters.—*Female.* Anterior division of body, seen dorsally, regularly elliptical in outline, greatest width nearly attaining half the length, anterior extremity evenly rounded, posterior somewhat contracted; seen laterally, evenly vaulted anteriorly, front obtuse, without any trace either of a rostrum or tentacular appendages below, inferior edges of cephalosome remarkably inflexed in the middle. Lateral lappets of last segment of metasome very acute and obliquely upturned. Urosome scarcely attaining $\frac{1}{3}$ of the length of the anterior division. Caudal rami short, rounded at the tip, apical setæ rather elongated. Anterior antennæ much shorter than the anterior division of the body, all the articulations sharply defined and clothed with very strong, ciliated bristles. Posterior antennæ with the outer ramus not even attaining half the length of the inner, and 6-articulate, last joint very small, with the apical setæ rudimentary. Inner ramus of mandibular palp poorly developed, with only 4 apical setæ. Sensory appendage of posterior maxillipeds club-shaped. Colour bright yellow. Length of adult female 2.60 mm.

Remarks.—In the notes on Copepoda left by Boeck this form is named as above. No description however, has, been published, and the figures accompanying the notes are, as far as this form is concerned, copies from some drawings long ago executed by the present author. It would seem therefore, that Boeck himself had not observed this Calanoid. The present form may be at once distinguished from the others belonging to the family *Ætideidæ*, by its unusually short and robust body and the comparatively short and densely setiferous anterior antennæ. Moreover, the upturned acute lateral lappets of the last segment of the metasome distinguish it very conspicuously.

Occurrence.—I have met with this peculiar Calanoid in several places off the Norwegian coast, from the Stavanger Fjord to Apelvær (Namdal), but only in greater depths ranging from 50 to 150 fathoms. Like the species of the genus *Undinopsis*, it is a true bottom-form, always keeping close to the ground, and accordingly only to be obtained by the aid of the dredge. I have several times had an opportunity of observing this form in the living state. It moves in a peculiar revolving manner, chiefly by the aid of the posterior antennæ and the powerfully developed mandibular palps, only now and then making an abrupt bound by the action of the natatory legs. All the specimens which I have seen, are of the female sex. The male, when once detected, will undoubtedly exhibit some additional distinguishing character of the present genus. Out of Norway this form has not yet been observed.

Fam. 6. Euchætidæ.

Characters.—Cephalosome coalesced with the 1st pedigerous segment, or at any rate imperfectly defined from it, front projecting in an acute, undivided rostrum. The last 2 segments of metasome united. Urosome consisting in female of 4 segments, the last of which, however, is very small, genital segment more or less protuberant below. Caudal rami short, with the outermost marginal seta rudimentary, appendicular bristle issuing from the inner corner of the rami, and generally much elongated. Anterior antennæ slender, with some of the bristles of the anterior edge very long and extending in different directions; those of male provided at the base with strongly developed sensory appendages. Posterior antennæ and mandibles normal. Maxillæ with the palp incurved in an unusual manner. Both pairs of maxillipeds very powerfully developed; the posterior ones

especially unusually strong, with the terminal part reflexed and armed with long claw-like spines. Oral parts in male much degenerated. Natatory legs powerfully developed, and on the whole resembling in structure those in the *Ætideidæ*. 5th pair of legs wholly wanting in female, those in male exceedingly large and powerful. Ovisac present in female.

Remarks.—This family as yet only comprises a single genus, viz., *Euchæta*, Philippi, which, however, exhibits some very conspicuous structural differences from the other *Amphascandria*. The genus was also regarded by Dr. Giesbrecht as the type of a particular subfamily, *Euchætinae*, which I now propose, in accordance with the plan followed in this account, to raise to the rank of a true family.

Gen. 10. **Euchæta**, Philippi, 1852.

Generic Characters.—Body comparatively slender, especially in the male, with the cephalosome attenuated in front, rostrum pointing in female obliquely forwards, in male more downwards, and having at the base in front a more or less projecting ledge. Lateral corners of last segment of metasome rounded off, and generally densely clothed with hairs below. Urosome, as a rule, more elongated than in the *Ætideidæ*, genital protuberance in female very prominent, and of different form in the different species. Caudal rami in female firmly connected with the last caudal segment, in male mobile, marginal setæ spread in a fan-like manner and beautifully plumous, the innermost but one much longer than the others, appendicular bristle generally very slender, hair-like and geniculate at the base. Eye small, subventral. Anterior antennæ in female 24-articulate, 3rd, 7th, 8th and 13th articulations each carrying an unusually long bristle at the end anteriorly; terminal articulation very small, with a long reflexed seta on the tip. Epistome produced in front of the anterior lip to a knob-like, densely hirsute projection. Anterior maxillipeds with the spines of the terminal part very strong, claw-like. Posterior maxillipeds with the 2nd basal joint very large, fusiform, attenuated distally. Both pairs in male much reduced in size. 1st pair of legs much smaller than the others, and having the first 2 joints of the outer ramus confluent in female. Inner ramus of the first 2 pairs of legs uniaarticulate, of the 2 succeeding pairs 3-articulate. Both legs of last pair in male well developed; right leg with a long styliform inner ramus, outer ramus biarticulate, with the distal joint claw-like; left leg terminating in a complicated hand, by which the spermatophore is seized.

Remarks.—This genus was established in the year 1852 by Philippi, to comprise the Mediterranean form recorded by Prestandrea as *Cyclops marinus*. Subsequently several additional species have been described, some of which, however, have justly been removed by Dr. Giesbrecht, and referred to particular genera of the family *Ætideidæ*. A considerable number of species are still left, amounting to about 16 in all. To the Norwegian fauna belong 3 species, to be described below, all of which are remarkable from their large size, representing in fact the largest known Calanoids.

15. *Euchæta norvegica*, Boeck.

(Pl. XXIV, XXV, XXVI).

Euchæta norvegica, Boeck. Nye Slægter og Arter af Saltvandscopepoder. Chr. Vid. Selsk. Forh. 1872, p. 40.

Syn: *Euchæta Prestandree*, Boeck (not Philippi).

” — *carinata*, Mœbius.

Specific Characters.—*Female.* Form of body rather slender. Anterior division, seen dorsally, oblong fusiform in outline, greatest width about equalling $\frac{1}{3}$ of the length, anterior extremity considerably more narrowed than the posterior. Cephalosome faintly defined from the 1st pedigerous segment, rostral ledge but slightly prominent. Lateral lobes of last segment of metasome somewhat produced and narrowly rounded, exhibiting at the tip a small nodiform projection. Urosome unusually slender, exceeding half the length of the anterior division, genital segment with the proximal part rather narrow, carrying 2 small juxtaposed tubercles below, genital protuberance very large and thick, proceeding from the hind part of the segment, and at right angles to it, tip blunted and exhibiting on each side a small projecting lobule. The 2 middle caudal segments of about equal size and minutely hairy. Caudal rami about the length of the last caudal segment, and obliquely oval in form, inner corner drawn out to a conical process carrying the appendicular bristle; the latter exceedingly slender, almost attaining the length of the whole body, and distinctly geniculate at the base; marginal setæ very densely plumous, the innermost but one considerably longer than the others, which are nearly equal in length. Anterior antennæ slightly exceeding in length the anterior division of the body, the proximal articulations finely hairy on the posterior edge.

Male exceedingly slender in form, with the cephalon and 1st pedigerous segment wholly coalesced, rostrum deflexed. Urosome narrow cylindric in form, and, as usual, 5-articulate, last segment, however, almost obsolete, hind edge of the 2 middle segments divided into delicate flattened denticles. Caudal rami more rounded than in female, and movably articulated to the last segment, appendicular

bristle comparatively short. Anterior antennæ somewhat thickened at the base, and only 22-articulate. Masticatory part both of the mandibles and maxillæ obsolete. Anterior maxillipeds extremely small and rudimentary. Posterior maxillipeds likewise much smaller than in female, spines of the terminal part transformed to flexible ciliated setæ. 1st pair of legs with the outer ramus distinctly 3-articulate. Last pair of legs considerably exceeding the urosome in length, left leg with the hand shorter than the preceding joint and slightly widening distally, with the inner edge coarsely dentate, thumb produced to a sharp unguiform point, dactylus short, with a brush of hairs inside the tip, appendicular lappet obtusely rounded.

Colour. Body pellucid, with the oral region more or less deeply tinged with crimson; ova in the ovisac dark blue. Caudal setæ with the cilia beautifully iridescent.

Length of adult female about 8 mm., of male 7 mm.

Remarks.—This form was first recorded by Boeck from the Norwegian coast, but at first erroneously identified with *E. Prestandrea*, Philippi (= *E. marina* Prestandrea), which species does not occur in the northern Ocean. The form recorded by Moebius as *E. carinata*, is unquestionably identical with Boeck's species. On the other hand, the form described and figured by the present author, in his account of the Crustacea of the Norwegian North Atlantic Expedition, as *E. norvegica*, Boeck, is not that species, but a nearly allied form, *E. barbata*, Brady; and the form recorded from Nansen's Polar Expedition under the same name, has also, on a closer examination, turned out to be a different species, viz., *E. glacialis*, Hansen. Both these species are now proved to belong to the fauna of Norway, and will be described below. The present species is chiefly characterised by its unusually slender body, the form of the genital protuberance in the female, and the structure of the hand in the last left leg of the male.

Occurrence.—I have found this handsome Calanoid rather frequently along the whole Norwegian coast, from the Christiania Fjord to Vadsö, especially in the great depths of the fjords. At times, however, it also ascends nearer to the surface, and in the several proofs of plankton taken during the cruise of the "Michael Sars" in the open sea, it was by no means unfrequent. Male specimens are not infrequently found, and are at once recognized by their extremely slender body and the largely developed last pair of legs.

Distribution.—Occasional in two different places in the polar basin crossed by Nansen,

16. *Euchæta glacialis*, Hansen.

(Pl. XXVII).

Euchæta glacialis, Hansen. Oversigt over de paa Dimplna-Togtet indsamlede Krebsdyr, p. 74, Pl. XXIII, figs. 5—5 K, Pl. XIV, figs. 1—1 d.

Syn: *Euchæta norvegica*, G. O. Sars (part).

Specific Characters.—*Female.* Very like the preceding species in its external appearance, though of larger size and somewhat more robust form of body. Cephalosome not defined from the 1st pedigerous segment by any perceptible demarcation, form of rostrum as in *E. norvegica*. Lateral lobes of last segment of metasome slightly angular, but without any tuberculiform projection at the tip. Urosome comparatively shorter, not nearly attaining half the length of the anterior division, genital protuberance issuing from about the middle of the segment, and broadly conical in form, extending somewhat obliquely behind, tip provided on each side with 2 narrowly rounded lobules. Outer caudal segments minutely hairy. Caudal rami comparatively shorter than in *E. norvegica* and less oblique, appendicular bristle not exceeding in length the marginal setæ, and slightly flexuous at the base, the innermost but one of the caudal setæ almost twice the length of the others. Structure of the several appendages almost exactly as in *E. norvegica*.

Male likewise closely resembling that of the said species, though perhaps somewhat less slender of form, and differing in the structure of the hand of the last left leg, the thumb of which has the form of an oblong quadrangular plate closely crenulated along the edges, and transversely truncated at the tip.

Colour more or less bright red.

Length of adult female about 10 mm., of male 8 mm.

Remarks.—This form was first described by Dr. Hansen in the above-quoted paper. I did not, however, at first recognise its specific difference from *E. norvegica*, and it was therefore, in my account of the Crustacea of Nansen's Polar Expedition, only quoted as a synonym to that species. The closer examination which I have recently instituted, however, has led to the result, that Dr. Hansen's species ought to be maintained, though it certainly comes very near to *E. norvegica*. The chief differences consist in the somewhat more robust form of the body, the more conical genital protuberance in the female, and the rather different structure of the thumb in the left last leg of the male. It also attains a considerably larger size, some of the specimens even exceeding 10 mm. in length.

Occurrence.—In the immediate neighbourhood of the Norwegian coast this form has not yet been met with. I have, however, recently found it in 3

of the plankton-samples taken during the cruise of the "Michael Sars" in 1900, two of which were from the Norwegian Sea, the one (St. 9) about midway between Iceland and Norway, the other farther north, at some distance east of Jan Mayen, the depth at the first-named Station being recorded to be from 200 to 400 metres, at the last-named from 500 to 1000 metres.

Distribution.—The Kara Sea (Hansen), Polar basin crossed by Nansen, rather abundant in many places, from 300 metres up to the very surface of the sea (the present author).

17. *Euchæta barbata*, Brady.

(Pl. XXVIII).

Euchæta barbata, Brady. Report on the Copepoda of the Challenger Expedition, p. 66, Pl. XXII, figs. 6—12.

Syn: *Euchæta norvegica*, G. O. Sars (part).

Specific Characters.—*Female.* General form of body closely resembling that of *E. glacialis*. Cephalosome wholly coalesced with the 1st pedigerous segment, rostrum as in the 2 preceding species; epistomal protuberance very densely hirsute. Lateral corners of last segment of metasome broadly rounded off and densely hairy below. Urosome not nearly attaining half the length of the anterior division, genital protuberance comparatively less prominent than in the 2 preceding species, and issuing from the anterior part of the segment, apical lobules very unequal, the anterior ones being much larger than the posterior and recurved in a beaklike manner. Outer caudal segments densely clothed with hairs, which, especially on the ventral face, are rather long and to some extent arranged in fascicles. Caudal rami comparatively short and likewise densely hairy on both edges; innermost but one of the caudal setæ almost twice as long as the others; appendicular bristle, as in *E. norvegica*, very much elongated, and distinctly geniculate at the base. Antennæ, oral parts, and legs scarcely differing in their structure from those parts in the 2 preceding species.

Male exhibiting the same differences from the female as in the 2 preceding species. Hand of left last leg, however, somewhat different, the thumb not being produced at the end, but coarsely denticulated along the inner edge, 2 of the denticles larger than the others, dactylus as in the 2 preceding species, appendicular lobe, however, narrower, cylindrical in form and hamiformly curved at the tip.

Colour bright red.

Length of adult female reaching to 12 mm., of male to 10 mm.

Remarks.—It is with considerable hesitation that I refer this form to Brady's species. I cannot, however, in the rather imperfect description and figures given by that author, find any essential difference which would forbid such an identification. In its general appearance this form closely resembles *E. glacialis*, from which species it is, however, at once distinguished by the rather different form of the genital protuberance in the female, as also by the great length of the appendicular bristle of the caudal rami, in which latter respect it agrees with *E. norvegica*. The dense hispidity of the outer caudal segments in the female likewise furnishes an easily recognizable character. In the male the hand of the left last leg looks somewhat intermediate in structure between that of the last-named species and of *E. glacialis*, the thumb resembling in form that in *E. glacialis*, whereas its armature more closely agrees with that in *E. norvegica*. This form is perhaps the largest of all known Calanoids, its size even exceeding that of *E. glacialis*.

Occurrence.—Several well-preserved specimens of this magnificent form were found in the above-mentioned plankton-sample from St. 34 of the cruise of the "Michael Sars". A single specimen, moreover, occurred in another plankton-sample taken at Stat. 46, at some distance west of the Lofoten Islands. The same species was also procured during the Norwegian North Atlantic Expedition by the aid of the trawl in several places in the Norwegian Sea, and always in great depths, down to 2000 fathoms. The figures given in my account of the Crustacea of that Expedition refer to this species, and not to *E. norvegica*. In the Polar basin crossed by Nansen, this form did not occur.

Distribution.—South Atlantic Ocean in lat. 36° 44' S., long. 46° 16' W., depth 2650 fathoms (Brady).

Fam. 7. Phaënnidæ.

Syn: *Scolecithricina*, Giesbrecht (part).

Characters.—Form of body, as a rule, rather robust, with the anterior division more or less tumefied. Cephalosome coalesced with the 1st pedigerous segment or imperfectly defined from it; frontal part rounded, rostral prominence with or without tentacular appendages. Last segment of metasome more generally defined from the preceding one. Urosome comparatively short, with the genital segment in female not very protuberant below, last segment small. Eye

generally double. Anterior antennæ in female of moderate length or comparatively short, 23- or 24-articulate; those of male with the usual supply of sensory appendages, and having some of the articulations confluent. Posterior antennæ with the outer ramus generally longer than the inner, and 6-articulate. Oral parts on the whole normal, except the anterior maxillipeds, which are rather short and clearly characterised by the peculiar transformation of the setæ of the terminal part into extremely delicate, incurved cylindric appendages terminating in a brush of fine ciliæ. Natatory legs strongly built, and of a structure similar to that in the *Ætideidæ*. 5th pair of legs in female generally present, though rather small, triarticulate, not natatory; those in male comparatively simple, left leg the longer.

Remarks.—This new family is established to comprise some genera referred by Dr. Giesbrecht to his subfamily *Scolecithricinæ*, for which the genus *Scolecithrix* of Brady is the type. As, however, the species referred to the latter genus in reality belong to several distinct genera, I have felt justified in comprising those genera in a separate family, *Scolecithricidæ*, to be treated of farther on. The chief character of the present family consists in the peculiar transformation of the setæ of the terminal part of the anterior maxillipeds to extremely delicate penicillate appendages, not found in any of the preceding families. In other respects, the forms belonging to this family recall, both in their external appearance and in several of the structural details, that of the *Ætideidæ*. Whereas, however, in the latter family the 5th pair of legs are always wanting in the female, these legs are generally present, though in a rudimentary state, in the *Phaënnidæ*. We know at present of 3 distinct genera belonging to this family, viz., *Phaëнна*, Claus, *Pseudophaëнна*, G. O. Sars, and *Xanthocalanus*, Giesbrecht. Of these the 2 last-mentioned are represented in the fauna of Norway.

Gen. 11. *Pseudophaëнна*, G. O. Sars, n.

Generic Characters.—Body comparatively short and stout, with the anterior division considerably tumefied. Cephalosome completely coalesced with the 1st pedigerous segment, frontal part rounded and projecting below in an undivided rostrum, obtuse at the tip. Last segment of metasome very small, but distinctly defined from the preceding one, lateral lobes but slightly produced. Urosome in female comparatively short, 4-articulate, in male more slender, last segment in both sexes rather small. Caudal rami short, obtusely rounded at the tip, apical setæ rather elongated, appendicular bristle small. Eye consisting of two closely

approximate halves. Anterior antennæ comparatively short and rather densely setiferous, consisting in female of 23 articulations. Posterior antennæ with the outer ramus very large, inner poorly developed, with the apical setæ much reduced in number. Mandibles well developed, with the teeth of the masticatory part strong and partly bidentate. Exopodite of maxillæ very small, bisetose. Anterior maxillipeds with all the spines of the basal part of the same structure though of different length, and very flexible. Posterior maxillipeds rather powerful, with the 2nd basal joint fusiformly dilated, terminal part comparatively short. Oral parts in male considerably reduced. Natatory legs strongly built, inner ramus with no spinules on the hind face. 5th pair of legs in female very small, with the terminal joint simple, digitiform; those in male with both legs well developed.

Remarks.—This new genus is somewhat intermediate between *Phaënna* and *Xanthocalanus*, agreeing with the former in the robust form of the body, with the latter in the presence in the female of distinct, though very small legs of 5th pair. From both these genera it differs very markedly in several of the structural details, though in the peculiar transformation of the apical setæ of the anterior maxillipeds it exactly agrees with both of them. The genus at present only contains a single species, to be described below.

18. *Pseudophaënna typica*, G. O. Sars, n. sp.

(Pl. XXIX, XXX).

Specific Characters.—*Female.* Anterior division of body, seen dorsally, regularly oval or elliptical in outline, greatest width about equalling half the length, anterior extremity narrowly rounded, posterior somewhat contracted. Cephalosome with the dorsal margin forming a quite even curve up to the tip of the rostrum; the latter conical in form and pointing straight downwards. Last segment of metasome very small, with the lateral lobes narrowly rounded. Urosome scarcely attaining $\frac{1}{3}$ of the length of the anterior division, genital segment about the length of the 2 middle segments combined. Caudal rami a little longer than they are broad, and scarcely at all divergent, innermost but one of the apical setæ longer than the others. Anterior antennæ scarcely longer than the anterior division of the body, and rather densely setous, all the articulations sharply defined. Posterior antennæ with the outer ramus more than twice as long as the inner, terminal joint of the latter with only 3 or 4 setæ on each of the lobules. Posterior maxillipeds with the 2nd basal joint almost twice as long as the 1st, and considerably dilated in the middle, terminal part scarcely half as long, and more or less incurved, with the 2 outer joints very small, procurved setæ of the preceding ones very

strong, spiniform. Last pair of legs extremely small, though distinctly 3-articulate, basal joint rather thick and armed at the end inside with densely crowded spinules, last 2 joints unarmed, middle one very short, terminal joint straight, digitiform.

Male not differing much from female in its external appearance, though having the urosome considerably more slender, and, as usual, 5-articulate. Anterior antennæ consisting of only 21 articulations. Both pairs of maxillipeds considerably transformed, the anterior ones very small, the posterior ones with the terminal part reflexed. Last pair of legs very slender, right leg 5-articulate and reaching beyond the antepenultimate joint of left.

Colour dark yellowish brown.

Length of adult female 1.60 mm., of male 1.40 mm.

Remarks.—In its general appearance this Calanoid somewhat recalls the *Ætideid* described above as *Bryaxis brevicornis*, Boeck, having a similar robust form of body and also comparatively short and densely setous anterior antennæ. On a closer examination, however, it is found to differ very essentially, so that it cannot even be included in the same family. It also somewhat resembles the Mediterranean form, *Phaënna spinifera*, Claus; but this Calanoid has the body still more robust, whereas its anterior antennæ are considerable more slender.

Occurrence.—I have found this peculiar Calanoid occasionally in several places on the Norwegian coast, from the Christiania Fjord to Vardö, and always, like the species of the genus *Undinopsis*, only close to the ground in depths ranging from 20 to 50 fathoms. It accordingly is a true bottom-form, unlike what is generally the case with the Calanoida. Out of Norway this form has not yet been found.

Gen. 12. **Xanthocalanus**, Giesbrecht, 1892.

Generic Characters.—Body less robust than in the preceding genus, with the cephalosome more or less distinctly defined from the 1st pedigerous segment, rostral prominence with 2 soft posteriorly-pointing tentacular appendages. Lateral lobes of last segment of metasome produced to more or less prominent acute lappets. Urosome short, of a structure similar to that in the preceding genus. Two eyes present, separated by a distinct interspace. Anterior antennæ in female rather slender, 24-articulate, bristles of anterior edge not very strong, 2 of them issuing from the basal joint finely plumose; those of male richly supplied with sensory appendages, and having some of the articulations coalesced. Posterior

antennæ with the inner ramus well developed, though somewhat shorter than the outer. Mandibles comparatively narrow, with the teeth of the masticatory part simple. Maxillæ normal. Anterior maxillipeds with each of the 2 outer digitiform lobes carrying a strong, claw-like spine, coarsely denticulate inside. Posterior maxillipeds rather slender. Inner ramus of 2nd to 4th pairs of legs armed on the hind face with oblique rows of rather strong spinules. Last pair of legs in female with the terminal joint spiniferous; those of male comparatively simple, left leg very slender, right rudimentary or wanting.

Remarks.—This genus was established in the year 1892 by Dr. Giesbrecht, to comprise 2 supposed species from the Mediterranean, viz., *X. agilis* and *minor*. In my opinion, however, the latter species ought to be discarded, being apparently only founded upon immature specimens of the former. The genus is easily distinguished both from *Phaëna* and *Pseudophaëna* by the less robust form of body, the structure of the rostral part, and the acutely produced lateral lobes of the last segment of the metasome. Moreover, the 2 strong and coarsely dentate spines on the anterior maxillipeds are rather characteristic, as also the structure of the last pair of legs in both sexes. Two well-defined, though closely allied species, to be described below, belong to the fauna of Norway.

19. *Xanthocalanus borealis*, G. O. Sars.

(Pl. XXXI, XXXII).

Xanthocalanus borealis, G. O. Sars. Crustacea of the Norwegian North Polar Expedition, p. 49, Pl. XI.

Specific Characters.—*Female.* Anterior division of body, seen dorsally, oblong oval in form, greatest width not attaining half the length, anterior extremity narrowly rounded, posterior slightly contracted. Cephalosome evenly vaulted above, and defined from the 1st pedigerous segment by a faint curved suture. Last segment of metasome completely coalesced with the preceding one, lateral lobes drawn out to acute, posteriorly-pointing lappets reaching in adult specimens beyond the middle of the genital segment. Urosome scarcely exceeding $\frac{1}{4}$ of the length of the anterior division, genital segment fully as long as the 2 succeeding ones combined. Caudal rami very short, scarcely longer than they are broad, apical setæ much elongated, especially the innermost but one, and somewhat divergent. Anterior antennæ very slender, when reflexed reaching about to the end of the genital segment. Posterior antennæ with the outer ramus but slightly exceeding the inner in length. Spinules on the hind face of the inner ramus in 2nd and 3rd pairs of legs regularly disposed in a single oblique row, those in 4th pair

more irregularly arranged, and wanting on the last joint. 5th pair of legs somewhat curved, with the inner edge of the basal joint densely spinulose, 2nd joint conspicuously dilated in the middle, almost globose, and slightly spinulose inside, terminal joint about the same length but much narrower, and armed in mature specimens with 4 short ciliated spines, 2 apical and 2 lateral. These legs in younger specimens of rather different appearance, the 2 outer joints being confluent to an angularly curved piece carrying only 3 spines on the tip.

Male considerably smaller than female and of more slender form, with the lateral lobes of last segment of metasome less prominent. Urosome very narrow, and comparatively longer than in female, caudal rami mobile. Anterior antennæ modified in the usual manner. Oral parts less rudimentary than in most other *Amphascandria*. Left leg of last pair exceedingly slender, with the 4th joint very narrow, linear, and longer than the last 2 joints combined; right leg distinctly developed, though very small, reaching about to the end of the 2nd joint of the left.

Colour. Body in both sexes whitish, pellucid, tinged in some places with a slight reddish pigment.

Length of adult female 3.50 mm., of male 2.50 mm.

Remarks.—This form was first described by the present author from a somewhat defective female specimen procured during Nansen's Polar Expedition. The apparent differences in the general form of the body, and especially in the structure of the last pair of legs, between the polar specimen and the Norwegian form here described, may be accounted for by the circumstance that that specimen was not fully mature, though of rather large size. I have found similar differences in young specimens of the Norwegian form. The present species is easily distinguished from the type species, *X. agilis*, Giesbrecht, both by its much larger size and by several other characters, for instance, the presence in the male of a right leg in the last pair.

Occurrence.—I have found this form not infrequently in the Stavanger Fjord, at Jelsö and Sunde, as also in a few other places off the west coast of Norway. The specimens were only procured by the aid of the dredge from very considerable depths, down to 400 fathoms, where it occurred together with *Chiridius armatus*, Boeck. The character of this Calanoid as a relict arctic form has been proved by the occurrence of a specimen of apparently the same species in the Polar Sea, at a far less depth.

Distribution.—Polar basin, north of the New Siberian Isles (a solitary young female specimen).

20. *Xanthocalanus propinquus*, G. O. Sars, n. sp.
(Pl. XXXIII).

Specific Characters.—*Female.* Form of body resembling that of the preceding species, though somewhat less slender. Last segment of metasome defined from the preceding one by a distinctly marked suture, lateral lappets comparatively shorter than in *X. borealis*, scarcely reaching to the middle of the genital segment. Urosome about $\frac{1}{3}$ as long as the anterior division of the body; caudal rami longer than they are broad. Anterior antennæ very slender, reaching when reflexed, to the end of the 2nd caudal segment. Posterior antennæ with the outer ramus considerably longer than the inner. Oral parts almost exactly as in the preceding species. Natatory legs likewise of a very similar structure, except that the spinules on the inner ramus of the 4th pair are arranged in a single oblique row. Last pair of legs comparatively shorter and more robust, basal joint coarsely spinulose inside, 2nd joint of about same breadth throughout, last joint much shorter and rather broad at the base, carrying an oblique row of 4 spines, the innermost of which is much coarser than the others.

Male resembling that of the preceding species, though somewhat differing in the structure of the last pair of legs, which are very asymmetrical, the right leg being extremely reduced in size, scarcely even reaching to the middle of the 1st joint of the left one.

Colour whitish, pellucid, without any conspicuous pigment.

Length of adult female 1.75 mm.

Remarks.—This form is closely allied to the preceding species, but of much smaller size, and somewhat less slender of form. It may, moreover, be easily distinguished by the well-marked separation of the last segment of the metasome from the preceding one, as also by the somewhat different structure of the last pair of legs in both sexes.

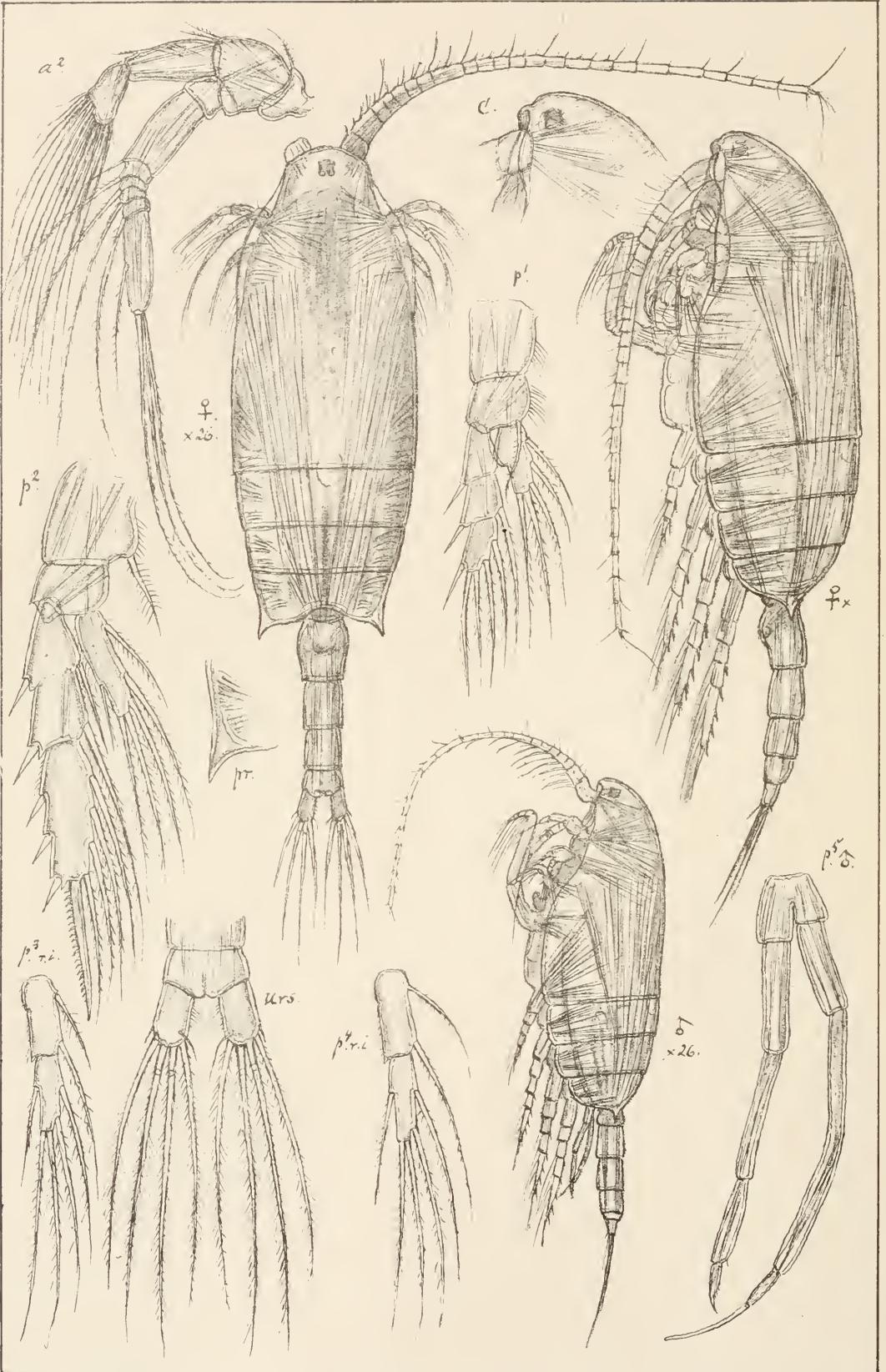
Occurrence.—Several specimens of this form were collected many years ago by the present author at Selsövig on the Nordland coast, located just within the Polar circle. They were procured by the aid of the dredge from a depth of about 100 fathoms. This species also occurs occasionally off the west coast of Norway, some few specimens having recently been found among those of *X. borealis* collected in this region.

Copepoda

Calanoida.

Ætideidæ.

Pl. XVII.



G. O. Sars autogr.

Chiridius obtusifrons, G. O. Sars.

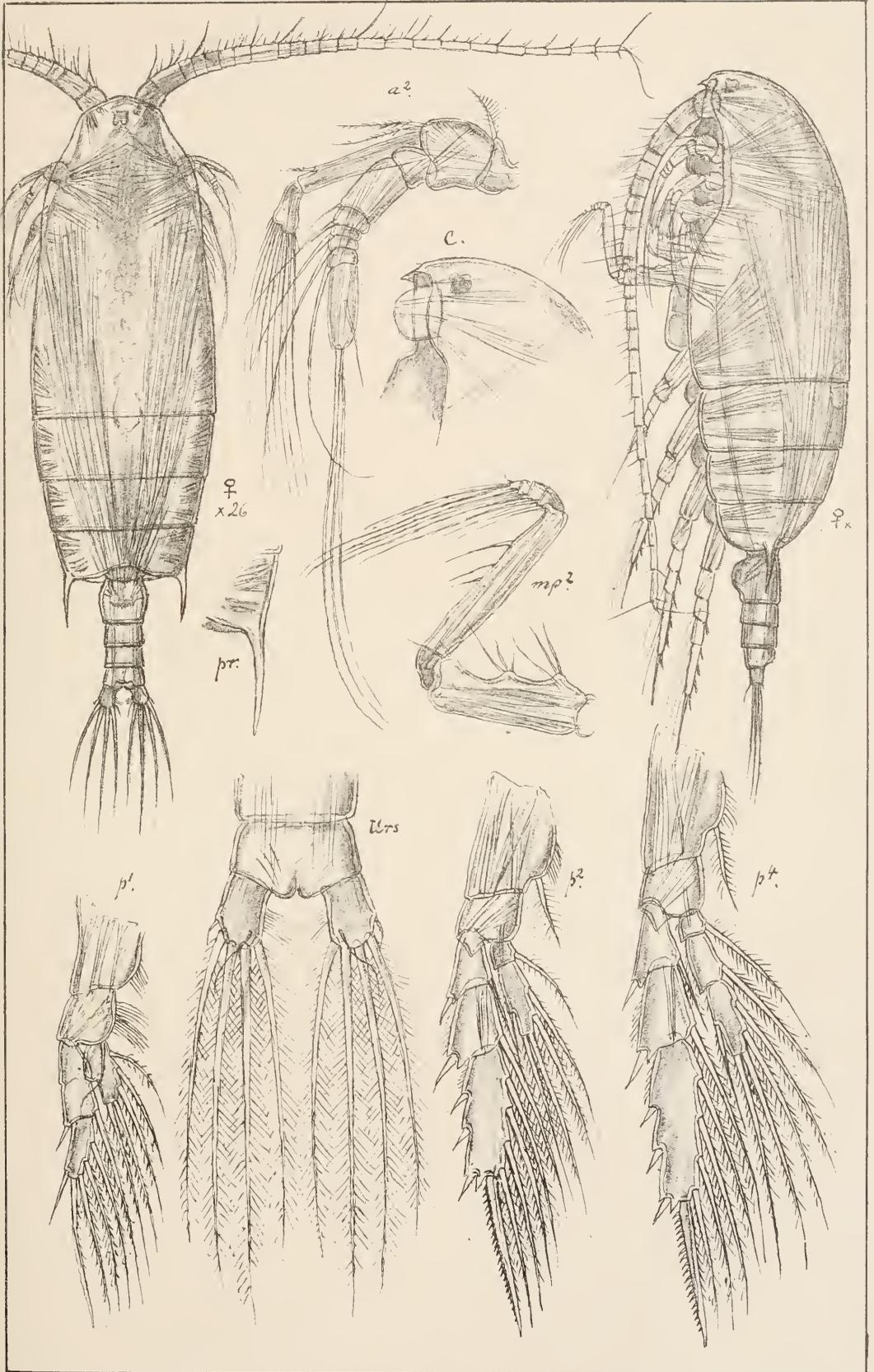
Trykt i den private Opmaaling, Chra

Copepoda

Calanoida.

Ætideidæ.

Pl. XVIII.



G.O. Sars autogr.

Trykt i den private Opmaaling, Chra

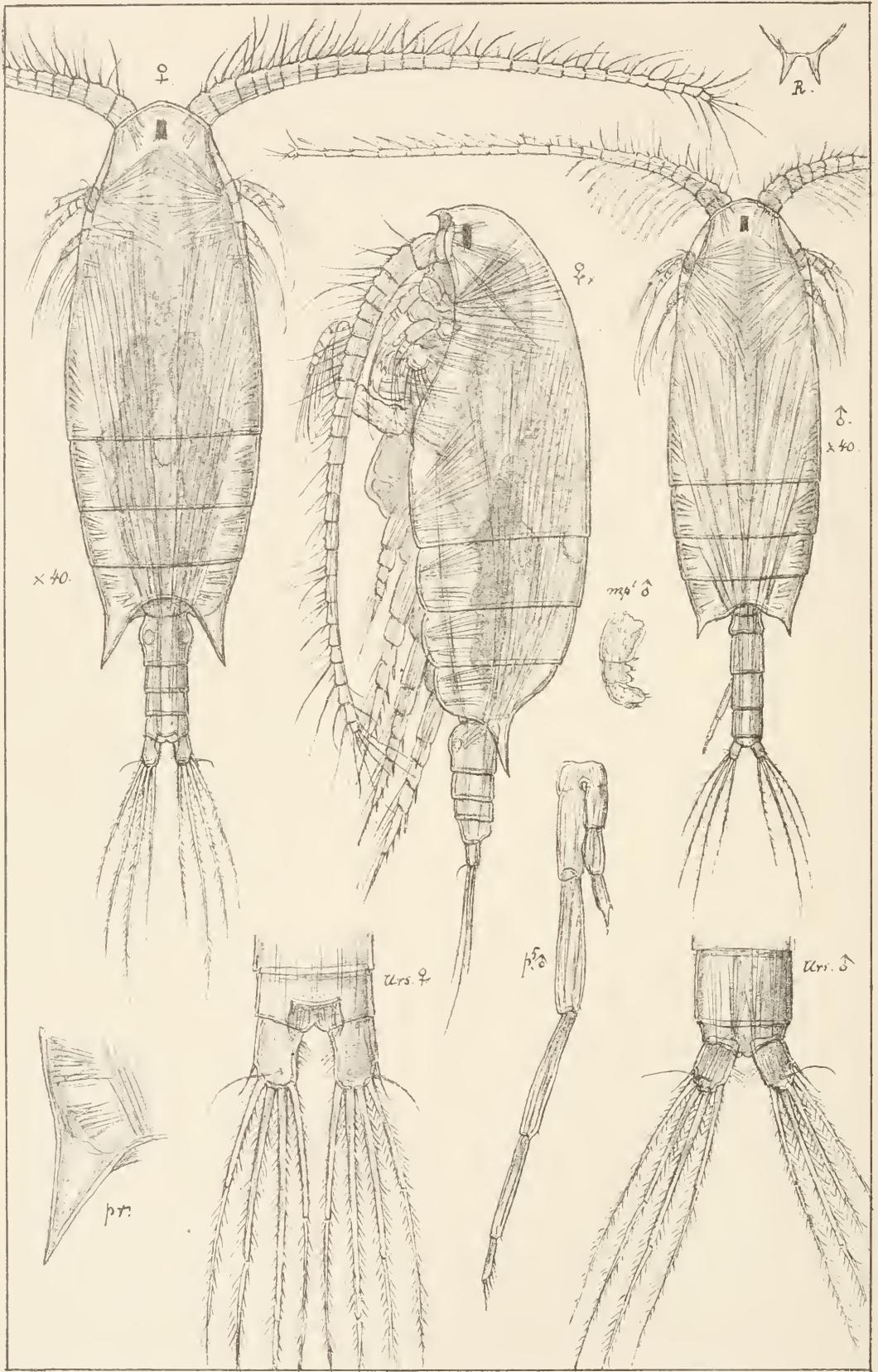
Chiridius tenuispinus, G. O. Sars.

Copepoda

Calanoida.

Æfideidæ.

Pl. XIX.



G. O. Sars autogr

Undinopsis Bradyi, G. O. Sars.

Trykt i den private Opmaalning, Chra

Copepoda

Calanoida.

Ætideidæ.

Pl. XX.



G. O. Sars autogr.

Undinopsis Bradyi, G. O. Sars.
(continued.)

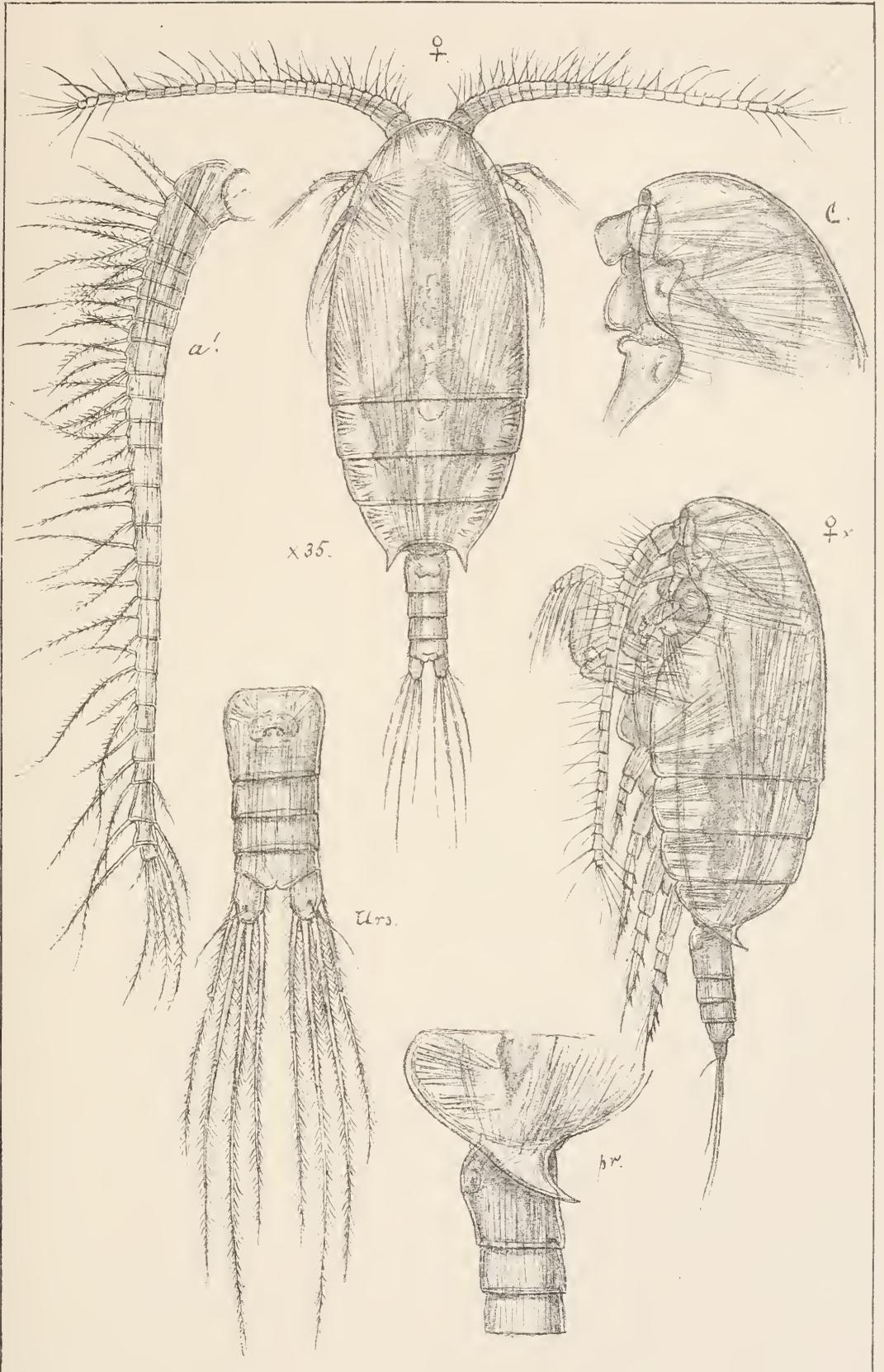
Trykt i den private Opmaaling, Chra

Copepoda

Calanoida.

Ætideidæ.

Pl. XXII

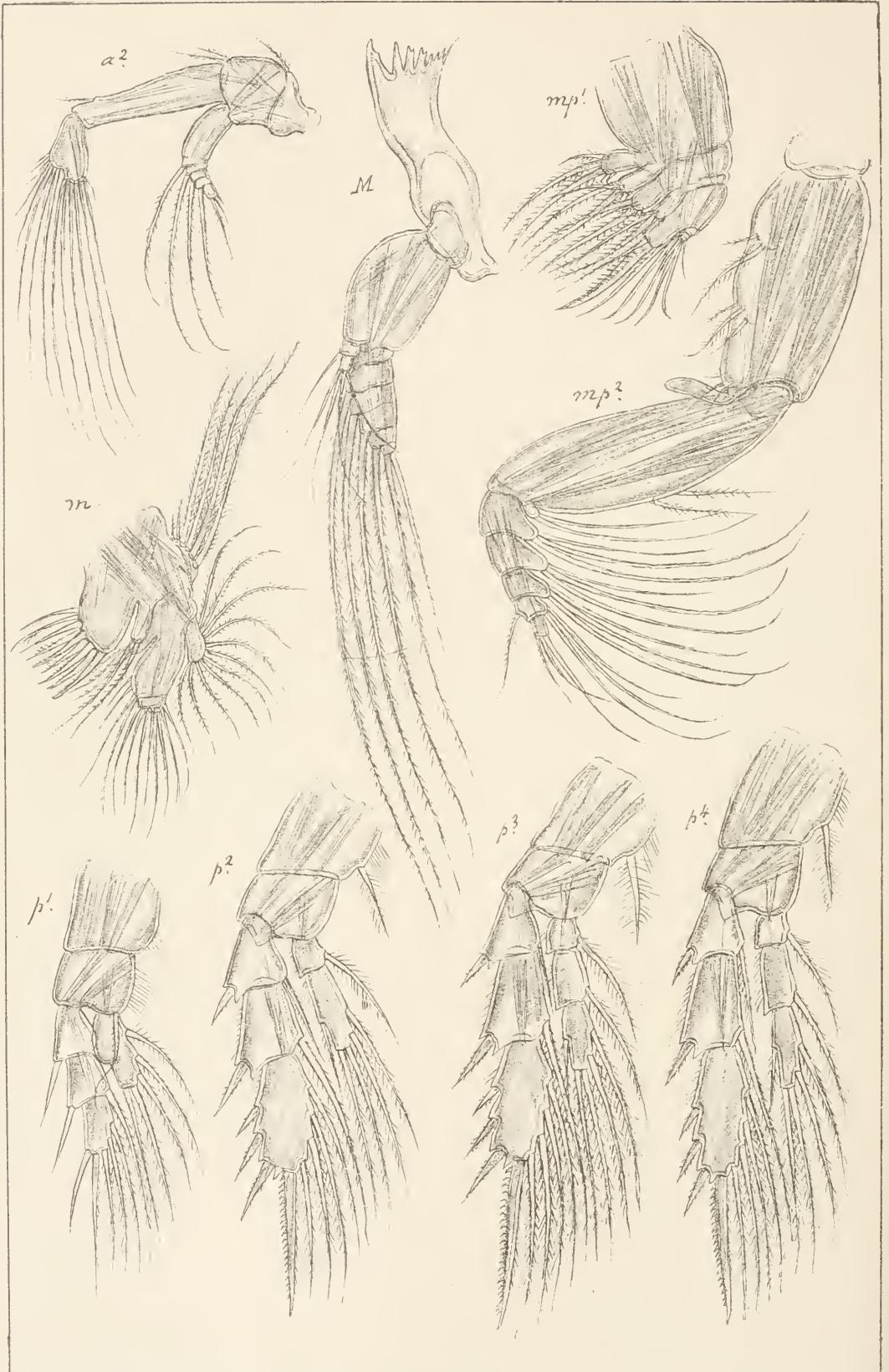


Copepoda

Calanoida.

Ætideidæ.

Pl. XXIII



G O Sars autogr.

Bryaxis brevicornis, Boeck.
(continued.)

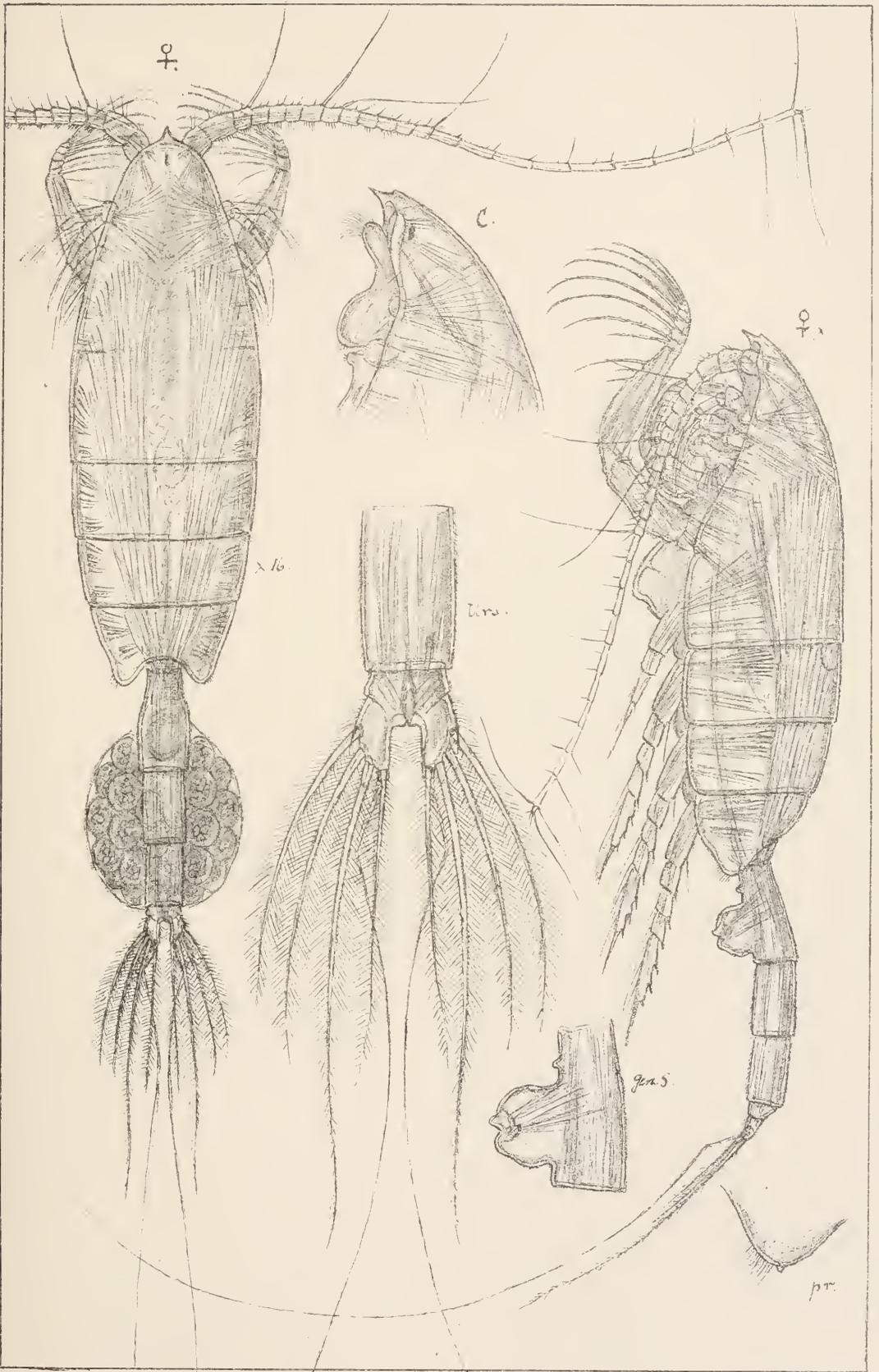
Trykt i den private Opmaalng Chra

Copepoda

Calanoida.

Euchætidæ.

PL. XXIV.



G. O. Sars autogr.

Euchæta norvegica, Boeck

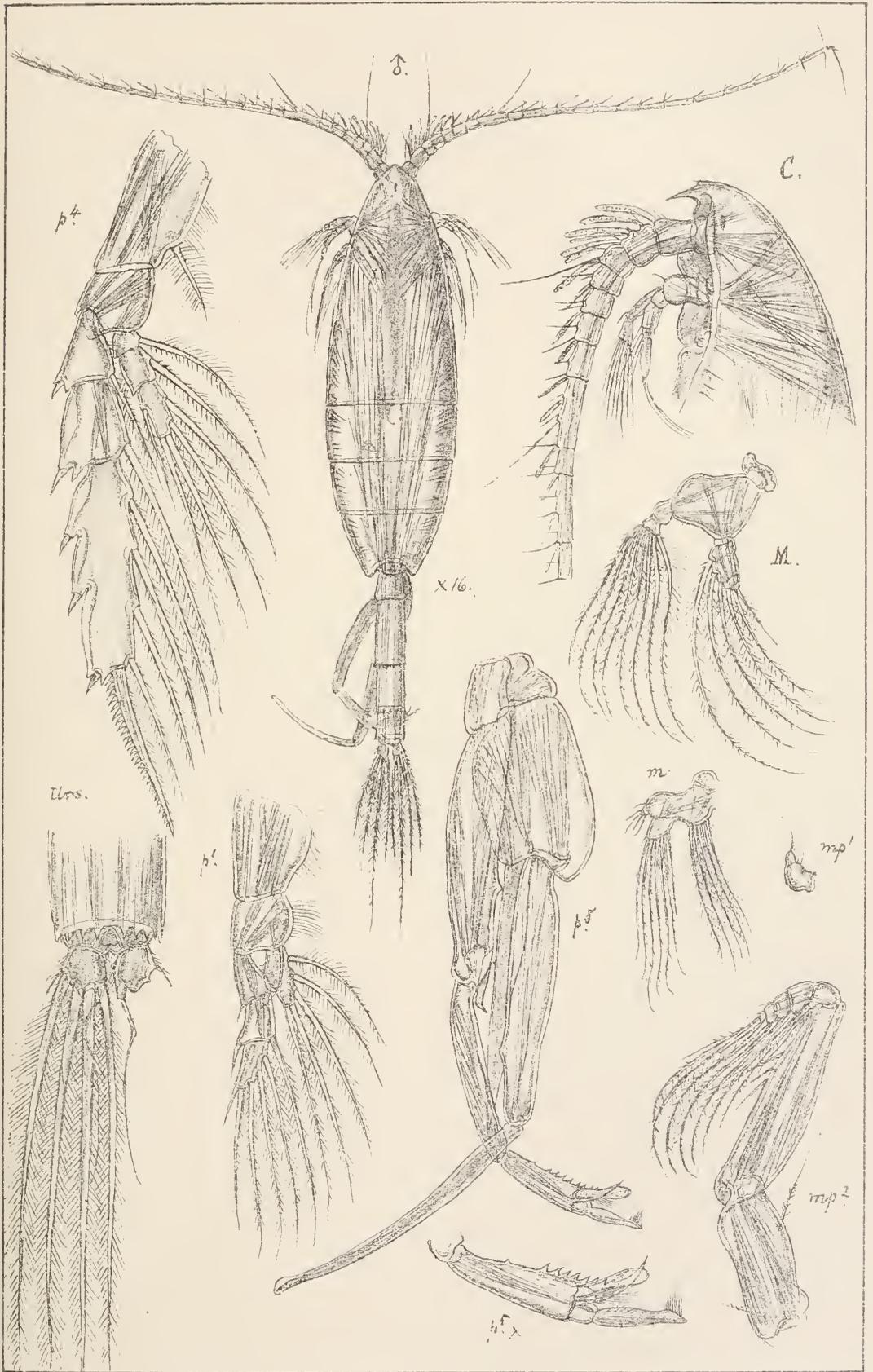
Trykt i den private Opaaaling, Chro

Copepoda

Calanoida.

Euchætidæ.

Pl. XXVI.



G.O Sars autogr

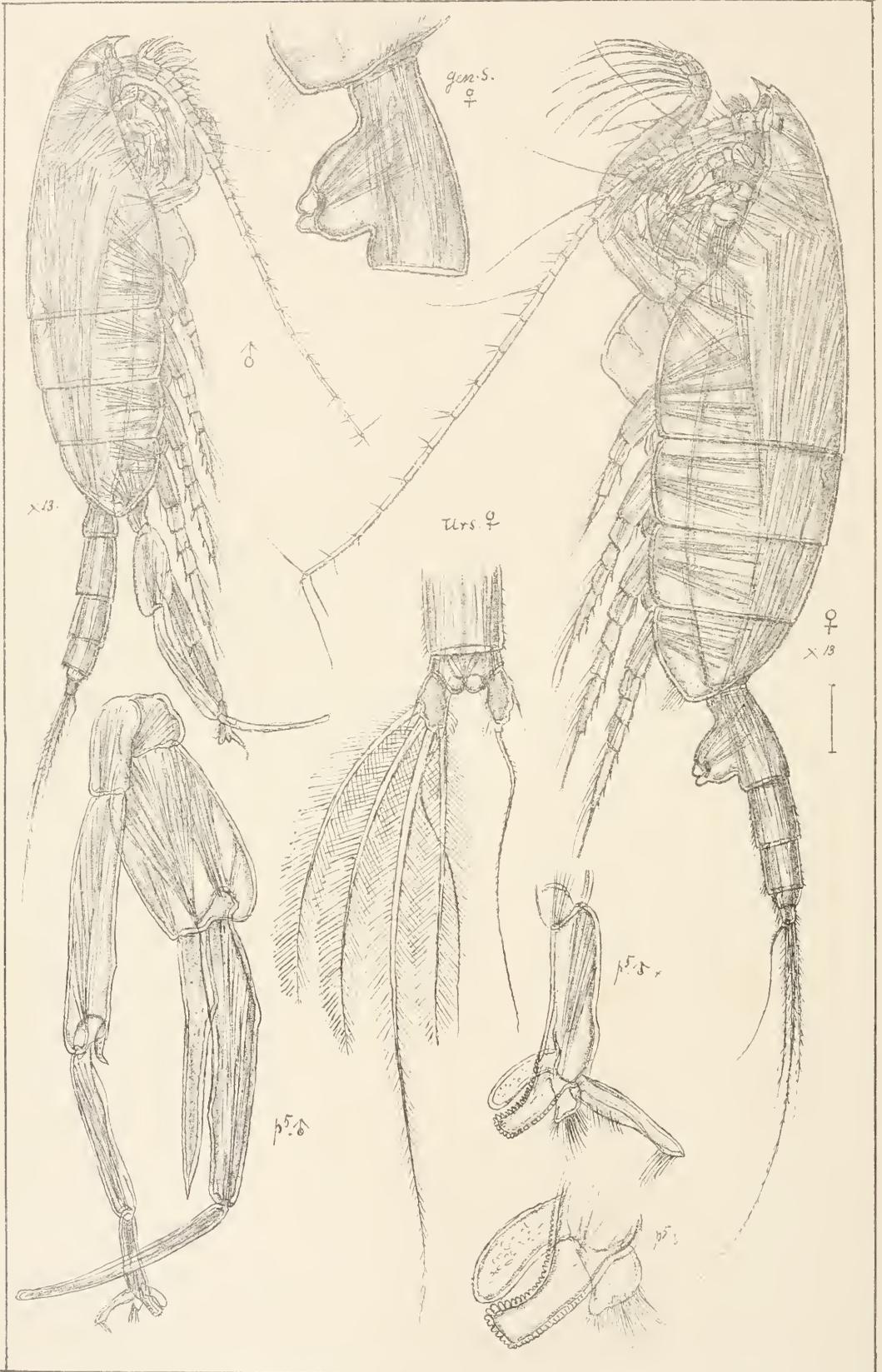
Trykt i den private Opmaalng, Cnra

Euchæta norvegica, Boeck
(male.)

Copepoda Calanoida.

Euchætidæ.

Pl. XXVII.

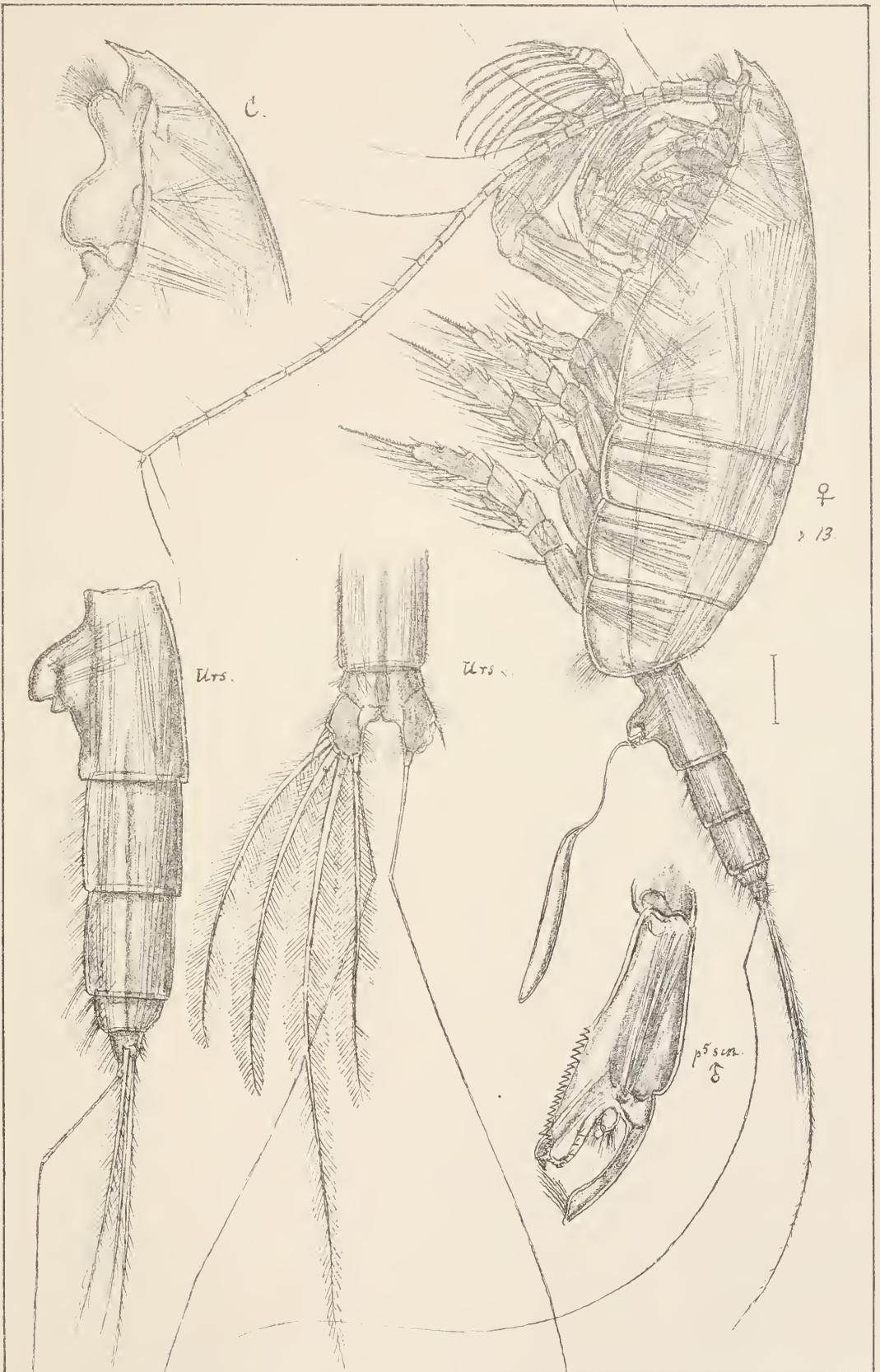


Copepoda

Calanoida.

Euchætidæ.

PL. XXVIII.



G. O. Sars autogr.

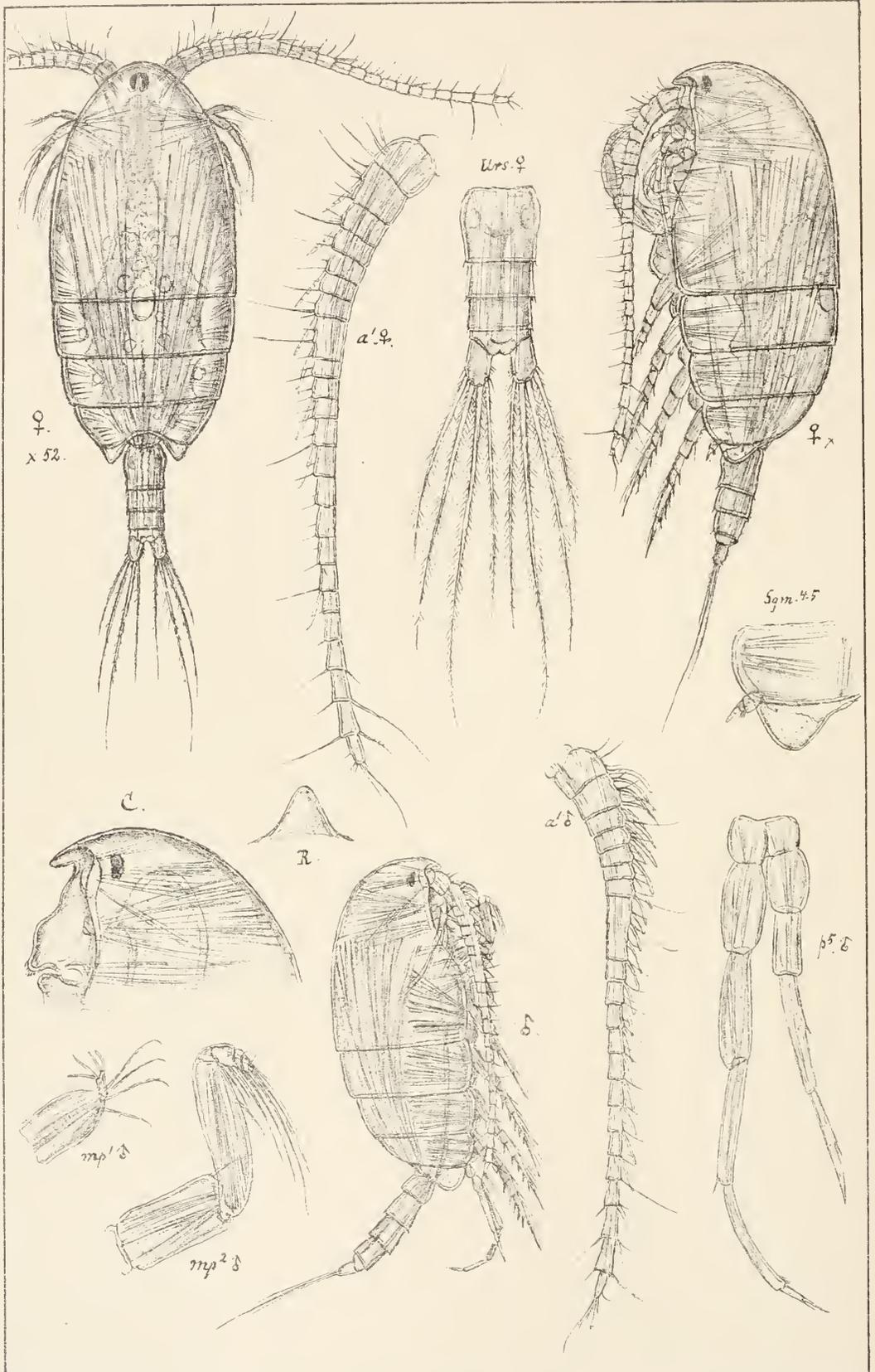
Trykt i den private Opmaaling, Chra

Euchæta barbata, Brady.

Copepoda Calanoida.

Phaennidæ

Pl. XXIX.



G. O. Sars autogr.

Grykt i den private Opmaling Chra

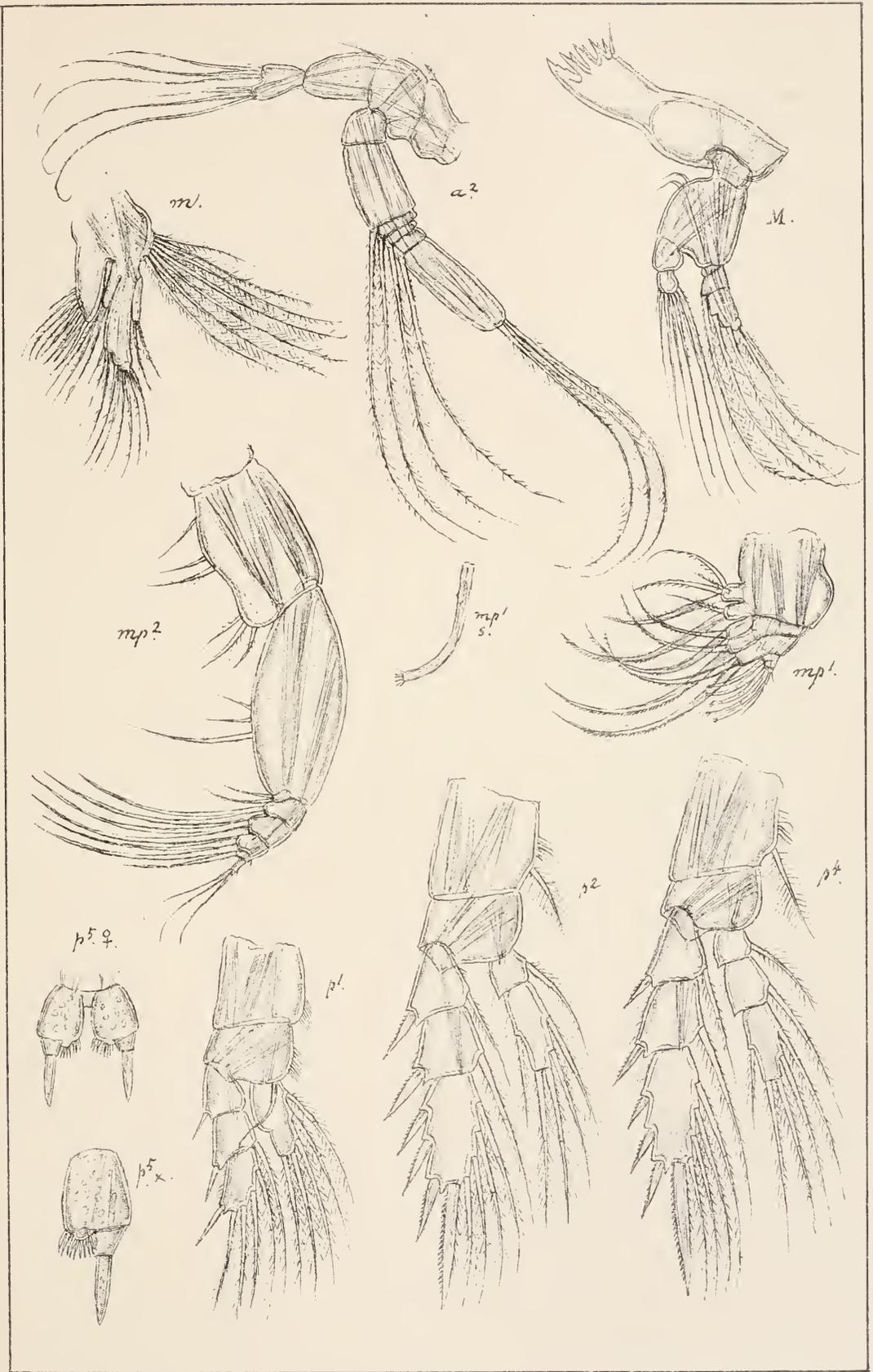
Pseudophaenna typica, G. O. Sars.

Copepoda

Calanoida.

Phaënnidæ

Pl. XXX.



G.O Sars autogr.

Trækt i den private Opmaaling Chrs

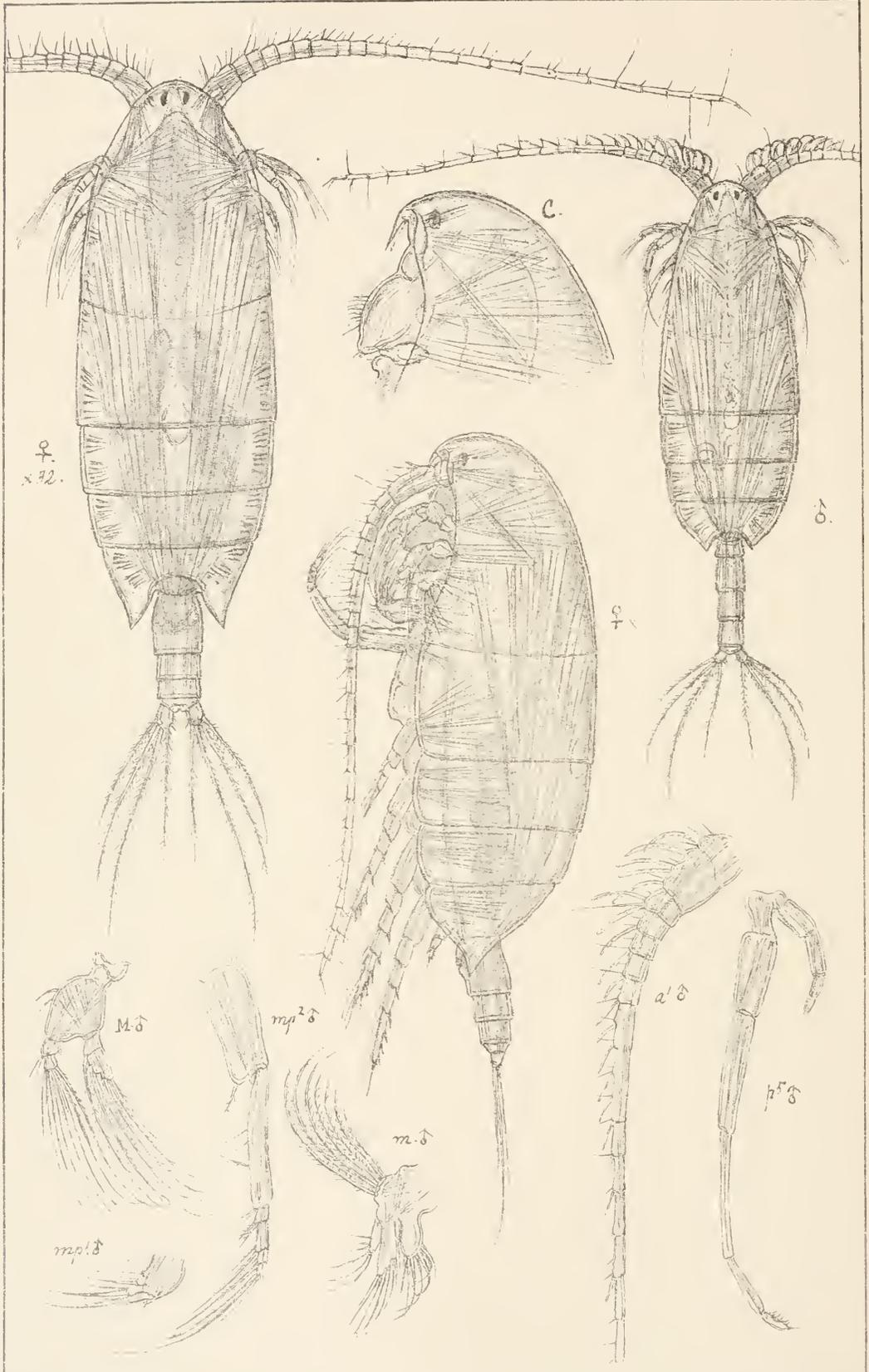
Pseudophaëna typica, G.O.Sars.
(continued.)

Copepoda

Calanoida.

Phaënnidæ

Pl. XXXI.



G. O. Sars auct.

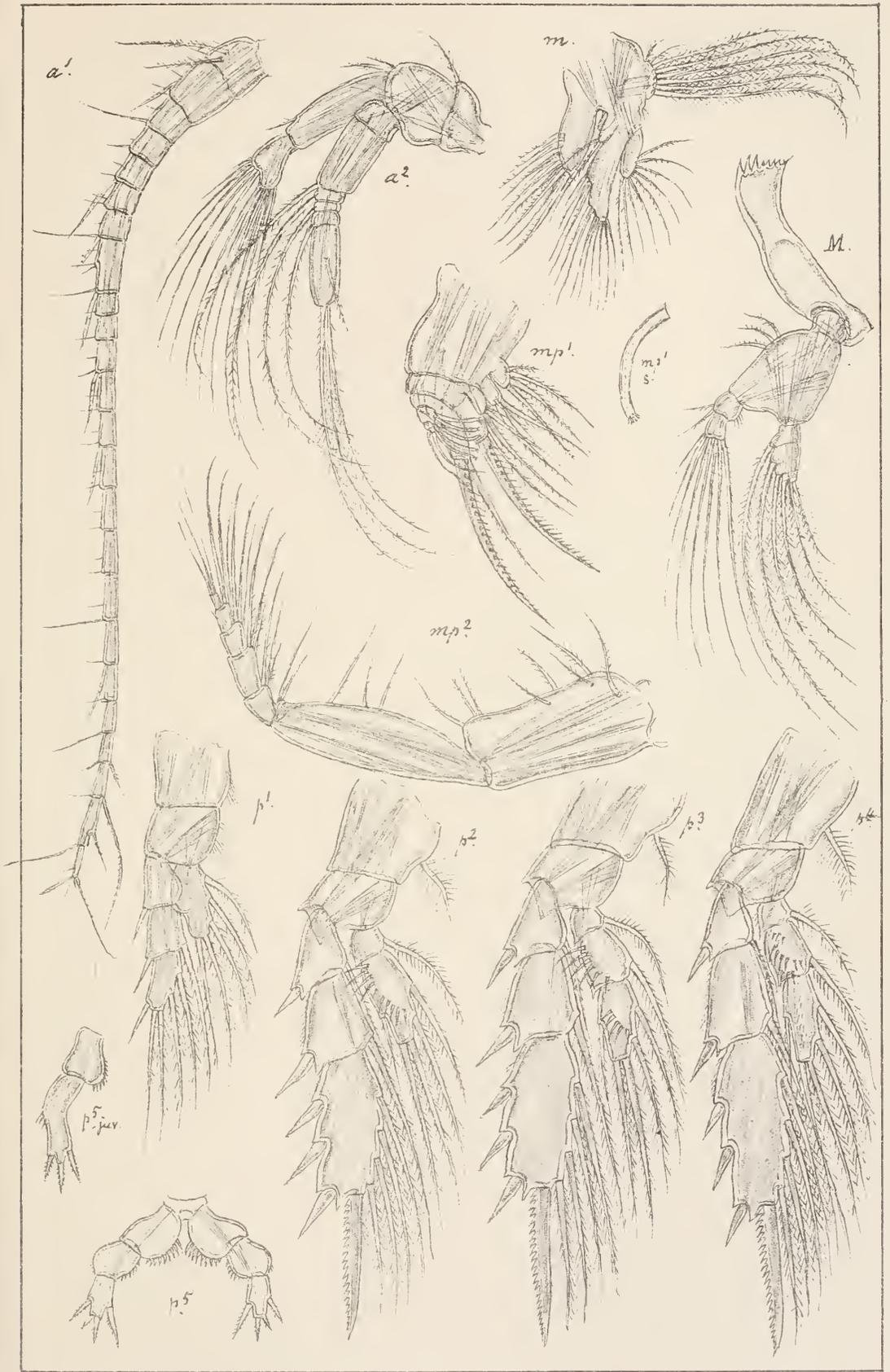
Ykt. den private Omslagning Utra

Xanthocalanus borealis, G. O. Sars.

Copepoda Calanoida.

Phaënnidæ

Pl. XXXII.



G.O. Sars autogr.

Trykt i den private Opmaaling, Chra

Xanthocalanus borealis, G.O. Sars.
(continued.)