AN ACCOUNT

OF THE

CRUSTACEA

OF

NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

G. O. SARS

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COPEPODA

CALANOIDA

PART XI & XII

HETERORHABDIDÆ (continued), ARIETELLIDÆ, PSEUDO-CYCLOPIDÆ, CANDACIIDÆ, PONTELLIDÆ

WITH 16 AUTOGRAPHIC PLATES

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Heterorhabdus, apical spine slender, setiform. Last pair of legs in female resembling in structure the preceding pairs, but of inferior size, 2nd joint of outer ramus without any falciform spine inside; those in male with the outer rami imperfectly prehensile.

Remarks.—This genus was established by Claus in the year 1863, to comprise some Mediterranean Calanoids distinguished by the extraordinary pellucidity of the body, and the richly plumose setæ with which some of the appendages were ornamented. The generic name proposed, *Hemicalanus*, had however previously been used by Dana in a different sense, and for this reason it has recently been replaced by Dr. Giesbrecht with that of *Haloptilus*. Two of the species described by Claus as belonging to this genus have moreover been transferred by the same author to another nearly-related genus, *Augaptilus*, Giesbr. In the restriction now generally adopted, the present genus is easily recognized by the perfectly hyaline, sub-depressed body, the comparatively short urosome, the exceedingly slender anterior antennæ, and the greatly produced inner ramus of the posterior ones. Moreover the structure of the oral parts is rather characteristic. We know at present of 11 or 12 species belonging to this genus. They are, on the whole, southern in distribution, 6 of the species occurring in the Mediterranean, the others in the Pacific and the tropical part of the Atlantic Ocean. Two of the species, however, have been stated to occur occasionally in the Norwegian Sea, one of them even as far north as in the Polar basin crossed by Nansen. These 2 species, which can thus only be regarded as quite exceptional visitors in the northern ocean, will be described below.

52. Haloptilus longicornis (Claus).

(Pl. LXXXII & LXXXIII, fig. 1).

Hemicalanus longicornis, Claus. Die freilebenden Copepoden, p. 179, Pl. XXIX, fig. 1.

Specific Characters.—Female. Body rather slender and distinctly depressed, with the anterior division, seen dorsally, oblong fusiform in outline, greatest width scarcely exceeding $^1/_3$ of the length, and occurring about in the middle, anterior extremity somewhat contracted, though slightly widening at the insertion of the anterior antennæ, and projecting in the middle to a knob-like prominence, posterior extremity considerably narrowed. Cephalosome about the length of the metasome and genital segment taken together, rostral prominence obtuse, and occurring not far from the frontal edge; tentacular filaments very delicate. Last segment of metasome with the lateral parts not at all expanded. Urosome scarcely exceeding

1/5 of the length of the anterior division, genital segment somewhat dilated in its anterior part, and about the length of the 3 succeeding segments combined. Caudal rami of moderate size and slightly divergent, setæ not very different in length, and densely plumose, the outermost one issuing from a separate ledge of the outer edge, the others from the transversely truncated tip. Anterior antennæ of quite extraordinary length, being more than twice as long as the whole body, and very slender, with some of the bristles greatly elongated and extending in different directions. Posterior antennæ with the inner ramus greatly produced and very slender, outer ramus scarcely more than 1/3 as long, and composed of 7 articulations. Legs of 2nd to 4th pairs with the inner ramus scarcely half as long as the outer, terminal joint of the latter about as long as the other 2 combined, and somewhat narrowed distally. Last pair of legs with a slender seta issuing from the outer corner of the 2nd basal joint.

Colour. Body highly pellucid, and almost perfectly hyaline. Length of adult female 2.15 mm.

Remarks.—This form, first described by Claus from the Mediterranean, is easily recognizable from the other species of this genus by the excessively elongated anterior antennæ, and by the slight, knob-like projection of the front. It is also rather inferior in size to most of the other species.

Occurrence.—A solitary, but well-preserved female specimen of this form was found in a plankton-sample taken during the cruise of the "Michael Sars" in 1901, at Stat. 25 a, located between Finmark and Bear Island.

Distribution.—Mediterranean (Claus), Atlantic and Pacific Oceans between 26° N. and 40° S. Lat. (Giesbrecht), gulf of Guinea (Scott).

53. Haloptilus acutifrons, Giesbr.

(Pl. LXXXIII, fig. 2).

Hemicalanus acutifrons, Giesbrecht, Pelagische Copepoden. Fauna d. golf. Neapel, p. 384, Pl. 3, fig. 11, Pl. 27, fig. 12, Pl. 42, figs. 12, 20.

Syn: *Hemicalanus spinifrons*, G. O. Sars.

Specific Characters.—Female. Anterior division of body, seen dorsally, narrow oblong in form, greatest width only slightly exceeding 1/4 of the length, and occurring somewhat in front of the middle, anterior extremity produced to a long spiniform projection pointing straight anteriorly, posterior gradually narrowed. Cephalosome occupying more than half the length of the body, rostral prominence very slight and somewhat remote from the frontal edge, tentacular filaments rather slender. Urosome very short and somewhat thicker than in *H. longicornis,* other-

wise of a very similar structure. Anterior antennæ shorter than in that species, reaching, when reflexed, beyond the caudal rami by about the 5 outer joints. Posterior antennæ with the inner ramus about twice the length of the outer. Oral parts and legs nearly as in the preceding species.

Colour. Body perfectly hyaline.

Length of adult female 3.20 mm.

Remarks.—I am now of opinion that the specimen described from Nansen's Polar Expedition as *Hemicalanus spinifrons* is more properly referable to the above-named Mediterranean species, with which it seems to agree fairly well, except in its size, which is somewhat larger. Another specimen, exactly agreeing with that found in the Polar Sea, has subsequently been captured farther south, in the Norwegian Sea, for which reason the species is now included in the Fauna of Norway. It may be at once distinguished from *H. longicornis* by the spiniform projection of the front, and the far less elongated anterior antennæ.

Occurrence.—The above-described specimen was found in a plankton-sample taken during the cruise of the "Michael Sars" in 1900 at Stat. 34, located between Jan Mayen and the Norwegian coast, the depth being recorded to be from 500 to 1000 metres.

Distribution.—Mediterranean (Giesbrecht).

Fam. 18. Arietellidæ.

Characters.—Body comparatively robust, not depressed. Cephalosome, as a rule, well defined from the 1st pedigerous segment, front more or less produced below and carrying 2 tentacular appendages. Last 2 segments of metasome united. Urosome comparatively short, composed in female of 4, in male of 5 segments. Caudal rami well defined, short, with some of the apical setæ much elongated. Anterior antennæ less slender than in the *Heterorhabdidæ,* in some cases very short, number of articulations considerably reduced, left antenna, as a rule, longer than the right, and in male imperfectly geniculate, with the terminal part very short, biarticulate. Posterior antennæ with the inner ramus longer than the outer, and having a limited number of setæ at the tip. Oral parts somewhat resembling in structure those in the *Heterorhabdidæ;* mandibular palp, however, without any trace of an inner ramus, and posterior maxil-

lipeds more robust, with the terminal part reflexed. The 4 anterior pairs of legs comparatively short and compact, with both rami triarticulate and less unequal than in the *Heterorhabdidæ*. Last pair of legs not natatory in either of the sexes, inner ramus rudimentary or quite wanting.

Remarks.—The type of this new family is the genus *Arietellus* of Giesbrecht, which was referred by that author to his subfamily *Heterochætinæ*, though in some respects, and more especially in the structure of the last pair of legs, it differs very materially from the 3 genera now included in the family *Heterorhabdidæ*. On the other hand, it exhibits a close relationship to the genus *Paramisophria* of Scott, as also to another new genus, *Scottula*, to be described below, these 3 genera accordingly forming together a natural group or family. The chief distinctive character of this family, as compared with the *Heterorhabdidæ*, is the very different structure of the last pair of legs, these in the latter family being natatory like the preceding ones, whereas in the present family they are much reduced in size, and not at all natatory in either of the sexes. This is apparently a character of fundamental importance, and has for this reason been taken into consideration in the distinction of several other Calanoid families. Another peculiar feature characteristic of the present family, is the inequality of the anterior antennæ in both sexes, the left one being the longer. This inequality is especially conspicuous in the genus *Scottula*, and is also present, though in a less conspicuous manner, in the genus *Paramisophria*. In the typical genus *Arietellus*, it is true, no mention of such an inequality has been made; but, taking into consideration the near relationship of this genus to *Paramisophria*, it seems to me very probable that this character has been overlooked, as it actually was previously in the case of *Paramisophria*. Of the 3 genera at present comprised within the family *Arietellidæ*, 2 are represented in the fauna of Norway, and will be treated of below.

Gen. 22. **Scottula**, G. O. Sars, n.

Generic Characters.—Body quite calanoid in appearance, with the anterior division moderately tumefied; front considerably produced below, and carrying 2 straight tentacular appendages. Last segment of metasome simple, without any subdorsal projections. Urosome moderately slender, with the genital segment in female comparatively short. Caudal rami with 3 of the setæ much elongated,

outermost seta quite rudimentary. Eye wholly absent. Anterior antennæ of moderate length, and very unequal in both sexes, the left one being much the longer; both antennæ in male with long, band-like sensory appendages on the proximal part. Posterior antennæ with the inner ramus very slender, outer 6-articulate, with the terminal joint comparatively short. Mandibles very strong, with only 4 cutting teeth, the outermost claw-like, palp with the ramus shorter than the basal part. Maxillæ with the masticatory lobe poorly developed and armed with only 2 spines, inner ramus of palp altogether wanting, outer large, sub-sigmoid, with 3 long curved setæ at the tip. Both pairs of maxillipeds powerfully developed, the anterior ones with the last joint of the basal part dilated in the middle, and carrying anteriorly a comparatively short but strong spine, appendages of the terminal part slender, claw-like. Posterior maxillipeds with the terminal part 5-articulate, and armed with strong claw-like spines finely denticulated on both edges. Natatory legs moderately strong, basal part not produced at the end inside, 2nd joint of inner ramus normal. Last pair of legs in female rather small, 3-articulate, 2nd joint not produced inside, terminal joint of moderate size and tipped with an ordinary seta; those in male 5-articulate and but slightly asymmetrical, terminal joint on both legs transformed to a slender claw.

Remarks.—This new genus is undoubtedly nearly allied to *Arietellus* of Giesbrecht, differing, however, not only in the very conspicuous inequality of the anterior antennæ, but also in the structure of the last pair of legs and that of the caudal rami. I have much pleasure in naming this genus in honour of the distinguished Scottish naturalist, Th. Scott, who has done so much important work in this order. A genus of Ostracoda, *Scottia*, has already, as is well known, been established by Canon Norman, likewise in honour of this naturalist. The present genus comprises as yet only a single species, to be described below.

54. Scottula inæqvicornis, G. O. Sars, n. sp.

(Pl. LXXXIV & LXXXV).

Specific Characters.—Female. Anterior division of body but slightly vaulted above, seen dorsally, regularly elliptical in form, greatest width equalling about half the length and occurring in the middle, both extremities gradually tapered, the anterior one narrowly rounded, the posterior deeply emarginated in the middle. Cephalosome well defined from the 1st pedigerous segment, rostral prominence rather large, conical, and pointing straight downwards, tentacular appendages slender and elongated. Lateral lobes of last segment of metasome

somewhat produced and narrowly rounded at the tip. Urosome exceeding in length $^1/_3$ of the anterior division, genital segment scarcely protuberant below. Caudal rami scarcely twice as long as they are broad, and not at all divergent, outermost seta present only as a minute hair, outermost but one only slightly longer than the caudal rami, the other 3 very much elongated. Left anterior antenna about the length of the anterior division of the body, and composed of 20 articulations, 7th to 10th very small; right antenna much shorter, scarcely reaching, when reflexed, beyond the 1st pedigerous segment, and composed of 19 articulations only, bristles on both antennæ partly ciliated. Posterior antennæ with the distal joint of the inner ramus shorter than the proximal one. Last pair of legs with the 2nd joint provided at the end inside with a long seta, terminal joint about the length of the other 2 combined, and armed outside with 2 short spines.

Male resembling the female in shape, but of considerably smaller size, and, as usual, having the urosome narrower and 5-articulate. Anterior antennæ exhibiting a similar inequality in length to that in the female, both provided on the proximal part with long band-like sensory appendages curved backwards, left one with an imperfect hinge near the tip, middle section scarcely at all tumefied. Right last leg a little longer than left, but otherwise of a very similar structure.

Colour. Body rather pellucid, with a light yellowish grey tinge.

Length of adult female 1.10 mm., of male 0.86 mm.

Remarks.—As mentioned above, this is as yet the only known species of the present genus. It is easily recognizable from all our other Calanoids by the very conspicuous inequality of the anterior antennæ. Its appearance is otherwise quite calanoid.

Occurrence.—Some few specimens of this peculiar Calanoid, all of the female sex, were found many years ago by the present author in the upper part of the Christiania Fjord, not far from the town, the depth being about 30 fathoms. A solitary male specimen, the one figured here, was further captured last summer in another locality of the Norwegian coast, viz., in the Storfjord, inland from Aalesund, at a depth of about 60 fathoms. It is a true bottom-form, always keeping close to the ground, and accordingly can only be procured by the aid of the dredge. This circumstance, in addition to its small size and insignificant colouring, may be the cause of its having escaped the attention of other authors, even that of the sharp-sighted Scottish naturalist, Th. Scott.

Gen. 23. **Paramisophria**, Scott, 1897.

Generic Characters.—Body cyclopoid in appearance, with the anterior division considerably tumefied. Cephalosome only faintly defined from the 1st pedigerous segment, front produced below to a very small rostral prominence, carrying on the tip 2 extremely minute filaments. Last segment of metasome with 2 very conspicuous subdorsal projections. Urosome somewhat robust, with the genital segment in female comparatively short. Caudal rami rather broad, with all the setæ well developed, 2 of them considerably longer than the others. Eye inconspicuous. Anterior antennæ very short and less unequal than in *Scottula*, both consisting in female of 21 articulations; left antenna in male with a slight hinge near the tip. Posterior antennæ and oral parts resembling in structure those in *Scottula;* maxillæ, however, with the masticatory lobe more fully developed, and with a distinct, though small inner ramus on the palp. Maxillipeds less robust. Natatory legs powerfully developed, with the rami considerably broader than in *Scottula*, basal part in 2nd to 4th pairs produced at the end inside to an acute triangular projection, 2nd joint of inner ramus considerably expanded outside. Last pair of legs of larger size than in *Scottula*, being in female 3-articulate, with the 2nd joint produced inside to a narrow lobe, terminal joint of considerable size and coarsely spinous outside; those in male 5-articulate, without any lobe inside the 2nd joint, terminal joint in right leg unguiform, in left spatulate.

Remarks.—This genus was established by Th. Scott in the year 1897, to include a peculiar deep-water Calanoid found by him off the Scottish coast. The name *Paramisophria* is somewhat inappropriate, as this genus in reality does not exhibit any very close relationship to *Misophria*, which even, as shown by Dr. Giesbrecht, belongs to quite a different division of the Copepoda, viz., the *Cyclopoida*. It cannot of course be placed in the family *Misophriidæ*, as first suggested by Th. Scott, whereas it is unquestionably closely related to the genus *Arietellus* of Giesbrecht, and accordingly ought to be included in the family *Arietellidæ*, as here defined. It differs conspicuously from *Scottula*, to which it bears a close relationship in some of the anatomical details, in the general appearance of the body, the much shorter and less unequal anterior antennæ, the full number of caudal setæ, and the larger size of the last pair of legs. The genus comprises as yet only a single species, to be described below.

55. Paramisophria Cluthæ, Scott.

(Pl. LXXXVI & LXXXVII).

Paramisophria Cluthæ, Scott. The Marine Fishes and Invertebrates of Loch Fyne; 15th Annual Report of the Fisheries Board for Scotland, p. 147. Pl. II, figs. 3—8, Pl. III, figs. 13—16.

Specific Characters.—Female. Body rather short and compact, with the anterior division, seen dorsally, oval in form, greatest width equalling about half the length, and occurring somewhat behind the middle, anterior extremity gradually narrowed and obtusely rounded at the tip, posterior only slightly contracted. Cephalosome considerably vaulted, with the dorsal margin forming quite an even curve as far as the tip of the very small rostral prominence. Last segment of metasome with the subdorsal processes spiniform and pointing straight backwards, lateral lobes broadly rounded, with a small indentation in the middle. Urosome scarcely exceeding $^1/_3$ of the length of the anterior division, genital segment shorter than the 2 succeeding segments combined, anal segment rather small. Caudal rami about twice the length of the anal segment, and somewhat flattened, all the 5 marginal setæ richly plumose, the innermost but one the longest. Length of anterior antennæ scarcely exceeding that of cephalosome, the left one slightly longer than the right, bristles of the anterior edges in both antennæ partly ciliated. Posterior antennæ with the distal joint of the inner ramus about the length of the proximal one. Last pair of legs with the inner projection of 2nd joint comparatively small, and cylindric in form, carrying at the tip a small denticle and a slender plumose seta; terminal joint fully twice as long as the other 2 combined, and armed with 6 strong spines, 4 of which issue from the outer edge, and 2 from the tip, inner edge straight and perfectly smooth.

Male resembling the female, but somewhat less robust, and with the urosome narrower and 5-articulate. Left anterior antenna with the middle section slightly tumefied, terminal section comparatively short and imperfectly biarticulate. Last pair of legs only slightly asymmetrical, penultimate joint in both legs lamellarly expanded, with a single spine outside, terminal joint of right leg transformed to a slender claw carrying 2 small spines outside the base, that of left leg spatulate, with 3 short spines at the end.

Colour not yet ascertained. Length of adult female 1.20 mm., of male 1.10 mm.

Remarks.—This form was first described by Th. Scott from some female specimens found in dredged material from Loch Fyne, Scotland. In its external

appearance it differs considerably from the ordinary Calanoid type, resembling rather, in this respect, the *Cyclopoida*, which may have been Th. Scott's reason for placing it in the family *Misophriidæ*.

Occurrence. Only 2 or 3 specimens of this remarkable form have hitherto come under my notice. They were taken many years ago at Christiansund, west coast of Norway, the exact depth not being recorded. On a closer examination, one of the specimens turned out to be an adult male, though at first I did not recognise it as such, on account of the inconspicuous sexual characters.

Distribution.—Scottish coast (Th. Scott).

Fam. 19. Pseudocyclopidæ.

Characters.—Body quite cyclopoid in appearance, though, as in other Calanoids, having the last segment of metasome firmly connected with the preceding one. Cephalosome well defined from the 1st pedigerous segment, front acutely produced below, and without any tentacular appendages. Urosome consisting in female of 4, in male of 5 segments. Anterior antennæ very short, with the number of articulations reduced; right antenna in male distinctly geniculate. Posterior antennæ with both rami well developed. Oral parts on the whole built upon the calanoid type. Legs robust, cyclopoid in shape, with both rami 3-articulate; last pair in female resembling in structure the preceding pairs, in male much transformed, prehensile.

Remarks.—This family has been established by Dr. Giesbrecht, to include the genus *Pseudocyclops* of Brady, which was erroneously placed by the latter author in the family *Misophriidæ*. Among the more prominent characters distinguishing this family, may be named the structure of the last pair of legs, these being biramous and natatory in the female, whereas in the male they are transformed to very large and compact prehensile organs, somewhat recalling the copulative appendages in the Ostracoda. We only know at present of a single genus belonging to this family.

Gen. 24. **Pseudocyclops,** Brady, 1872.

Generic Characters.—Body short and compact, with the anterior division considerably tumefied. Cephalosome strongly vaulted, and projecting below in a sharply pointed rostrum, which in the male is movably connected with the head. Last segment of metasome rather small, but distinctly defined from the preceding one. Urosome with the anal segment very small. Caudal rami short, with the outermost seta spiniform. Eye distinctly developed. Anterior antennæ scarcely longer than the cephalosome, and composed of 15 to 18 articulations; right antenna in male distinctly geniculate, with the terminal part 4-articulate. Posterior antennæ somewhat cyclopoid in shape, the distal joint of the inner ramus being connected with the proximal one at nearly a right angle, outer ramus about same length as the inner, and only 3-articulate. Mandibles with the palp distinctly biramous. Maxillæ with the inner ramus of the palp considerably produced. Anterior maxillipeds rather compact, with all the digitiform lobes distinct, appendages of terminal part comparatively small, setiform. Posterior maxillipeds scarcely longer than the anterior and somewhat resembling those in the genus *Eurytemora*. The 4 anterior pairs of legs rather powerful, with strong spines outside the outer ramus. Last pair of legs in female with the natatory setæ much reduced in size, inner ramus short, biarticulate or triarticulate; those in male somewhat asymmetrical, right leg the larger and hooked at the tip, inner ramus lamellar.

Remarks. This genus, as stated above, was placed by its founder, Prof. Brady, in the family *Misophriidæ*, apparently on account of some resemblance in its external appearance to the genus *Misophria*. As subsequently shown by Dr. Giesbrecht, it is however very different, not even belonging to the same division; and, as it also differs considerably from the other true Callanoids, its rank as the type of a distinct family is fully justified. It is only to be regretted, that the name of another Calanoid family, *Pseudocyclopiidæ*, founded on the genus *Pseudocyclopia* of Scott, is so very like that of the present family. We know at present of 3 species of this genus, one from the Bay of Naples, and 2 from the Scottish coast. One of the latter is also found off the Norwegian coast, and will be described below.

56. Pseudocyclops obtusatus, Brady.

(Pl. LXXXVIII).

Pseudocyclops obtusatus, Brady & Robertson, in Ann. Nat. Hist. ser. IV, Vol. XII, p. 128. Pl. VIII, figs. 4—7.

Specific Characters.—Female. Anterior division of body, seen dorsally, oval in form, greatest width slightly exceeding half the length, and occurring in the middle, anterior extremity evenly rounded, posterior somewhat contracted; seen laterally, considerably vaulted above. Cephalosome occupying nearly half the anterior division, dorsal margin forming an even curve as far as the tip of the rostrum; the latter rather strong, slightly curved, and terminating in a sharp point. Last segment of metasome very small, with the lateral lobes narrowly rounded. Urosome comparatively short, scarcely exceeding $^1/_3$ of the length of the anterior division, anal segment almost obsolete. Caudal rami scarcely longer than they are broad, innermost but one of the apical setæ much longer than the others. Eye rather large, subdorsal. Anterior antennæ, when reflexed, scarcely reaching beyond the cephalosome, and consisting of 18 articulations, bristles partly ciliated. Posterior antennæ with the distal joint of the inner ramus fully as long as the proximal one. Last pair of legs with the inner ramus distinctly 3-articulate; terminal joint of outer ramus with 4 natatory setæ inside.

Male somewhat smaller than female, and having the rostral projection sharply defined at the base. Urosome much more slender than in female, with some of the segments slightly produced dorsally. Right anterior antenna with the middle section somewhat tumefied. Last pair of legs very massive, basal part of both legs considerably tumefied, and on right side biarticulate, on left uniarticulate; outer ramus with a strong deflexed spine outside, and terminating on the right leg in 2 slender juxtaposed claws, on left leg in a peculiarly contorted, incurved piece; inner ramus on both legs lamellar.

Colour.—Body pellucid, whitish, with a slight rosy tinge along the ventral face.

Length of adult female 0.80 mm., of male 0.70 mm.

Remarks.—This form was first recorded by Brady and Robertson in the above-mentioned journal, and was subsequently re-described by the first-named author in his well-known Monograph of the British Copepoda. The specific name *obtusatus* seems to refer to the obtusely rounded frontal part. The rostrum is also said to be short and blunt, and is so represented in the figure of the male given; but this may be due to the fact of the rostral plate having accidentally been detached in the specimen examined.

Occurrence.—Only 3 specimens, one female and 2 males, have hitherto come under my notice. They were taken many years ago at Christiansund, from a depth of about 30 fathoms.

Distribution.—Scottish coast (Brady).

Fam. 20. Candaciidæ.

Characters.—Body quite calanoid in appearance. Cephalosome well defined from the 1st pedigerous segment, front abruptly deflexed, but without any distinct rostrum or tentacular appendages. Last segment of metasome confluent with the preceding one, and having the lateral parts expanded in both sexes. Urosome consisting in female of 3, in male of 5 segments. Caudal rami comparatively short, with the full number of setæ. Anterior antennæ slender and attenuated, with the number of articulations less reduced than in the 2 preceding families; right antenna in male geniculate. Posterior antennæ with the inner ramus imperfectly defined from the basal part, outer ramus comparatively small, with the terminal joints very short. Oral parts, especially the maxillæ, rather different in their structure from those in other Calanoids. Anterior maxillipeds much larger than the posterior. The 4 anterior pairs of legs with the inner ramus consisting of only 2 joints. Last pair of legs comparatively small and of simple structure, not natatory; those in male rather asymmetrical. No ovisac present in female.

Remarks.—This family was established by Dr. Giesbrecht, to include the genus *Candacia* of Dana, which differs considerably in some respects from the Calanoids treated of in the preceding pages, and forms, as it were, a transition to the *Pontellidæ*. We do not know at present of more than this one genus; but it is not improbable that in future it will be found convenient to divide it into 2 nearly-allied genera, as at any rate the structure of the last pair of legs in the male presents 2 very different types.

Gen. 25. **Candacia**, Dana, 1846.

Syn: *Candace*, Dana.
„ *Iphionyx*, Kröyer.

Generic Characters.—Body generally rather robust, with the anterior division more or less vaulted above, front narrowly truncate, with 2 juxtaposed knob-like prominences below. Lateral corners of last segment of metasome more or less produced, and, as a rule, asymmetrical in the male. Urosome of moderate size, sometimes conspicuously asymmetrical in female; 1st segment in male with a projection on right side. Caudal rami comparatively small, setæ subequal. Eye present or wanting. Anterior antennæ consisting in female of 23 or 24 articulations, the proximal ones somewhat irregular and partly dentate in front; right antenna in male distinctly geniculate, with the terminal section very slender, 5-articulate. Posterior antennæ with the outer ramus much smaller than the inner and 5-articulate, 2nd joint much the largest. Mandibles with the masticatory part very narrow and bifurcate at the tip, palp well developed, with the basal part rather broad. Maxillæ with the proximal appendicular lobe excessively prolonged, rod-like, and carrying 3 unequal, incurved spines at the tip, inner ramus of palp bent abruptly outwards, and having one of the apical setæ excessively prolonged, outer ramus wanting. Anterior maxillipeds exceedingly large and powerful, being armed distally with a restricted number of very strong falciform claws, digitiform lobes rudimentary. Posterior maxillipeds much reduced in size, though of normal structure. Natatory legs with the rami very unequal, the outer one much the larger and finely serrate along the exterior edge, terminal joint occupying more than half the length of the ramus, and armed outside with 3 comparatively small spines. Last pair of legs in female very small, 3 articulate, in male somewhat larger, left leg 4-articulate, right 3-articulate and terminating in some species with an imperfect chela, in others with a slender deflexed, ciliated seta.

Remarks.—This genus was established by Dana as early as the year 1846. The name *Candacia* originally proposed was subsequently changed by the same author to *Candace*, and the latter name has been generally used by subsequent carcinologists. Dr. Giesbrecht, however, in his recent synopsis, has restored the original name *Candacia*, and accordingly the name of the family must be changed from *Candacidæ* to *Candaciidæ*. The genus *Iphionyx* of Kröyer it unquestionably identical with Dana's genus. We know at present of a considerable number of species belonging to this genus, amounting to about 16 in

all. Two of these have been found off the coast of Norway, and will be described below. A 3rd Norwegian species, *C. elongata*, has been recorded by Boeck; but it is impossible to recognise this form, which in all probability does not belong to the genus *Candacia* at all, as the lateral parts of the last segment of the metasome are said to be rounded off, a character not found in any of the other known species.

57. Candacia norvegica, Boeck.

(Pl. LXXXIX & XC).

Candace norvegica, Boeck. Oversigt over de ved Norges Kyster iagttagne Copepoder. Chr. Vid. Selsk. Forh. 1864, p. 235.

Specific Characters.—Female. Body, as compared with that in the other species, rather slender, with the anterior division, seen dorsally, oblong in form, greatest width but slightly exceeding $^1/_3$ of the length, anterior extremity considerably contracted, and transversely truncated at the tip, posterior scarcely at all attenuated, and only very slightly emarginated in the middle. Cephalosome occupying more than half the length of the anterior division, rostral prominence very small, bi-tuberculate. Lateral parts of last segment of metasome terminating in a short somewhat outwards-pointing corner, acute at the tip. Urosome perfectly symmetrical, and equalling about $^1/_3$ of the length of the anterior division, genital segment slightly tumefied in its anterior part, and armed on each side with a small posteriorly-pointing spine. Caudal rami shorter than the preceding segment, all 5 setæ of about same length, the outermost issuing from a separate ledge of the outer edge. Eye wholly absent. Anterior antennæ very slender and elongated, reaching, when reflexed, beyond the tip of the caudal rami, and composed of 24 articulations. Anterior maxillipeds exceedingly large, with the claw-like spines unusually strong. Apical spine of outer ramus in the 2nd to 4th pairs of legs exceeding half the length of the terminal joint. Last pair of legs very small, terminal joint scarcely longer than the other 2 combined, and projecting at the tip in 2 unequal spines; outer edge armed with 2 or 3 small denticles, inner with 3 short setæ.

Male still more slender than female, with the right corner of last segment of metasome produced to a highly chitinised, dark-coloured, somewhat incurved projection, left corner about as in the female. Genital segment with the projection on right side rather large and irregularly tubercular at the tip. Right anterior antenna with the middle section only slightly tumefied, and having

at the end anteriorly a finely serrate lamella. Right last leg terminating in a pair of obtuse scissors formed by the last 2 joints.

Colour. Body in both sexes highly pellucid and almost colourless.

Length of adult female 3.20 mm., of male about the same.

Remarks.—This form was briefly mentioned by Boeck in the above-mentioned journal; but no figures or detailed description have as yet been given, for which reason it is placed by Dr. Giesbrecht, in his recent synopsis, among the doubtful species of the genus. Boeck considers it to be most nearly allied to *C. bispinosa* of Claus, probably on account of the similar armature of the genital segment in the female. It is evidently much more closely related, however, to another species described by the same author, viz., *C. longimana*, though it also differs from this species in some characters, e. g. in the total absence of eye, the much more elongated anterior antennæ, and the somewhat different structure of the last pair of legs, especially in the female.

Occurrence.—Boeck first recorded this form from the Hardanger Fjord. I have myself found it occasionally in the following localities: at Hankø, lower part of the Christiania Fjord, at Jelsø, upper part of the Stavanger Fjord, at Kalvaag, west coast of Norway, and at Skraaven, Lofoten Islands, in all these places only from depths of more than 150 fathoms. The same form has also been found by Mr. Nordgaard in the neighbourhood of Bergen, and a male specimen was sent to me by Prof. Cleve, who found it in a plankton-sample taken from great depth in the Skagerak. This species has not yet been recorded, however, elsewhere than from the Norwegian Sea

58. Candacia armata, Boeck.

(Pl. XCI).

Candace armata, Boeck. Nye Slægter og Arter af Saltvands-Copepoder. Chr. Vid. Selsk. Forh. 1872, p. 39.

Syn: *Candace pectinata*, Brady.

Specific Characters.—Female. Body much more robust than in the preceding species, with the anterior division considerably vaulted above, and, seen dorsally, oval fusiform in shape, greatest width nearly attaining half the length and occurring in the middle, anterior extremity abruptly contracted and transversely truncated at the tip, posterior slightly attenuated. Last segment of metasome deeply emarginated in the middle, lateral corners produced to acute posteriorly-pointing projections reaching beyond the middle of the genital segment.

Urosome conspicuously asymmetrical, genital segment somewhat irregularly dilated in the middle, and without any lateral spines, 2nd segment forming below a sacciform dilatation turned somewhat to right side, last segment with an irregular dorsal lappet curved to left side. Caudal rami likewise somewhat asymmetrical, the left one being smaller than the right; setæ about as in *C. norvegica*. Eye present, but very small, sub-ventral. Anterior antennæ much shorter than in *C. norvegica*, when reflexed scarcely reaching beyond the genital segment, and consisting of only 23 articulations. Anterior maxillipeds rather large, but with the claw-like spines less strong than in *C. norvegica*. Apical spine of outer ramus in 2nd to 4th pairs of legs very short, not nearly attaining half the length of the terminal joint. Last pair of legs with the terminal joint much longer than the other 2 combined, and falciform in shape, tapering distally, and terminating in a simple acute point, outer edge with 3 extremely small denticles, one of which is placed at rather a long distance from the other 2, inner edge perfectly smooth.

Male more slender than female, with the right projection of last segment of metasome slightly larger than left, but scarcely incurved. Urosome without any sacciform dilatation below, genital segment with the projection on right side simple, acuminate. Right anterior antenna with the middle section considerably more tumefied than in *C. norvegica*, and having at the end anteriorly a very coarsely serrate, dark-coloured lamella. Right last leg terminating in a somewhat irregular chela formed by the last 2 joints.

Colour. Body semipellucid, with a faint yellowish tinge, and exhibiting on the dorsal face of the anterior division a double row of small dark blue patches.

Length of adult female 2.70 mm., of male about the same.

Remarks.—The above-described form is unquestionably Boeck's *Candace armata*. Owing to the imperfect manner in which it was recorded by that author, it was, however, not recognized by subsequent carcinologists, and it has accordingly been recorded under the name proposed by Brady several years later, viz., that of *Candace pectinata*. It may be observed that, according to Dr. Giesbrecht, the form described under this name from the Challenger Expedition, is a different species, viz., *Candacia curta* of Dana. From most other species the present form may be easily recognized, at any rate in the female sex, by the peculiar asymmetry of the urosome.

Occurrence.—Boeck did not record the locality where he found this form. Most probably it was Haugesund, west coast of Norway, where he made most of his collections. I have myself taken it occasionally off Mærdø, outside Arendal, and in the lower part of the Christiania Fjord, at Hankø. All the specimens were procured by the aid of the tow-net near the surface of the sea. The same

species has also been taken by Mr. Nordgaard in the neighbourhood of Bergen; and 2 specimens were further found in a plankton-sample taken during the cruise of the "Michael Sars" in 1901, at Stat. 11, located east of Iceland.

Distribution.—British Isles (Brady), Atlantic Ocean, between Lat. 33° and 50° N. (Cleve), Mediterranean (Giesbrecht).

Fam. 21. Pontellidæ.

Characters. Body generally strongly built, with the anterior division more or less fusiform in shape. Cephalosome well defined from the 1st pedigerous segment, and having often laterally a hook-like projection, front produced below to a strong bifurcate rostrum. Last segment of metasome with the lateral parts, as a rule, produced behind. Urosome in female generally asymmetrical, with the number of segments more or less reduced. Caudal setæ present in the normal number. Visual organs, as a rule, highly developed, consisting of a single protuberant ventral eye and 2 well defined dorsal eyes, each often provided with one or 2 cuticular lenses. Anterior antennæ in female 16—24-articulate; right antenna in male distinctly geniculate, with the middle section generally greatly tumefied. Posterior antennæ resembling in structure those in the *Candaciidæ*. Mandibles and maxillæ on the whole normal. Anterior maxillipeds strongly built, with long, anteriorly-curving spiniform setæ, digitiform lobes well developed. Posterior maxillipeds much smaller than the anterior, with the 1st basal joint more or less expanded and carrying long setæ, remaining part very narrow, and clothed with very short setæ. The 4 anterior pairs of legs of normal structure, with the inner ramus shorter than the outer and generally biarticulate. Last pair of legs not natatory in either of the sexes, though in female generally biramous; those in male very asymmetrical, right leg more or less pronouncedly cheliform. No ovisac present in female.

Remarks.—This family, answering to the subfamily *Pontellina* of Giesbrecht, comprises a number of Calanoids, which are distinguished by their strongly built body and the often vivid blue colour with which they are ornamented. Of all the known Calanoida, they seem to be those which have reached to the highest degree of development, this being manifested both by their unusually energetic movements and the generally complicated structure of the visual organs. In the

restriction here adopted, the family comprises 7 distinct genera, viz., *Anomalocera* Templeton, *Labidocera* Lubbock, *Pontella* Dana, *Pontellopsis* Brady, *Ivellopsis* Claus, *Monops* Lubbock, *Pontellina* Dana and *Calanopia* Dana. Of these genera, only the first 2 are represented in the fauna of Norway; the others are characteristic of the tropical parts of the oceans.

Gen. 26. **Anomalocera,** Templeton, 1837.

Syn: *Irenæus,* Goodsir.
„ *Pontia,* Kröyer (part).

Generic Characters.—Body comparatively slender, with the anterior division oblong in form. Cephalosome with distinct lateral hooks, rostrum very strong, with the rami abruptly deflexed and acute at the tip. Last segment of metasome well defined from the preceding one, and having the lateral lobes in female triangularly pointed, in male conspicuously asymmetrical. Urosome in female consisting of 3, in male of 5 segments; caudal rami more slender in male than in female, in the latter conspicuously asymmetrical. Dorsal eyes well developed and of the same appearance in both sexes, each with 2 cuticular lenses; ventral eye in male enormously developed, club-shaped. Anterior antennæ not very elongated, consisting in female of 21 articulations; right antenna of male greatly swollen in the middle. Posterior antennæ with the inner ramus well defined from the basal part, outer very small, 5-articulate. Mandibles with 7 denticles on the cutting edge, the outer 2 claw-shaped, palp rather robust. Maxillæ with the proximal appendicular lobe much larger than the distal one. Maxillipeds exhibiting the structure characteristic of the family. First pair of legs with the inner ramus 3-articulate. Last pair of legs in female with the rami very unequal, the outer one slender, biarticulate, inner very small, bidentate at the tip; right leg in male with the chela not very strong and having both the dactylus and thumb obtuse at the tip.

Remarks.—This genus was established by Templeton as early as the year 1837. The genus *Irenæus* of Goodsir is identical with that of Templeton. It is nearly related to the typical genus *Pontella* of Dana, differing however rather materially in some points, e. g. in the presence of 2 pairs of dorsal eye-lenses, the comparatively short anterior antennæ, and the structure of the last pair of legs in both sexes. We know at present of only a single species, to be described below.

59. Anomalocera Patersoni, Templeton.

(Pl. XCII—XCIV).

Anomalocera Patersoni, Templeton, in Transact. Entom. Soc. London. Vol. II, p. 35, Pl. V, figs. 1—3.

Syn: *Irenæus splendidus*, Goodsir.
„ *Pontia Patersoni*, Kröyer.
„ *Pontella Eugeniæ*, Leuckart.

Specific Characters.—Female. Anterior division of body but very slightly vaulted above, seen dorsally, oblong in form, greatest width equalling about $^1/_3$ of the length, and occurring about in the middle, anterior extremity rather broad and triangularly pointed at the tip, posterior gradually somewhat attenuated. Cephalosome about the length of the 3 succeeding segments combined, and somewhat depressed in its anterior part, lateral edges forming on each side, somewhat in front of the middle, a well-marked hook-like projection, rostrum abruptly deflexed, with the rami rather strong and acutely pointed. First segment of metasome considerably larger than the succeeding ones, last segment comparatively small, with the lateral lobes of moderate size and triangularly pointed. Urosome considerably exceeding half the length of the anterior division, and somewhat asymmetrical, being generally turned out of the axis of the body to the right, genital segment somewhat tumefied in the middle and produced ventrally on right side to a narrow rod-like projection. Caudal rami conspicuously unequal, left ramus constricted at the base and gradually widening distally, right considerably larger and more exstant, with the outermost seta quite short, both rami very finely ciliated inside. Ventral eye comparatively small, though distinctly protuberant, dorsal eyes well developed, corneal lenses placed at some distance from them, near the lateral edges. Anterior antennæ, when reflexed, reaching about to the end of the 3rd pedigerous segment, being generally extended obliquely anteriorly in the living animal, proximal part somewhat dilated, distal part rather slender. Posterior antennæ with the inner ramus rather fully developed, outer, on the other hand, very small, scarcely exceeding in length the proximal joint of the inner, and much narrower. Natatory legs with the apical spine of the outer ramus rather slender and coarsely dentate outside. Last pair of legs with the outer ramus narrow and elongated, about twice the length of the basal part, proximal joint linear in form, with 2 small spines outside, and produced at the tip inside to a slender spiniform process, distal joint rather small, carrying 3 spines on the tip, the innermost much the largest and finely denticulate inside; inner ramus very small, and produced at the end to 2 subequal diverging denticles.

Male somewhat more slender than female, and having the last segment of metasome conspicuously asymmetrical, right lateral lobe much larger than left, and produced to a slender, somewhat inflexed process. Urosome much narrower than in female, and, as usual, 5-articulate. 1st joint on right side produced in a triangular projection, the 2 succeeding segments slightly asymmetrical. Caudal rami much more elongated than in female, and nearly equal. Ventral eye of extraordinary size, sub-pedicellate or club-shaped, extending obliquely anteriorly, its broadly rounded end being received between the rami of the rostrum. Right anterior antenna with the middle section bulbously tumefied in its proximal part, and carrying a slender spine pointing obliquely inwards, the last 2 joints of this section attenuated, and each provided in front with a finely serrate lamella. Last pair of legs without any trace of an inner ramus, left leg with the terminal joint comparatively small, incurved, projecting at the tip to a short claw, and carrying 3 small spines outside; right leg with the chela sub-quadrangular in form, thumb very small, dactylus somewhat spoon-shaped.

Colour. Body generally of a fine bluish green colour, with a number of irregular dark patches on the dorsal face of the anterior division arranged in a double row, 1st and 2nd pedigerous segment each with a median dorsal pigment-star, consisting of a dark nucleus and numerous radiating fibres of a silvery hue; ventral eye indigo blue.

Length of adult female 3.20 mm., of male 3.00 mm.

Remarks.—This handsome Calanoid was first described under the above name by Templeton, and was some years afterwards recorded by Goodsir under another name, viz., *Irenæus splendidus*. Kröyer referred the species to the genus *Pontia* of Milne-Edwards (= *Pontella* Dana). It is an easily recognizable form, and perhaps one of our most beautiful Calanoids, being clearly distinguished both by its unusual colouring and the very full development of the visual organs, especially in the male.

Occurrence.—I have met with this form in several places, both off the south and west coasts of Norway, generally congregated in great shoals. The true habitat of this form, however, is undoubtedly the open ocean, and it is only after heavy gales, and by the accompanying strong sea-currents, that it is occasionally brought close to the shores and into the fjords. Under such circumstances I have found it rather plentifully at the Biological Station at Drøbak, and sometimes even in the uppermost part of the Christiania Fjord, close to the town. Off the west coast of Norway, where it is known to the fishermen as "Blaaaate" (blue bait), its presence in the fjords is a very good sign of the approach of the summer-herring. It is always found swimming close to the surface of

the sea, often jumping out of the water; and, as it generally occurs in great abundance, the presence of this Calanoid in calm weather may be easily observed by a slight disturbance of the surface, as if by fine rain. The movements of this Calanoid are exceedingly rapid and energetic, and indeed, when kept alive in a bottle with sea-water, it is a matter of great difficulty to catch the specimens with the ordinary implements, viz., a small feather or a dipping-tube. When brought under the microscope in a small quantity of water, the animal immediately jumps off the object-glass, and in order to prevent its escape, it is therefore necessary to add to the water a little alcohol or other narcotizing fluid.

Distribution.—British Isles (Brady), coast of France (Canu), Mediterranean (Claus), Atlantic Ocean, between Lat. 36° and 67° N. (Giesbrecht), Black Sea (Karawajew).

Gen. 27. **Labidocera**, Lubbock, 1853.

Syn: *Pontella*, Dana (part.).
„ *Hemipontella*, Claus.

Generic Characters.—Body less slender than in *Anomalocera*, with the anterior division more tumefied. Cephalosome with or without lateral hooks, rostrum about as in *Anomalocera*, but somewhat smaller. Last segment of metasome confluent with the preceding one, lateral lobes more or less produced behind. Urosome in female comparatively short and composed of 2 or 3 segments, that in male 5-articulate, genital segment in female generally asymmetrical. Caudal rami of moderate size, sometimes conspicuously unequal in female. Ventral eye of same appearance in the 2 sexes, dorsal eyes each with a single cuticular lense, rather small in female, greatly developed in male. Anterior antennæ slender and elongated, consisting in female of 23 articulations; right antenna in male with the middle section moderately tumefied. Posterior antennæ with the inner ramus confluent with the basal part, outer ramus larger than in *Anomalocera*. Oral parts on the whole resembling in structure those in that genus. Inner ramus in all the natatory legs biarticulate. Last pair of legs in female with both rami uniarticulate and less unequal than in *Anomalocera;* left leg in male sometimes with a rudimentary inner ramus, right leg terminating in a very large and perfect chela.

Remarks.—This genus, established by Lubbock, is chiefly distinguished from *Anomalocera* by the presence of only a single pair of dorsal ocular lenses,

which in the male are greatly developed, whereas the ventral eye is of the same appearance in both sexes. Moreover, the last segment of the metasome is confluent with the preceding one, and the inner ramus of the 1st pair of natatory legs is biarticulate, like that in the other pairs. Finally, the structure of the last pair of legs is somewhat different in the 2 sexes, the chela of the right leg in male being exceedingly large and powerful. We know at present of numerous species belonging to this genus, amounting to about 23 in all. One of these species has been found off the Norwegian coast, and will be described below.

60. Labidocera Wollastoni, Lubbock.

(Pl. XCV & XCVI).

Pontella Wollastoni, Lubbock, in Ann, nat. hist. ser. 2, Vol. 20, p. 406, Pl. 10, 11.

Syn: *Pontella helgolandica*, Claus.

Specific Characters.—Female. Anterior division of body, seen dorsally, oblong oval in form, greatest width exceeding $^1/_3$ of the length, and occurring behind the middle, anterior extremity somewhat contracted and narrowly rounded at the tip, posterior but slightly attenuated. Cephalosome exceeding in length the 3 succeeding segments combined, lateral hooks well marked, rostrum abruptly deflexed, with the rami acutely pointed. Lateral lobes of last segment of metasome triangular and perfectly symmetrical. Urosome comparatively short and thick, 3-articulate, not nearly attaining $^1/_3$ of the length of the anterior division, genital segment produced dorsally to a large sacciform expansion turned somewhat to the right, and quite overlapping the succeeding segment. Caudal rami symmetrical, with the setæ comparatively short and thick. Dorsal ocular lenses small and widely apart. Anterior antennæ very slender, reaching, when reflexed, about to the end of the 2nd caudal segment. Posterior antennæ with both rami rather slender, the inner one the longer. Last pair of legs rather robust, both rami well developed, lanceolate, without any denticles or setæ, the outer one the larger.

Male more slender than female, with the lateral lobes of last segment of metasome shorter and more obtuse. Urosome narrower and perfectly symmetrical, 1st segment not produced on right side. Caudal rami more elongate than in female, with the setæ rather slender. Dorsal ocular lenses exceedingly large and placed near together. Right anterior antenna with a hook-like projection on the penultimate joint of the middle section and a coarsely serrate lamella on the last one; antepenultimate joint of the terminal section produced at the end anteriorly to a slender, rod-like process. Last pair of legs very asymmetrical, left leg provided

with a thin deflexed lamella issuing from inside the basal part, and terminating in 2 unequal digitiform processes, terminal part somewhat complanate, biarticulate, with the distal joint discoidal and armed outside with 3 slender spines; right leg very strongly built, with the chela exceedingly large and tumid, both the dactylus and thumb sharply pointed, palmar edge irregularly indented, with an obtuse projection in the middle.

Colour.—Body semipellucid, with a yellowish green tinge, and in female generally with 3 dark yellow transverse patches on the dorsal face of the anterior division; dorsal ocular lenses in male highly refractive.

Length of adult female 2.40 mm., of male 2.20 mm.

Remarks.—This form was first described by Lubbock as a species of the genus *Pontella* of Dana. The *Pontella helgolandica* of Claus is unquestionably identical with Lubbock's species. It is easily recognized from the 2nd Norwegian Pontellid, *Anomalocera Patersoni*, though agreeing closely with some of the exotic species of the present genus.

Occurrence.—I have taken this form occasionally at Mærdø, outside Arendal, and in the lower part of the Christiania Fjord. Some few specimens were also found in a plankton-sample taken by Dr. Hjort in the Langesund Fjord, and Mr. Nordgaard has observed this form in the neighbourhood of Bergen. Like all the other Pontellidæ, it is a true pelagic form, occurring more generally in the open ocean, close to the surface of the sea.

Distribution.—British Isles (Brady), Heligoland (Claus), coast of France (Canu), Mediterranean (Giesbrecht), Atlantic Ocean, between Lat. 36° and 55° N. (Giesbrecht).

Fam. 22. Parapontellidæ.

Characters.—General form of body somewhat resembling that in the *Pontellidæ*. Cephalosome well defined from the 1st pedigerous segment, front without any rostrum, but carrying below 2 soft tentacular appendages. Last segment of metasome united with the preceding one, and in male conspicuously asymmetrical. Urosome composed in female of 3, in male of 5 segments. Caudal rami in both sexes perfectly symmetrical, with the full number of setæ. A small ventral eye present, and moreover a rather large central eye; no cuticular lenses

present. Anterior antennæ comparatively short, with the number of articulations somewhat reduced; right antenna in male distinctly geniculate. Posterior antennæ with both rami well developed. Oral parts, especially the mandibles and maxillæ, of rather anomalous structure. Anterior maxillipeds much more strongly built than the posterior. The 4 anterior pairs of legs resembling in structure those in the *Pontellidæ*. Last pair of legs not natatory in either of the sexes; in female biramous, in male uniramous, right leg in the latter not cheliform.

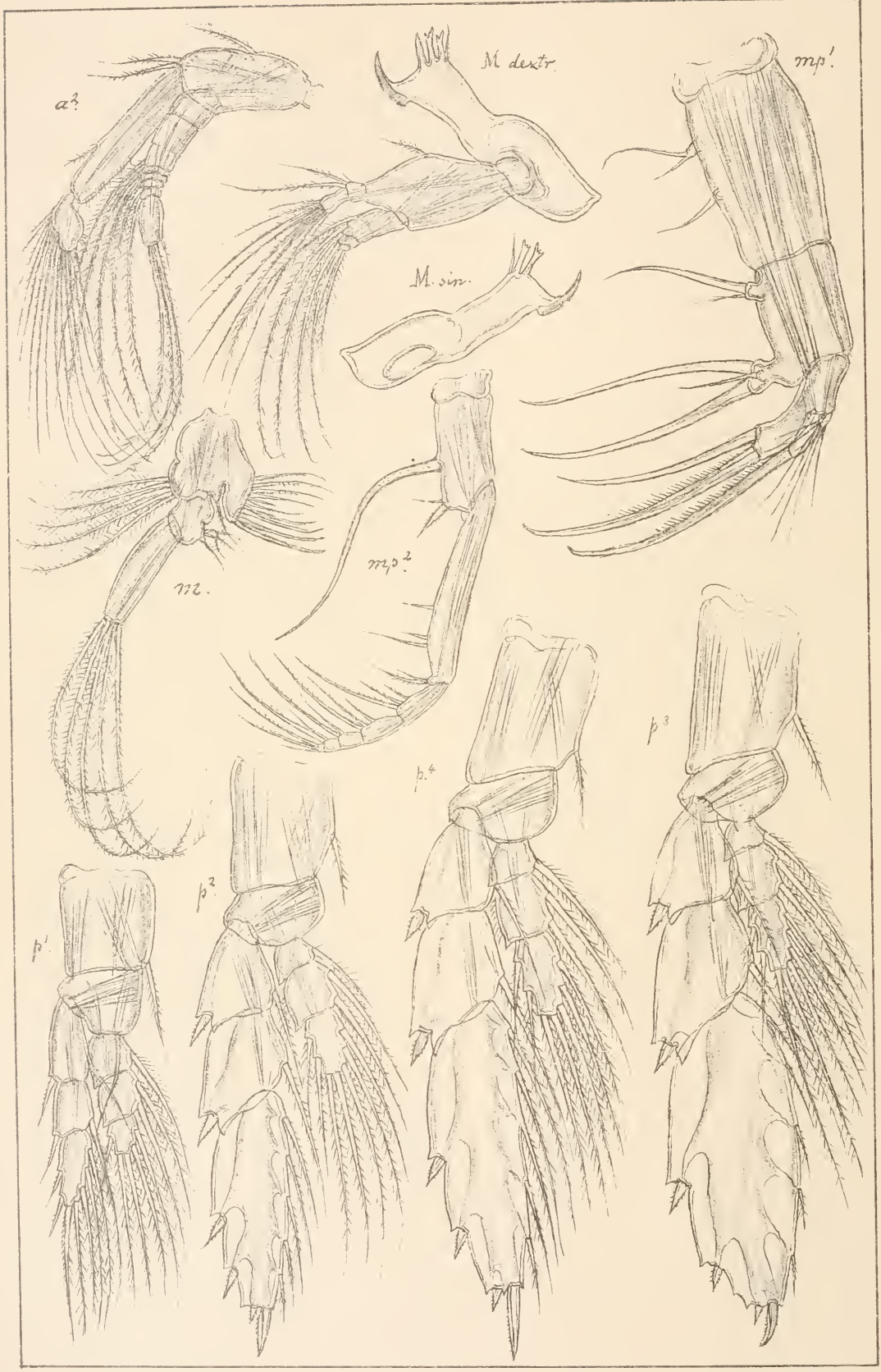
Remarks.—This family is here taken in a much more restricted sense than even the subfamily *Parapontellinæ*, which, according to Dr. Giesbrecht, comprises the 3 genera *Parapontella*, *Acartia* and *Corynura*. In my opinion, these 3 genera are so widely different, that each of them ought to be regarded as the type of a separate family. The present family accordingly, in the restriction here adopted, comprises only the genus *Parapontella* of Brady, which, although in some respects exhibiting a slight resemblance to the *Pontellidæ*, in reality differs very materially in several structural features, for instance in the want of the strong bifurcate rostrum characteristic of that family, in the very different structure of the posterior antennæ and oral parts, and finally in the not chelate right last leg of the male. The solitary species of the genus as yet known seems also to differ pronouncedly in habits from the *Pontellidæ*.

Gen. 28. **Parapontella**, Brady, 1878.

Syn: *Pontellina*, Lubbock (not Dana).

Generic Characters.—Body comparatively robust, with the anterior division considerably tumefied. Cephalosome well arched, front scarcely at all produced below, tentacular appendages very delicate, recurved. Lateral parts of last segment of metasome in female rounded off, in male produced on right side. Urosome in female perfectly symmetrical, in male with some of the segments produced on right side. Caudal rami sublinear in form, and of same appearance in the 2 sexes; all the setæ well developed. Anterior antennæ composed in female of 20 articulations, last one very small and imperfectly defined; right antenna in male with the joints of the middle section somewhat irregular, terminal section composed of only 2 joints. Posterior antennæ with the inner ramus imperfectly defined from the basal part, outer ramus longer than the inner. Mandibles rather strong, with the outer cutting teeth unguiform, palp of somewhat unusual

Copepoda
Calanoida.



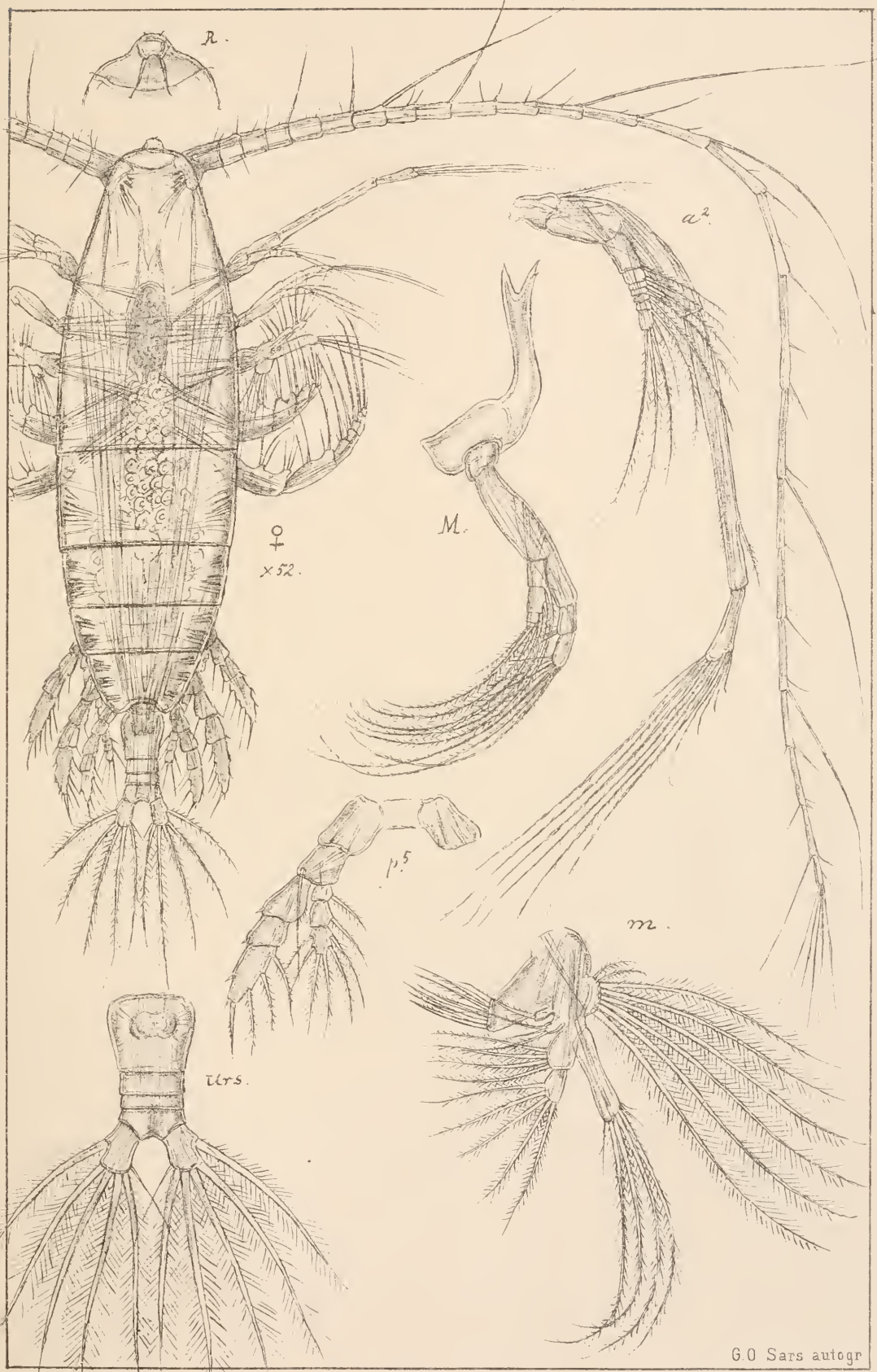
G.O. Sars autogr.

Trykt i den private Opmaaling. Chra.

Heterorhabdus norvegicus, (Boek)
(continued)

Copepoda

Heterorhabdidæ — Calanoida — Pl. LXXXII



Trykt i den private Opmaaling, Chra

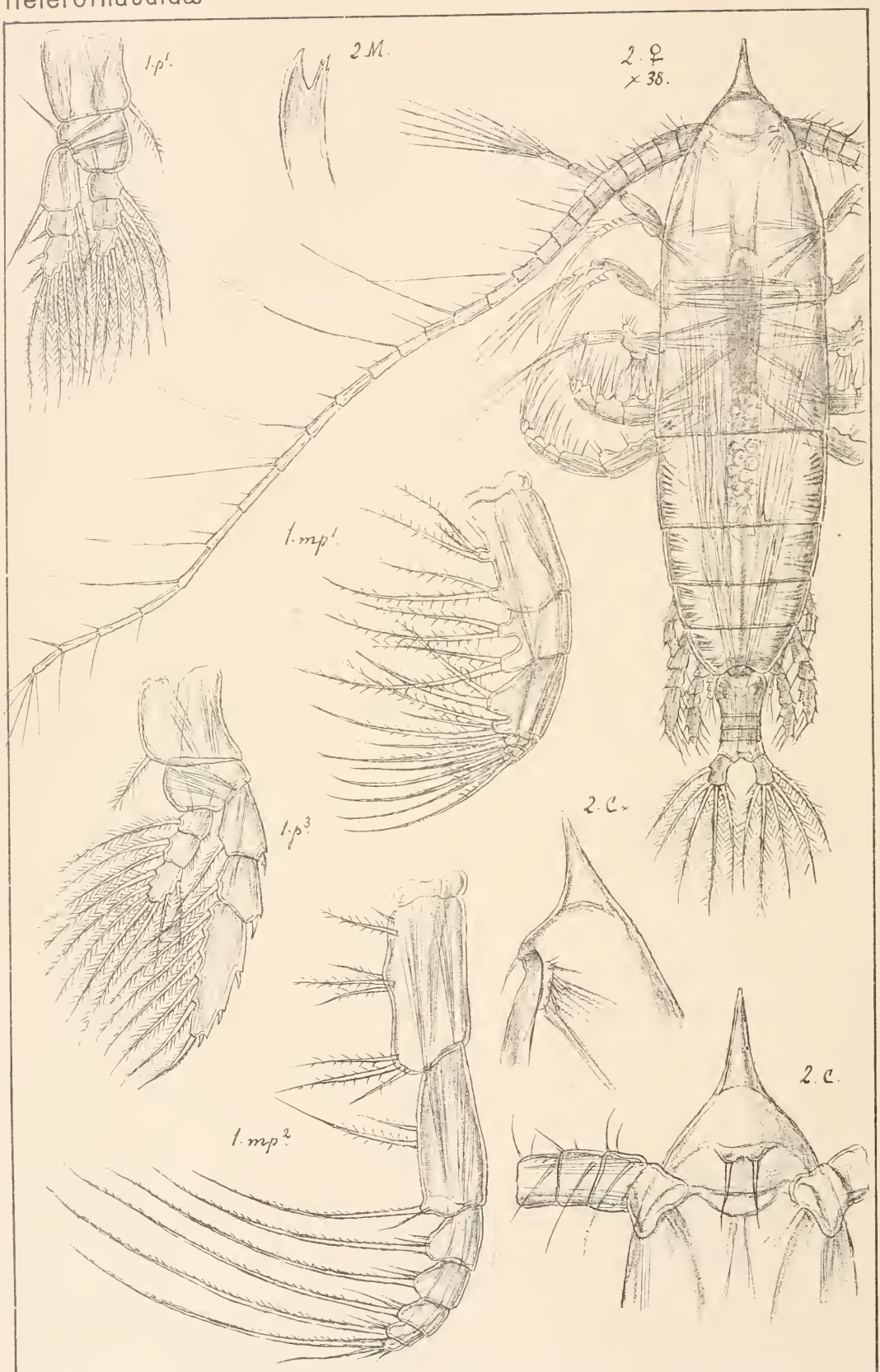
Haloptilus longicornis, (Claus)

Copepoda

Calanoida.

Heterorhabdidæ

Pl. LXXXIII.

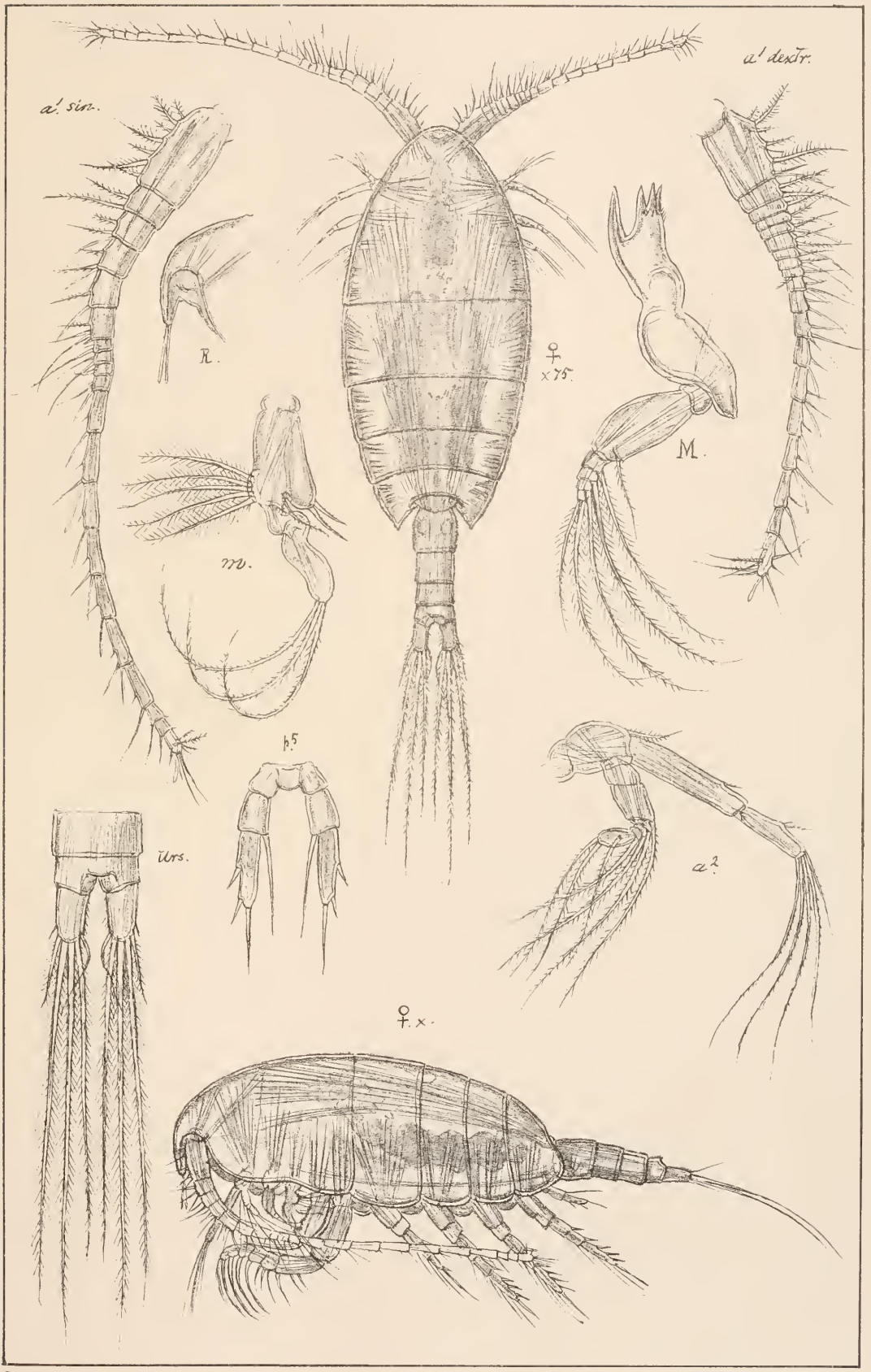


G O Sars autogr.

Trykt i den private Opmaaling, Chra

1 Haloptilus longicornis, (Claus)
(continued)
2 Haloptilus acutifrons, Giesbr.

Copepoda
Calanoida

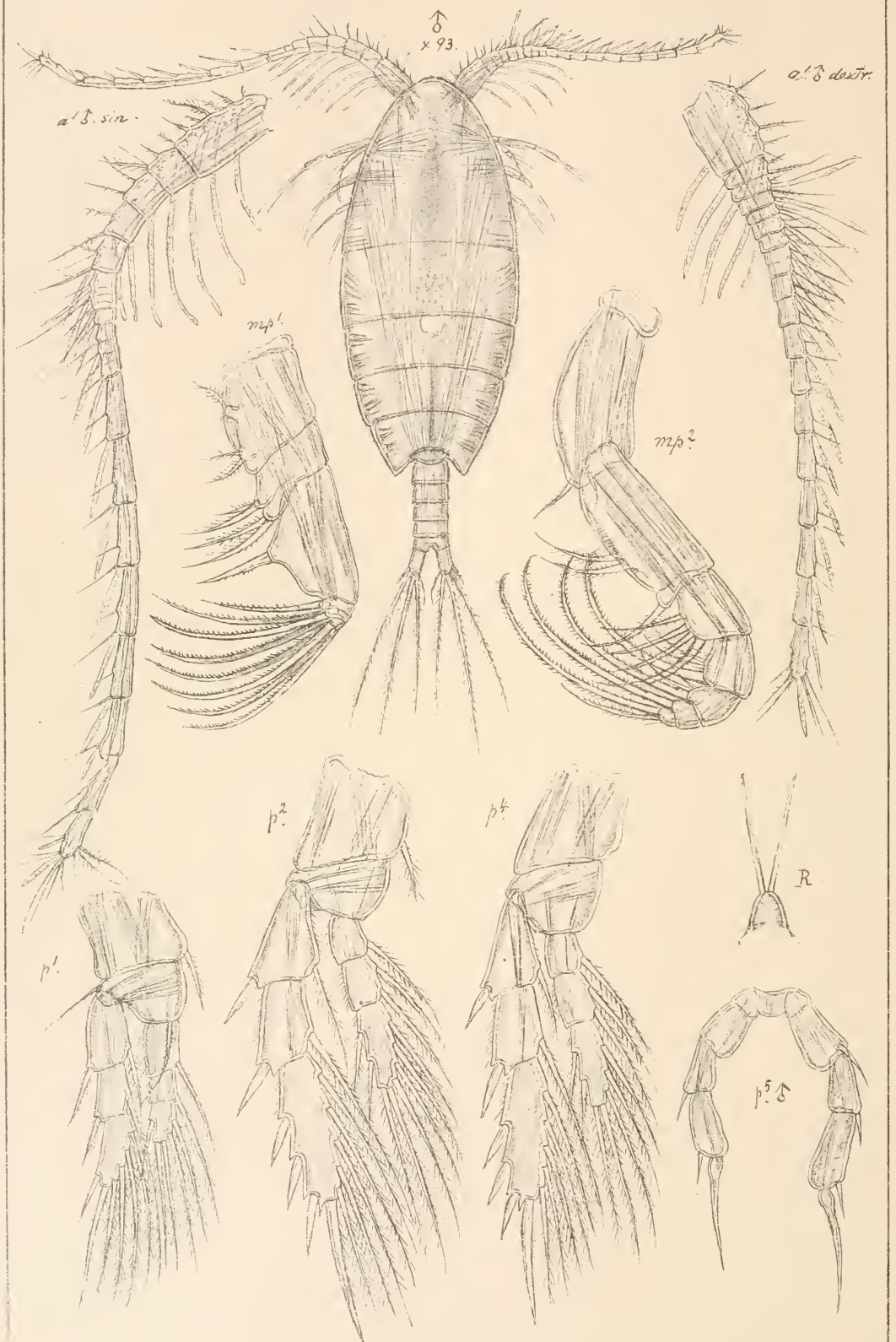


G O Sars autogr.

Trykt i den private Opmaaling, Chra

Scottula inæqvicornis, G.O. Sars

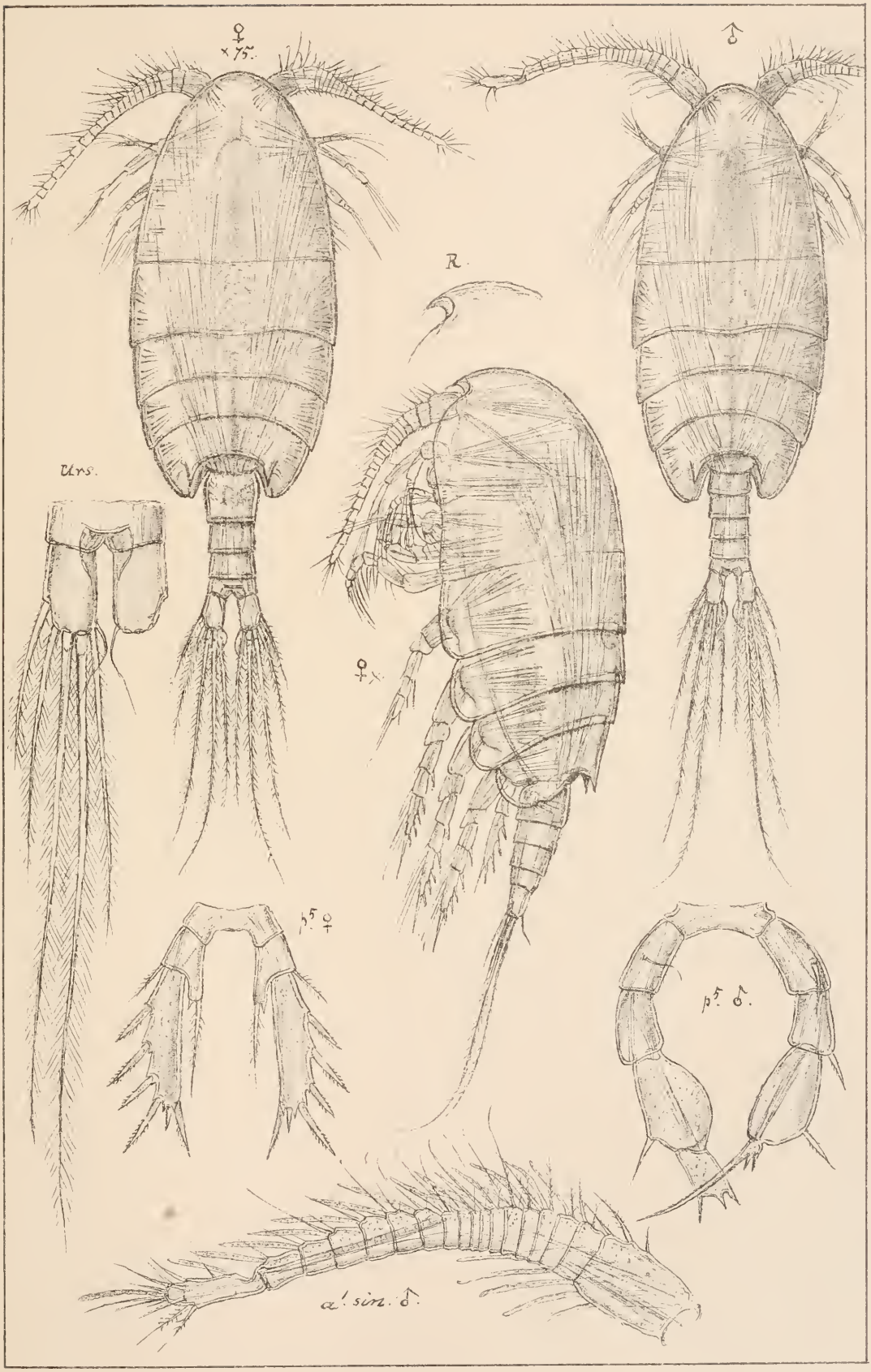
Copepoda
Calanoida



G. O. Sars autogr.

Trykt i den private Opmaaling, Chra

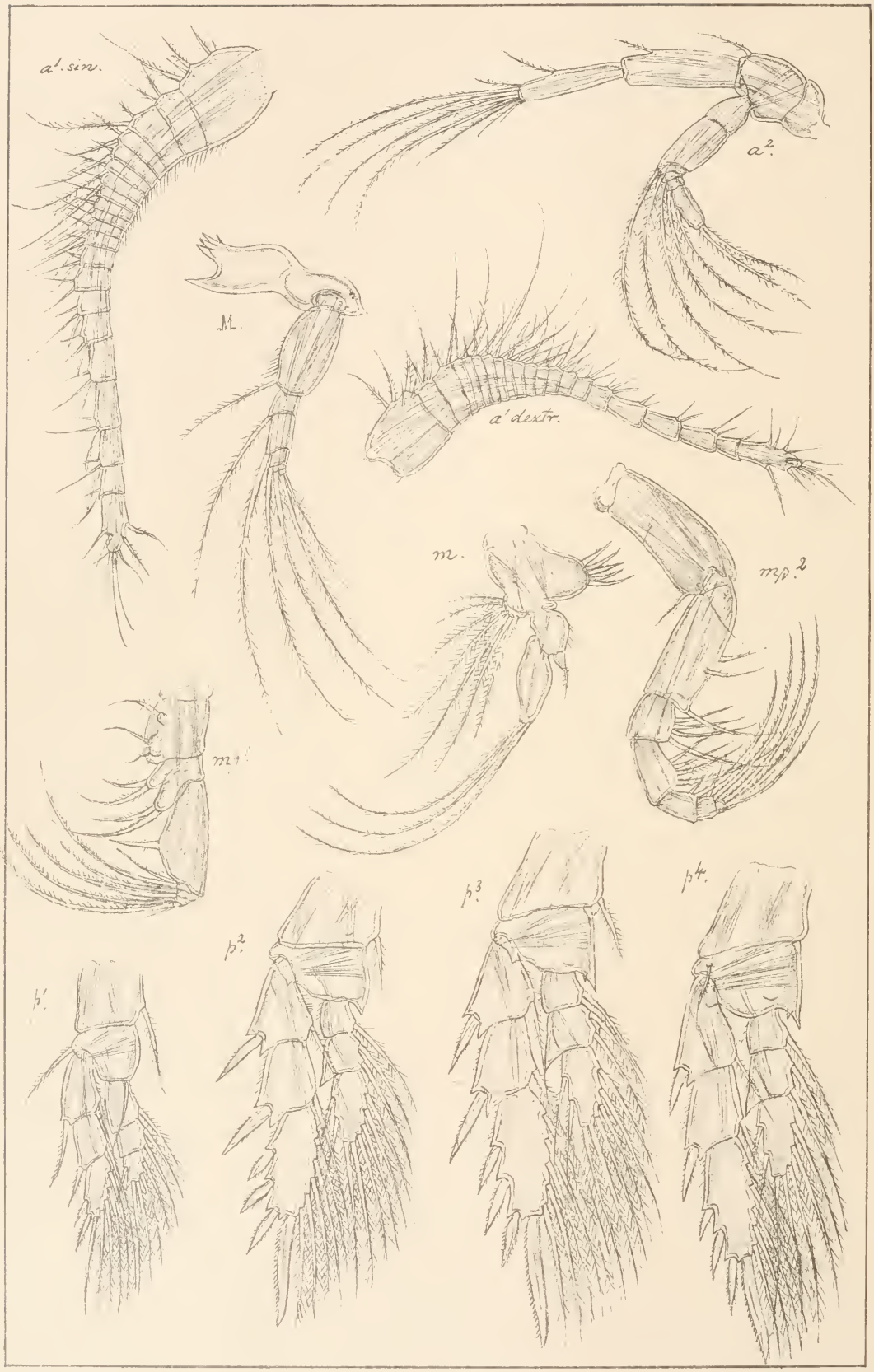
Scottula inæqvicornis, G. O. Sars
(continued)



G O Sars autogr
Trykt i den private Opmaaling Chra

Paramisophria Cluthæ, Scott

Copepoda
Calanoida.



G O Sars autogr

Trykt i den private Opmaaling, Chra

Paramisophria Cluthæ, Scott
(continued)

Copepoda
Calanoida.

G.O. Sars autogr.

Trykt i den private Opmaaling, Chra

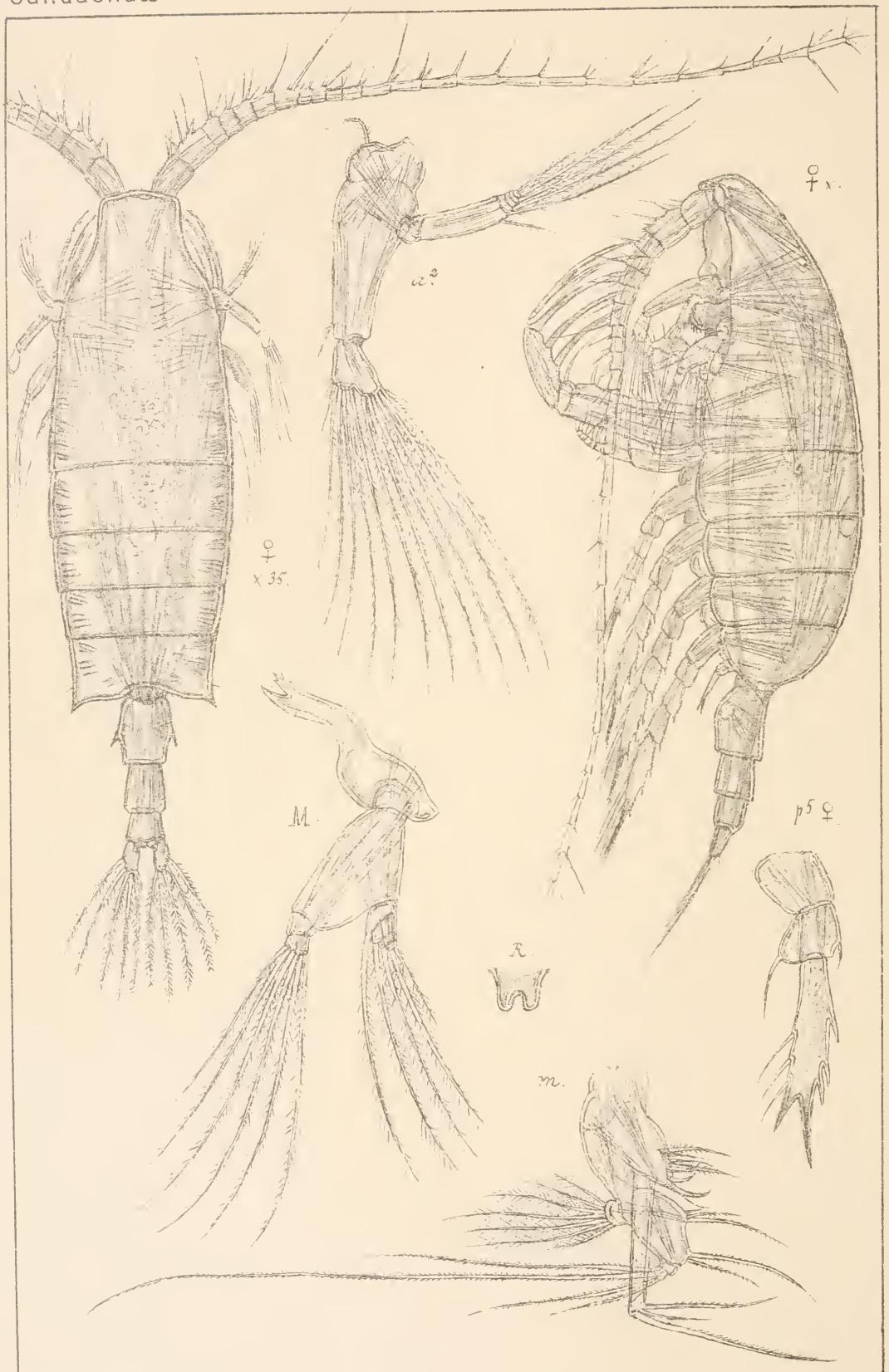
Pseudocyclops obtusatus, Brady

Copepoda

Calanoida

Candaciidæ

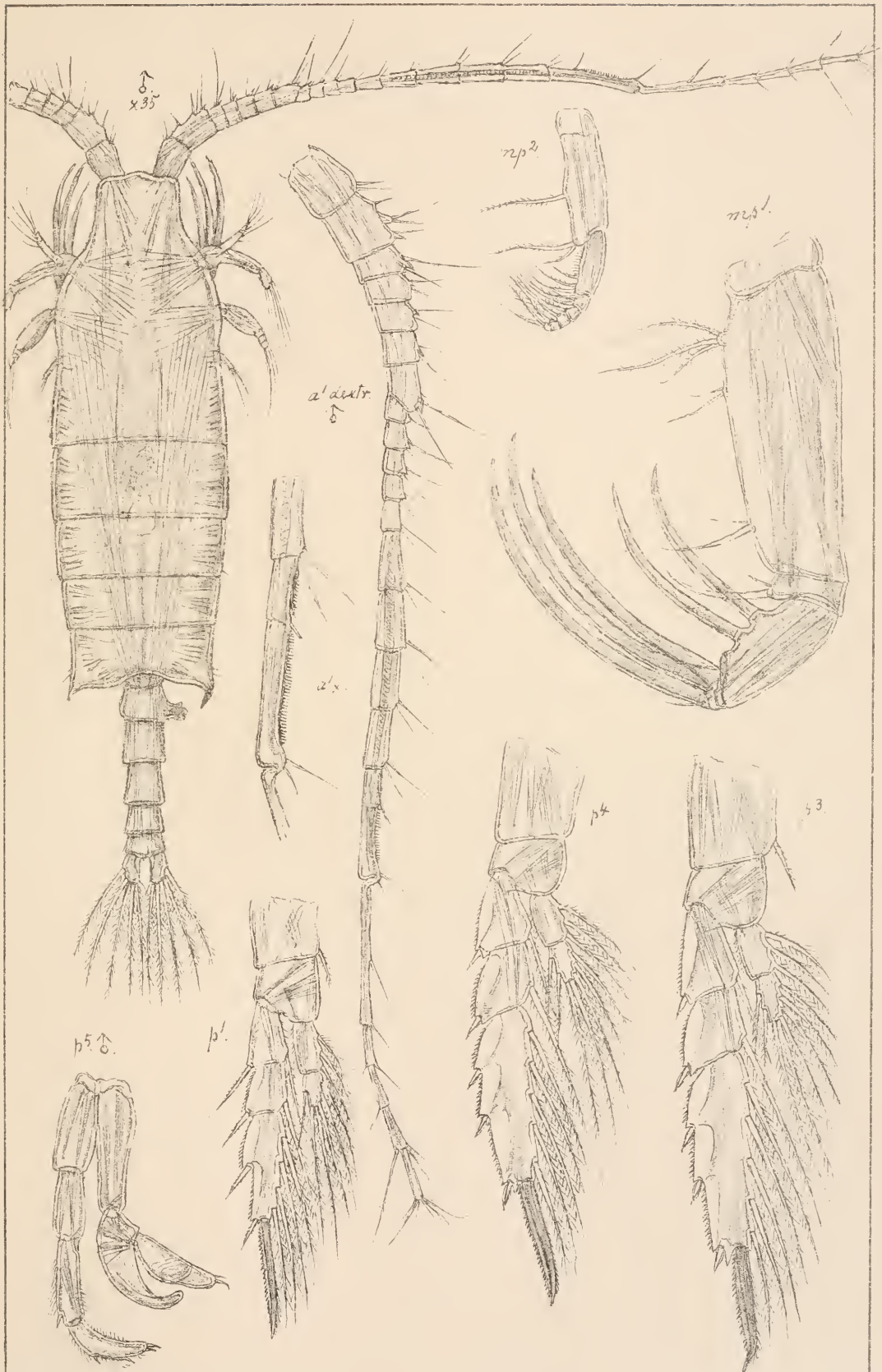
PI. LXXXIX



G O Sars autogr

Trykt i den private Opmaaling, Chra

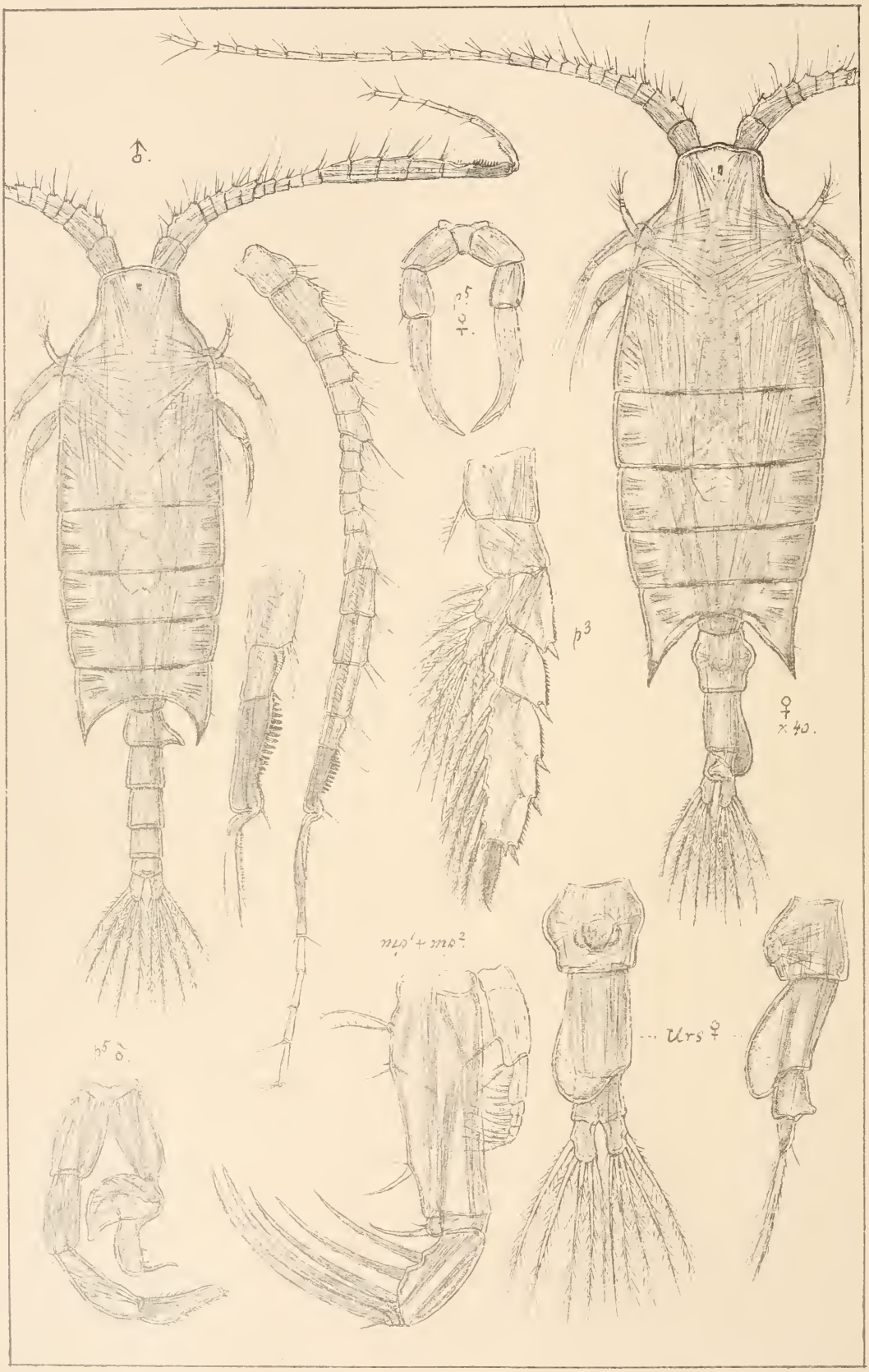
Candacia norvegica, Boeck



G O Sars autogr

Trykt i den private Opmaaling Chra

Candacia norvegica, Boeck
(continued)

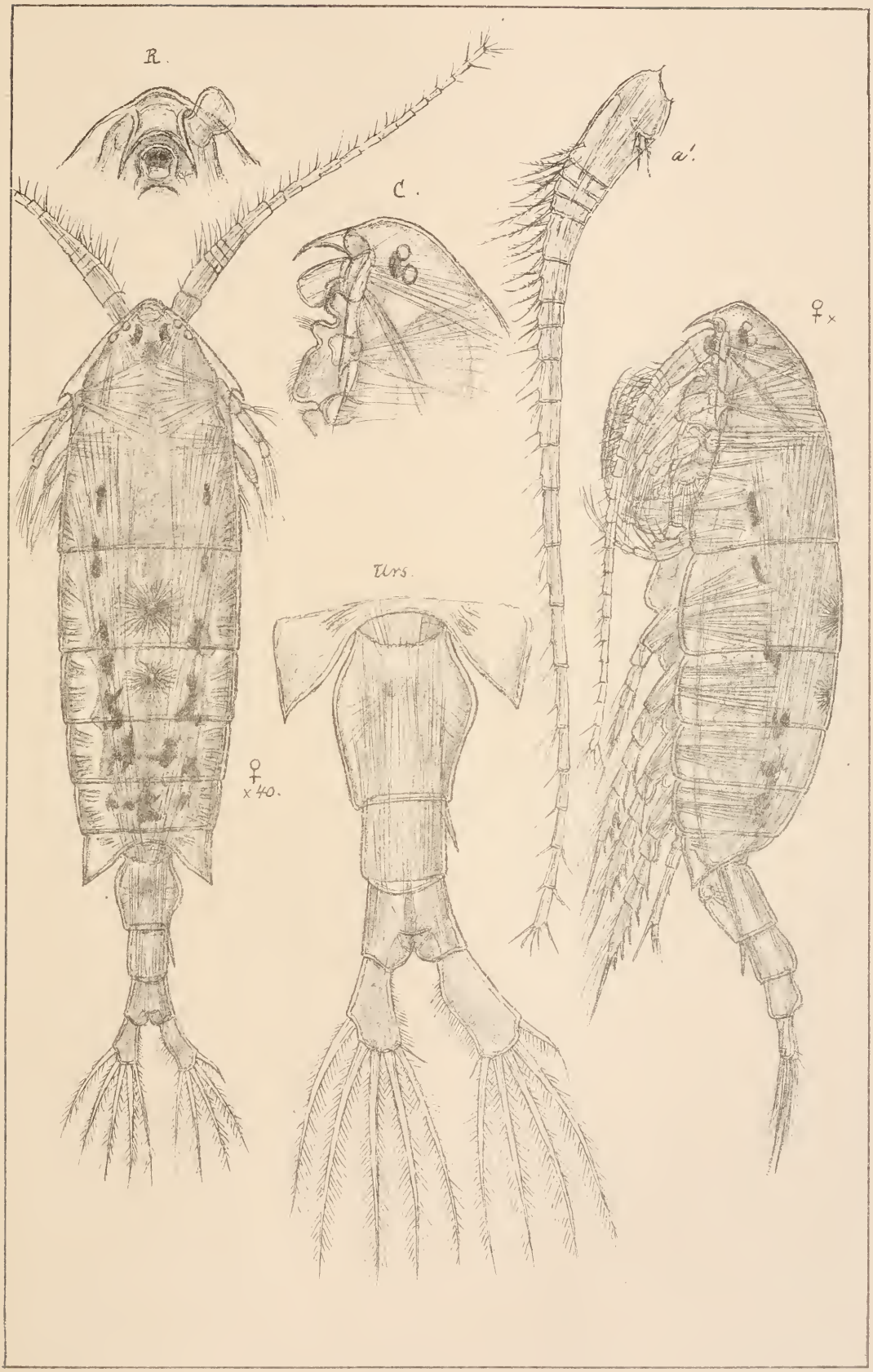


G. O. Sars autogr. Trykt i den private Opmaaling, Chra.

Candacia armata, Boeck

Copepoda

Pontellidæ — Calanoida. — PI. XCII



G O Sars autogr.

Trykt i den private Opmaaling, Chra

Anomalocera Patersoni, Templt.

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SYSTEMATIC LIST

OF THE SPECIES DESCRIBED IN THE PRESENT VOLUME.

Amphascandria.

Calanidæ.

Calanus, Leach.
finmarchicus, Gunner.
helgolandicus, Claus.
hyperboreus, Kröyer.

Eucalanidæ.

Rhincalanus, Dana.
nasutus, Giesbrecht.

Paracalanidæ.

Paracalanus, Boeck.
parvus, Claus.

Pseudocalanidæ.

Pseudocalanus, Boeck.
elongatus, Boeck.
gracilis, G. O. Sars.
Microcalanus, G. O. Sars.
pusillus, G. O. Sars.
Spinocalanus, Giesbrecht.
abyssalis, Giesbrecht.

Ætideidæ.

Ætideus, Brady.
armatus, Boeck.
Ætideopsis, G. O. Sars.
rostrata, G. O. Sars.
Chiridius, Giesbrecht.
armatus, Boeck.
obtusifrons, G. O. Sars.
Gaïdius, Giesbrecht.
tenuispinus, G. O. Sars.
brevispinus, G. O. Sars.
Undinopsis, G. O. Sars.
Bradyi, G. O. Sars.
similis, G. O. Sars.
Bryaxis, Boeck.
brevicornis, Boeck.

Euchætidæ.

Euchæta, Philippi.
norvegica, Boeck.
glacialis, Hansen.
barbata, Brady.

Phaënnidæ.

Pseudophaënna, G. O. Sars.
typica, G. O. Sars.
Xanthocalanus, Giesbrecht.
borealis, G. O. Sars.
propinquus, G. O. Sars.

Scolecithricidæ.

Amallophora, Scott.
magna, Scott.
brevicornis, G. O. Sars.
Scolecithricella, G. O. Sars.
minor, Brady.

Isokerandria.

Diaixidæ.

Diaixis, G. O. Sars.
hibernica, Scott.

Stephidæ.

Stephos, Scott.
lamellatus, G. O. Sars.
Scotti, G. O. Sars.
Parastephos, G. O. Sars.
pallidus, G. O. Sars.

Tharybidæ.

Tharybis, G. O. Sars.
macrophthalma, G. O. Sars.

Pseudocyclopiidæ.

Pseudocyclopia, Scott.
stephoides, Thompson.

Heterarthrandria.

Centropagidæ.

Centropages, Kröyer.
typicus, Kröyer.
hamatus, Lilljeborg.
Isias, Boeck.
clavipes, Boeck.
Limnocalanus, G. O. Sars.
macrurus, G. O. Sars.

Diaptomidæ.

Diaptomus, Westwood.
castor, Jurine.
denticornis, Wierzejsky.
bacillifer, Koelbel.
laticeps, G. O. Sars.
laciniatus, Lilljeborg.
gracilis, G. O. Sars.
graciloides, Lilljeborg.

Temoridæ.

Temora, Baird.
longicornis, Müller.
Eurytemora, Giesbrecht.
velox, Lilljeborg.
hirundoides, Nordqvist.
lacustris, Poppe.
Heterocope, G. O. Sars.
saliens, Lilljeborg.
borealis, Fischer.
appendiculata, G. O. Sars.

Metridiidæ.

Metridia, Boeck.
longa, Lubbock.
lucens, Boeck.
Pleuromamma, Giesbrecht.
robusta, Dahl.

Heterorhabdidæ.

Heterorhabdus, Giesbrecht.
norvegicus, Boeck.
Haloptilus, Giesbrecht.
longicornis, Claus.
acutifrons, Giesbrecht.

Arietellidæ.

Scottula, G. O. Sars.
inaequicornis, G. O. Sars.
Paramisophria, Scott.
Clothæ, Scott.

Pseudocyclopidæ.

Pseudocyclops, Brady.
obtusatus, Brady.

Candaciidæ.

Candacia, Dana.
norvegica, Boeck.
armata, Boeck.

Pontellidæ.

Anomalocera, Templeton.
Patersoni, Templeton.

Labidocera, Lubbock.
Wollastoni, Lubbock.

Parapontellidæ.

Parapontella, Brady.
brevicornis, Lubbock.

Acartiidæ.

Acartia, Dana.
longiremis, Lilljeborg.
Clausi, Giesbrecht.
discaudata, Giesbrecht.

appearance, the basal part being very slender, almost cylindric in form, inner ramus abruptly reflexed, outer quite rudimentary and occurring at rather a long distance from the inner. Maxillæ with the palp much produced, vibratory plate rudimentary. Anterior maxillipeds with strong, claw-like spines on the distal part, proximal lobes very small. Posterior maxillipeds with the 1st basal joint considerably produced in front, and carrying strongly developed setæ, distal part very small, with the setæ rudimentary. Inner ramus of 1st pair of legs 3-articulate, that of the 3 succeeding pairs biarticulate. Last pair of legs in female with both rami uniarticulate, outer slender and linear, inner short, conical; those in male 3-articulate, terminal joint in both legs spatulate, though of somewhat different form.

Remarks.—This genus was established in the year 1878 by Prof. Brady, to include a form previously described by Lubbock as a species of the genus *Pontellina* of Dana. The removal of this form, not only from that genus, but also from the family *Pontellidæ*, is justified by a number of well-marked differences, which have been mentioned in the preceding pages. The genus comprises at present only a single species, to be described below.

61. Parapontella brevicornis (Lubbock).

(Pl. XCVII & XCVIII).

Pontellina brevicornis, Lubbock, in Ann. Nat. Hist., 2nd series, Vol. XX, p. 407, Pl. XI, figs. 4—8.

Specific Characters.—Female. Anterior division of body, seen dorsally, oval in form, greatest width slightly exceeding half the length, and occurring in the middle, anterior extremity somewhat contracted and narrowly rounded at the tip, posterior but slightly attenuated. Cephalosome about the length of the 3 succeeding segments combined, and evenly vaulted above. Lateral lobes of last segment of metasome somewhat deflexed and narrowly rounded at the tip. Urosome scarcely attaining half the length of the anterior division, genital segment slightly tumefied in its proximal part and rather protuberant below, 2nd segment armed at the posterior edge with 2 sub-dorsal, posteriorly-pointing spines. Caudal rami about 3 times as long as they are broad, sublinear in form, and scarcely divergent, marginal setæ of moderate length, the outermost issuing from the outer edge, at some distance from the others. Anterior antennæ much shorter than the anterior division of the body, reaching, when reflexed, to about the end of the 2nd pedigerous segment, proximal part somewhat tumefied and clothed inside with a number of partly plumose setæ, apical bristles likewise ciliated.

Posterior antennæ with the outer ramus considerably longer than the inner, and composed of 5 joints only, last joint rather narrow, with only 2 apical setæ. Last pair of legs with the outer ramus very narrow and slightly curved, being produced at the end inside to a spiniform projection, tip armed with a slender spine, outer edge with 2 much smaller spines, the distal one placed near the tip; inner ramus about half the length of the outer, and produced at the tip to 2 short digitiform projections.

Male much more slender than female, with the right corner of last segment of metasome remarkably expanded and conically produced behind. Urosome very slender and somewhat asymmetrical, being generally turned out of the axis of the body to the left, 3rd and 4th segments each produced on right side to a small dentiform process. Right anterior antenna longer than left and much more strongly built, middle section moderately tumefied in its proximal part, its penultimate joint produced at the end anteriorly to a short dentiform projection, last joint with a serrated lamella in front; terminal section exserted at the tip to a strong mucroniform projection, at the base of which, posteriorly, issue the apical bristles. Last pair of legs rather asymmetrical, the right one being the larger, with the 1st joint considerably dilated, and produced inside to a narrow digitiform process; 2nd joint of both legs with a short dentiform projection inside; terminal joint of right leg somewhat lozenge-shaped, being suddenly dilated near the base, and exserted at the end to a slender acuminate lappet pointing straight downwards, that of left leg broadly oval in outline and partly ciliated on the edges, apical lappet quite short and pointing inwards, outer edge with 2 dentiform projections.

Colour. Body of female generally pellucid, with a faint yellowish tinge, and exhibiting dorsally at the end of each of the pedigerous segments an interrupted transverse band of a dark reddish hue; in some cases, however, rather deeply tinged with a reddish brown pigment, both on the anterior and posterior divisions. Body of male always of a uniform yellowish hue.

Length of adult female 1.55 mm., of male 1.35 mm.

Remarks.—This form was described by Lubbock as early as the year 1857, and was at that time referred to the genus *Pontellina* of Dana, apparently owing to a slight resemblance in the general form of the body. It is, however, in reality very different from that genus, and is also easily recognizable from any of the other known Calanoida.

Occurrence.—I have met with this Calanoid occasionally in 3 different localities of the west coast of Norway, viz., Molde, Christiansund and Kalvaag. In all these localities it occurred close to the shore, at a depth of a few fathoms,

among algæ. On the other hand, I have never met with it in any of the numerous plankton-samples examined by me, for which reason I have come to the conclusion that, at any rate off the Norwegian coast, this Calanoid is a strictly littoral form. It moves in the usual manner, now proceeding rather slowly in a somewhat jumping manner by rhythmical strokes of the posterior antennæ and mandibular palps, now starting away more suddenly by employing the natatory legs and the urosome.

Distribution.—British Isles (Brady), coast of France (Canu), Mediterranean (Giesbrecht), Atlantic Ocean between 50° and 59° N. Lat. (Giesbrecht).

Fam. 23. Acartiidæ.

Characters.—Body more or less slender, with the anterior division but slightly vaulted. Cephalosome well defined from the 1st pedigerous segment; front without any rostrum. Last 2 segments of metasome united. Urosome consisting in female of 3, in male of 5 segments. Caudal rami with the full number of setæ. A single eye present. Anterior antennæ very slightly attenuated and of a peculiar nodular appearance. the articulations being rather irregular and sometimes indistinctly defined, bristles very unequal; right antenna in male slightly transformed, and imperfectly geniculate. Posterior antennæ very delicate, with the inner ramus very slender, outer poorly developed. Oral parts conspicuously differing from those in other Calanoids; posterior maxillipeds, however, built upon a somewhat similar type to that in the *Pontellidæ*. The 4 anterior pairs of legs very slender and delicate, with unusually long natatory setæ; inner ramus in all these pairs biarticulate. Last pair of legs not natatory, uniramous in both sexes, very small in female, somewhat larger and subprehensile in male. No ovisac present in female.

Remarks.— This family is established to include the genus *Acartia* of Dana, which in several respects differs materially from the other known Calanoida, representing quite a particular type. It is only in the structure of the maxillipeds that some agreement is found to the *Pontellidæ*, to which family this genus has often been referred; but otherwise it is widely different. In addition to the typical genus, another nearly-allied genus has recently been established by Th. Scott as *Paracartia*. Only the former genus is represented in the northern seas.

Gen. 29. **Acartia,** Dana, 1846.

Syn: *Dias*, Lilljeborg.

Generic Characters.—Form of body slender and elegant. Cephalosome attenuated anteriorly, with the front unarmed, or in some cases carrying 2 delicate tentacular filaments below. First segment of metasome much larger than the others; lateral parts of last segment generally rounded. Urosome of moderate size, genital segment in female comparatively large, penultimate segment in male very short, and imperfectly defined from the last one. Caudal rami of different form in the different species, and, as a rule, shorter in male than in female; appendicular bristle well developed and finely plumose, arising with a bulbous base from the dorsal face of the rami. Eye comparatively large and placed close to the front. Anterior antennæ in female consisting of 17 or 18 articulations, some of the bristles rather elongated and partly plumous; those in male with some of the articulations confluent, middle section of right antenna very slightly tumefied, terminal section consisting of 3 articulations. Posterior antennæ with the junction of the inner ramus with the basal part imperfectly defined, and having the distal joint unusually prolonged, outer ramus consisting of 3 joints only, the outer 2 very small. Anterior lip trilobate, with the middle lobe very prominent. Mandibles not very strong, outermost cutting tooth larger than the others and claw-shaped, palp with the inner ramus imperfectly separated from the basal part and, like the outer, carrying very long and slender setæ. Maxillæ with a single appendicular lobe, inner ramus of palp replaced by a plumose seta, outer ramus large and reflexed, with very long setæ. Anterior maxillipeds short and stout, with long curved spines anteriorly, digitiform lobes well developed. Posterior maxillipeds resembling those in the *Pontellidæ*. Natatory legs without any plumose seta inside the 1st basal joint, 2nd basal joint of 4th pair carrying a slender deflexed seta at the outer corner; outer ramus in this and the 2 preceding pairs without distinctly defined spines outside, each of the joints being only produced at the end to a short dentiform projection, apical spine very slender, sword-shaped, with the outer edge closely serrate. Last pair of legs in female 3-articulate, 2nd joint somewhat dilated and carrying a long plumose seta outside, terminal joint gradually exserted to a slender point, which in some cases is spiniform, in others setiform; those in male 4-articulate and somewhat asymmetrical, right leg the larger, with some of the joints lamellarly expanded inside, terminal one securiform or slightly hooked; left leg with the terminal joint somewhat spoon-shaped.

Remarks.—This genus was established by Dana as early as the year 1846, to comprise some species chiefly from the Pacific Ocean. The genus *Dias* of Prof. Lilljeborg is unquestionably identical with Dana's genus. It is easily recognizable by the slender, pellucid body, and the very delicate and peculiar structure of the several appendages. We know at present of a considerable number of species from different tracts of the oceans, amounting to about 20 in all. Some of them, however, may probably be referable to the nearly-related genus *Paracartia* of Scott. To the fauna of Norway belong 3 species, to be described below. A 4th species, *A. bifilosa* Giesbrecht, will also in all probability be found to occur off the Norwegian coast, as it has been observed both in the Baltic and off the British coast.

62. Acartia longiremis (Lilljeborg).

(Pl. XCIX & C).

Dias longiremis, Lilljeborg, De Crustaceis ex ordinibus tribus in Scania occurrentibus, p. 181, Pl. XXIV.

Specific Characters.—Female. Anterior division of body, seen dorsally, oblong fusiform in outline, greatest width about equalling $^1/_3$ of the length, anterior extremity somewhat contracted and obtusely truncated at the tip, posterior gradually attenuated. Cephalosome attaining nearly half the length of the anterior division, front without any trace of tentacular filaments below. Lateral lobes of last segment of metasome rounded off at the tip, and each carrying dorsally a rather conspicuous, delicate spinule. Urosome about equal in length to $^1/_3$ of the anterior division, genital segment fully as long as the other 2 combined, and, like them, clothed both laterally and at the posterior edge with scattered, very delicate spinules. Caudal rami sublinear in form, their length considerably exceeding that of the anal segment, and slightly asymmetrical, right ramus projecting somewhat beyond the left, and having the appendicular bristle nearer to the tip; marginal setæ densely plumose and somewhat divergent. Anterior antennæ, when reflexed, reaching about to the middle of the genital segment, none of the articulations dentiferous. Length of apical spine of outer ramus in 2nd to 4th pairs of legs considerably exceeding that of the whole ramus. Last pair of legs with the terminal joint exserted to a slender setiform point, and somewhat curved in the middle.

Male considerably smaller than female and easily recognizable by the structure of the anterior antennæ and urosome. Caudal rami comparatively shorter than in female, otherwise of a very similar appearance. Last pair of legs of moderate size, 2nd and 3rd joints of right leg each expanded inside in to a rounded

lamellar projection, terminal joint of same leg securiform, that of left leg comparatively broad.

Colour. Body in both sexes highly pellucid, with a very faint tinge of blue. Length of adult female reaching to 1.25 mm., of male to 1.05 mm.

Remarks.—This form was first described by Prof. Lilljeborg in his well-known treatise on the Entomostraca of Skåne under the name of *Dias longiremis*. It is not easy at once to distinguish this form from some of the other species, to which it bears a great similarity. On a closer examination, however, it may be readily recognized in both sexes by the slender and delicate spinule occurring on the dorsal face of the lateral lobes of the last segment of the metasome, as also by the relative length of the anterior antennæ and caudal rami. Moreover the apical spine of the outer ramus in the 2nd to 4th pairs of legs is more elongated than in most other species, and the difference in the last pair of legs in the female is very distinctly marked by the slenderness of the terminal joint, which is exserted to a very thin, flexible point, whereas in most other species this joint is pronouncedly spiniform.

Occurrence.—This Calanoid is distributed along the whole Norwegian coast, from the Christiania Fjord to Vadsø, sometimes occurring in great numbers. It is a true pelagic form, being often met with far out at sea, and at the very surface. Not unfrequently, however, it is brought by the current close to shore; and it is even often found in tidal pools together with *Paracalanus parvus* and *Temora longicornis*. It moves with great rapidity in abrupt bounds.

Distribution.—British Isles (Brady), Kattegat (Lilljeborg), the Baltic (Giesbrecht), Gulf of Finland (Nordqvist), Färoes Isles (Cleve), Iceland and southern Greenland (idem), Spitsbergen, polar basin, north of the New Siberian Islands (the present author).

63. Acartia Clausi, Giesbrecht.

(Pl. CI).

Acartia Clausii, Giesbrecht, Fauna & Flora des Golfes von Neapel. Pelagische Copepoden, p. 507, Pl. 30, figs. 2, 4, 13—15, 17, 28, 36, 47; Pl. 42, fig. 32; Pl. 43, figs. 3, 5, 14.

Syn: *Dias longiremis*, Claus (not Lilljeborg).

Specific Characters.—Female. Very like the preceding species both in size and general appearance, and, like the latter, without any trace of tentacular appendages in front. Lateral lobes of last segment of metasome, however, without the dorsal spinule found in *A. longiremis*, but having the edge armed with from 4 to 6 extremely small and closely set denticles. Urosome with the first 2

segments clothed at the end dorsally with a transverse row of still smaller denticles, but having no lateral spinules. Caudal rami comparatively shorter than in *A. longiremis*. Anterior antennæ likewise somewhat shorter, scarcely exceeding the length of the anterior division of the body, 5th articulation with a distinct denticle in front. Length of apical spine of outer ramus in 2nd to 4th pairs of legs scarcely exceeding that of the ramus. Last pair of legs with the terminal joint produced to a strong claw-like spine minutely spinulose outside.

Male resembling that of the preceding species, but having the caudal rami comparatively shorter, and nearly as broad as they are long. Last pair of legs very like those in the male of *A. longiremis*, though having the terminal joint of right leg considerably narrower and that of left leg less expanded.

Colour.—Body in both sexes extremely pellucid and nearly colourless.

Length of adult female 1.15 mm., of male 1.00 mm.

Remarks.—This form is so very like the preceding species that, without a close examination, it may readily be confounded with it. This has also actually been done by Claus, who described it as *Dias longiremis* Lilljeborg; and Brady also seems to have confounded the 2 species. Dr. Giesbrecht, however, has pointed out some minute differences between them, and as these differences are fairly constant, they seem to justify the specific distinction of the two forms. The most conspicuous distinctive characters are the different armature of the lateral lobes of the last segment of the metasome and of the urosome, as also the comparatively shorter anterior antennæ and caudal rami in the present species. The last pair of legs in the female, moreover, conspicuously differ from those in *A. longiremis* in the form of the terminal joint; and these legs in the male also exhibit some slight differences, as shown by the figures here given.

Occurrence.—Off the south and west coasts of Norway this form is fully as common as *A. longiremis*, in company with which species it is often found. On the other hand, I have never met with it in any of the samples of plankton from the Arctic Ocean. It accordingly seems to be a more southern form than *A. longiremis*, and this assumption is also confirmed by what is at present known of its foreign distribution.

Distribution.—British Isles (Scott), Färoe Isles (Cleve), Heligoland (Claus), coast of France (Canu), Mediterranean (Giesbrecht), Black Sea (Karawajew), Azores (Cleve), Atlantic Ocean between 36° and 61° N. Lat. (Giesbrecht); Gulf of Guinea (Scott).

64. Acartia discaudata, Giesbrecht.

(Pl. CII).

Dias discaudatus, Giesbrecht, Die freilebenden Copepoden der Kieler Föhrde. 7te Bericht. d. Commiss. Unters. Deutsch. Meere, p. 148, Pl. III, figs. 4, 22, 23; Pl. V, fig. 18; Pl. VI, fig. 17; Pl. VIII, figs. 32, 33; Pl. IX, fig. 30.

Specific Characters.—Female. Anterior division of body of a form similar to that in the 2 preceding species. Front without any tentacular filaments. Lateral lobes of last segment of metasome rounded off and quite smooth. Urosome likewise without any traces of spinules or denticles, and rather robust, genital segment very large, conspicuously dilated in its proximal part, and very protuberant below in the middle; 2nd segment terminating dorsally in a rounded protuberance; 3rd segment flattened and considerably expanded distally. Caudal rami of rather an unusual appearance, being bulbously dilated, and rounded oval in form, with the marginal setæ comparatively short and conspicuously dilated at the base. Anterior antennæ about the length of the anterior division of the body, and without any denticles in front. Last pair of legs resembling those in *A. Clausi*, the terminal joint being spiniform, though somewhat less strong than in that species.

Male resembling that of the 2 preceding species, though perhaps less slender. Urosome of normal appearance, the caudal rami not, as in the female, bulbously dilated, but of a similar form to that in the male of *A. Clausi*. Last pair of legs considerably larger than in either of the 2 preceding species, right leg much elongated, being more than twice as long as the left, with the lamellar expansions inside the 3 first joints comparatively small, terminal joint rather narrow, almost claw-like.

Colour.—Body of female semipellucid, with a distinct bluish grey hue; that of male paler.

Length of adult female 1.20 mm., of male 1.10 mm.

Remarks.—This form may at once be distinguished from the other known species, at any rate in the female sex, by the peculiar structure of the urosome, but more especially by the greatly dilated caudal rami. The male differs less conspicuously, though the last pair of legs exhibit well marked peculiarities. Another distinguishing character not mentioned in the above diagnosis, is the large size and peculiar sac-like form of the spermatophore often found attached to the genital segment of the female.

Occurrence.—I have hithertho only met with this form in 2 localities of the Norwegian coast, viz., Bratholmen and Skjerjehavn, the former situated at some distance south of Bergen, the latter at the mouth of the Sogne Fjord. In both these localities it occurred occasionally close to the shore, together with *A. longiremis*, from which it was at once distinguished by its darker blue colour.

Distribution.—The Baltic (Giesbrecht), Scottish coast (Scott), coast of France (Canu).

SUPPLEMENT.

Page 15. Rhincalanus nasutus, Giesbr.

Remarks.—The form recorded by Th. Scott as *R. gigas*. Brady, is unquestionably the present species.

Distribution.—Scottish coast (Scott).

Page 18. Paracalanus parvus (Claus).

Distribution.—Black Sea (Karawajew), Gulf of Guinea (Scott).

Page 21. Pseudocalanus elongatus, Boeck.

Distribution.—Black Sea (Karawajew).

Page 21. The following species should be added:

Pseudocalanus gracilis, G. O. Sars.

(Suppl. Pl. I).

Specific Characters.—Female. Body of still more slender form than in the typical species, with the anterior division, seen dorsally, narrow oblong in form, greatest width scarcely attaining $^1/_3$ of the length; frontal part conspicuously projecting, and, seen laterally, almost angularly curved in the middle. Lateral parts of last segment of metasome obtusely rounded. Urosome very slender, though scarcely exceeding half the length of the anterior division. Caudal rami comparatively narrower than in *P. elongatus*. and more divergent. Anterior antennæ more elongated, reaching. when reflexed, to the end of the 3rd caudal segment. Legs considerably more slender than in the typical species, with both rami very narrow. Ovisac rather large, rounded oval in form, and somewhat flattened, containing a number of globular. highly pellucid ova.

Male resembling that of *P. elongatus*. but having the anterior antennæ considerably longer. Last pair of legs of a structure very similar to that in the male of the said species.

Colour not yet ascertained.

Length of adult female 1.65 mm., of male 1.15 mm.

Remarks.—This form, though nearly allied to the typical species, is unquestionably distinct, differing, as it does, not only in the more slender form of the body and the gibbously produced frontal part, but also in the greater length of the anterior antennæ, and the more slender form of the natatory legs.

Occurrence.—This form occurred not unfrequently in some of the plankton-samples taken during the cruise of the "Michael Sars", 1900, in the open sea between Finmark and Bear Island; but as the specimens were more or less damaged, and moreover, as shown by the structure of the urosome, had not arrived at sexual maturity, their specific difference from *P. elongatus* was less apparent, for which reason I at first only regarded this form as a variety of the typical species. It was only by the examination of another sample taken by Mr. Amundsen early in the spring of the following year from about the same tract, that I could convince myself of the distinctness of the present form. This sample contained several fully adult and admirably preserved female specimens with the rather large ovisac still attached to the genital segment, and also some few adult male specimens. In the same sample a number of comparatively large, and likewise ovigerous, specimens of *P. elongatus* also occurred, and it was very easy to distinguish between these 2 species, on account of the rather different shape of the frontal part, and the difference in the length of the anterior antennæ. That this undoubledly true arctic form also occasionally occurs in the immediate neighbourhood of the Norwegian coast, was proved by the examination of one of the plankton-samples taken during the cruise of the „Michael Sars" in the Lyngenfjord, Finmark. This sample contained some young specimens of a *Pseudocalanus* evidently belonging to the present species.

The following genus is also to be added:

Microcalanus, G. O. Sars 1901.

Syn: *Pseudocalanus*, G. O. Sars (part).

Generic Characters.—Body of comparatively small size, and rather short and compact form, recalling that of *Paracalanus*. Cephalosome completely coalesced with the 1st pedigerous segment; front carrying 2 extremely small tentacular appendages below. Urosome in female comparatively short, with the genital segment more or less dilated, in male considerably more slender. Caudal rami

small, each with 4 subequal apical setæ. Anterior antennæ more or less slender, composed in female of 24 articulations, and in male transformed in much the same manner as in *Pseudocalanus*. Posterior antennæ and oral parts resembling in structure those parts in the said genus. Posterior maxillipeds, however, more slender, and having the terminal part reflexed. Natatory legs on the whole built upon the same type as in *Pseudocalanus*. Last pair of legs in female wholly absent, in male comparatively small and very asymmetrical, left leg slender, 6-articulate, right very small, 3-articulate, last joint not styliform.

Remarks.—As I stated on page 20, it is now my opinion that the small Calanoid described from Nansen's Polar Expedition as *Pseudocalanus pygmæus* should more properly be regarded as the type of a separate genus, for which the name *Microcalanus* was proposed. The correctness of this view has now been still further confirmed by the discovery off the Norwegian coast of another still smaller Calanoid, which is evidently congeneric with the polar form, though apparently specifically distinct. This form is described below.

Microcalanus pusillus, G. O. Sars, n. sp.

(Suppl. Pl. II, & Pl. III, fig. 1).

Specific Characters.—Female. General form of body resembling that of *M. pygmæus*, the anterior division being rather tumid and, seen dorsally, of oval form, greatest width almost attaining half the length, both extremities abruptly contracted, the anterior one narrowly rounded at the tip. Cephalosome together with the united 1st pedigerous segment occupying $^2/_3$ of the anterior division, dorsal margin evenly curved in front. Lateral lobes of last segment of metasome somewhat appressed and rounded off at the tip. Urosome about equal in length to $^1/_3$ of the anterior division, genital segment conspicuously dilated in the middle. Caudal rami scarcely longer than they are broad, apical setæ of moderate length. Eye wholly absent. Anterior antennæ much shorter than in the typical species, scarcely reaching, when reflexed, beyond the genital segment. Natatory legs less slender than in *M. pygmæus*, terminal joint of outer ramus in 2nd to 4th pairs comparatively broader, with the apical spine remarkably dilated, cultellate in shape, and very coarsely serrate outside.

Male rather unlike the female in general appearance, the anterior division being still shorter and more tumid, whereas the urosome is much more slender than in female, fully equalling half the length of the anterior division. Anterior antennæ with the proximal part rather dilated and clothed anteriorly with large

curved sensory appendages, 7th joint very elongated and apparently formed by the coalescence of 5 articulations. Oral parts, as in the male of *Pseudocalanus*, much reduced. Last right leg scarcely $^1/_3$ as long as the left, terminal joint simple, rounded.

Colour.—Body in both sexes highly pellucid and almost colourless.

Length of adult female scarcely exceeding 0.70 mm., that of male about the same.

Remarks.—This dwarf Calanoid, perhaps the smallest of all hitherto known forms, is closely allied to the polar species, *M. pygmæus*, though differing conspicuously in the much shorter anterior antennæ, as also in the structure of the natatory legs, but more especially in the peculiar development of the apical spine of the outer ramus. It may here be remarked that the male specimen figured on Pl. XXII of my Account of the Crustacea of the Norwegian North Polar Expedition, and described as the male of *Spinocalanus longicornis*, most certainly does not belong to that form, but to *Microcalanus pygmæus*, which is proved by its great similarity to the male of the present species.

Occurrence.—Owing to its small size and inconspicuous colouring, this form had previously quite escaped my attention, though in reality it seems to be rather common, at any rate off the west coast of Norway. During a 2 months' stay last summer in that part of the country, I found this Calanoid rather abundantly in 3 different places, viz., at Christiansund, Aalesund, and in the Storfjord, farther inland than the last-mentioned town. In all these places, however, it only occurred in depths of more than 150 fathoms; and it thus appears to be a true deepwater form. The same species was also found in 2 plankton-samples kindly sent to me by Mr. Nordgaard, both taken from great depths, the one in the Herlö Fjord, the other in the Oster Fjord, near Bergen. Finally, some few more or less defective specimens of a *Microcalanus* (perhaps more properly referable to the polar species) were picked out of a plankton-sample taken during the cruise of the "Michael Sars" in the open sea between Jan Mayen and Finmark.

Page 22: Spinocalanus abyssalis, Giesbrecht.

(See Pl. XII & Suppl. Pl. III, fig. 2).

Spinocalanus abyssalis, Giesbrecht, Fauna & Fl. Golfes Neapel. Pelagische Copepoden, p. 209, Pl. 13, figs. 42—48, Pl. 36, fig. 49.

Syn: *Spinocalanus longicornis*, G. O. Sars.

(For the description of the female, see p. 22).

Description of Male. General appearance very different from that of the female. Anterior division of body oblong oval in form, both extremities,

especially the posterior one, contracting abruptly. Front unarmed, as in the female. Urosome very slender and narrow, attaining almost half the length of the anterior division, 2nd segment much the largest, anal segment very small, almost obsolete. Caudal rami mobile, and generally spread to each side. Anterior antennæ very much shorter than in female, their length scarcely exceeding that of the anterior division, and clothed in their proximal part with large curved, sensory appendages. Oral parts transformed in a manner similar to that found in the male of *Paracalanus* and *Pseudocalanus*. Natatory legs exhibiting the characteristic armature mentioned by Dr. Giesbrecht, 2nd joint of outer ramus in 2nd to 4th pairs provided on the hind face with an obliquely transverse row of extremely delicate, somewhat flattened spines. Last pair of legs comparatively small and but slightly asymmetrical, both legs biramous, with the inner ramus simple styliform and longer on right side, outer ramus of right leg biarticulate, of left 3-articulate, terminal joint in both styliform.

Colour not yet ascertained. Length of the specimen examined 1.60 mm.

Remarks.—I am now of opinion that the form recorded from Nansen's Polar Expedition as *S. longicornis*, and subsequently redescribed in the present Account under the same name, is in reality identical with Giesbrecht's species. On a closer examination, I have convinced myself that the characteristic armature of the natatory legs described and figured by Dr. Giesbrecht, is also present in both sexes of the northern form. The transverse row of flattened spines occurring on the hind face of the 2nd joint of the outer ramus is of such a delicate nature, however, that it may easily escape attention, if the opposite face of the joint be turned to the observer. The male, of which only a solitary specimen has hitherto come under my notice, is so very unlike the female, that it was only by the dissection of the specimen that I could with perfect certainty refer it to the present species. The most striking difference is unquestionably the disproportionate length of the anterior antennæ, these being scarcely longer than the anterior division of the body, whereas in the female their lenght considerably exceeds that of the whole body. An analogous sexual disproportion in these antennæ has also been shown by Dr. Giesbrecht, however, in a few other Calanoids belonging to the genera *Calanus* and *Haloptilus*.

Occurrence.—The above-described male specimen was found in a plankton-sample taken by Mr. Nordgaard in the Oster Fjord from a depth of from 400 to 600 metres, and kindly sent to me for examination. In the same sample a few female specimens also occurred.

Distribution.—Pacific Ocean, between Lat 14° N. and 4° S., at a depth of 1000—4000 metres (Giesbrecht); polar basin crossed by Nansen, at 2 different Stations.

Page 25. Ætideus armatus, Boeck.

Remarks.—I have recently had an opportunity, through the kindness of Prof. Brady, of examining 2 of the Challenger specimens, from which the original description of his *Ætideus armatus* was made, and cannot find any difference whatever between them and the northern form. For this reason I must consider Brady's and Boeck's species as identical, in spite of the widely-separated localities.

Occurrence.—I found this form last summer not unfrequently at Aalesund and in the Storfjord, in depths ranging from 30 to 150 fathoms.

Distribution.—Off the Shetland Islands (Scott), Färoe Channel (Norman's Collection), Indian Ocean, Torres Strait, Chinese Sea, South Atlantic Ocean (Brady), Gulf of Guinea (Scott).

Page 26. The following new genus is to be added:

Ætideopsis, G. O. Sars.

Generic Characters.—External appearance somewhat resembling that of *Ætideus*, the front being produced below to a strong bifurcate rostrum. Last segment of metasome, however, well defined from the preceding one, and having the lateral corners acutely produced. Urosome of moderate size, with the caudal rami comparatively short; outermost seta rudimentary, appendicular bristle very small. Anterior antennæ slender and attenuated, consisting (in female) of 24 well-defined articulations. Posterior antennæ and oral parts nearly agreeing in their structure with those in *Chiridius*, the posterior maxillipeds exhibiting a similar slender form. Legs likewise built upon the same type as in that genus.

Remarks.—This new genus is somewhat intermediate in character between *Ætideus* and *Chiridius*, agreeing with the former in the strongly developed, bifurcate rostrum, while the structure of the caudal rami and of the several appendages resembles more that of *Chiridius*. The present genus differs from both these genera in the fact that the last segment of the metasome is well defined from the preceding one. The genus comprises as yet only a single species, described below.

Ætideopsis rostrata, G. O. Sars, n. sp.

(Suppl. Pl. IV & V).

Specific Characters.—Female. Body moderately slender, with the integuments of an unusually firm consistency. Anterior division, seen dorsally, oblong oval in form, greatest width slightly exceeding $^1/_3$ of the length, anterior extremity conspicuously dilated in the oral region, and abruptly contracted in front, tip triangularly produced, posterior extremity gradually attenuated. Cephalosome separated above from the 1st pedigerous segment by a well-marked transverse groove, dorsal face only slightly vaulted, lateral edges conspicuously insinuated in the middle. Rostrum highly chitinized and pointing straight downwards, lateral spikes acutely pointed and somewhat divergent. Last segment of metasome very short, but defined in front by a well-marked curved suture, lateral corners produced to strong mucroniform processes pointing straight backwards and extending beyond the middle of the genital segment. Length of urosome scarcely exceeding $^1/_3$ that of the anterior division, genital segment not very large, and but slightly protuberant below. Caudal rami about the length of the anal segment, and somewhat flattened, tip obliquely rounded. Eye apparently well developed. Anterior antennæ, when reflexed, reaching about to the end of the 2nd caudal segment. Posterior antennæ with the outer ramus somewhat longer than the inner. Posterior maxillipeds almost exactly as in *Chiridius*, the 2nd basal joint being very narrow and elongated, whereas the terminal part is comparatively short, scarcely half as long as this joint. Apical spine of outer ramus in 2nd to 4th pairs of legs very strong, its outer edge densely aculeate in a pectinate manner.

Male unknown.

Colour not yet ascertained.

Length of adult female 4.40 mm.

Remarks.—This form, as stated above, somewhat recalls *Ætideus armatus* by the strongly-developed, bifurcate rostrum and the acutely produced lateral corners of the last segment of the metasome. It may, however, be at once distinguished by the far less vaulted cephalosome, and the sharply marked boundary between the last 2 segments of the metasome. It is also of considerably larger size.

Occurrence.—Two female specimens of this form were found in a plankton-sample taken, during the cruise of the "Michael Sars" in 1900, at Stat. 34, situated between Jan Mayen and Finmark, the depth being recorded to be from 500 to 1000 metres.

Page 28. Chiridius armatus (Boeck).

Occurrence.—A solitary male specimen, unquestionably belonging to this species, was found in a plankton-sample taken during the cruise of the "Michael Sars", at Stat. 10, east of Iceland, depth 250—400 metres.

Page 30. The following genus should be added:

Gaïdius, Giesbrecht, 1895.

Syn: *Chiridius*, G. O. Sars (part).

Generic Characters.—Body comparatively more robust than in *Chiridius*, with the urosome shorter in proportion to the anterior division. Front produced below to a very small, undivided rostral projection. Last segment of metasome wholly coalesced with the preceding one, lateral lobes obtusely rounded and each exhibiting, somewhat outside the tip, a narrow spiniform process pointing backwards. Caudal rami short, resembling in structure those in *Chiridius*. Anterior antennæ in both sexes very slender, in female 24-articulate, in male with some of the articulations coalesced. Posterior antennæ with the inner ramus somewhat longer and narrower than in *Chiridius*. Oral parts almost exactly as in that genus. Legs likewise of a very similar structure, except that in the outer ramus of 1st pair, the spine outside the 1st joint is missing.

Remarks.—Although the differences between this genus and *Chiridius* appear to be very slight, it may perhaps be advisable to retain the genus, since there are 2 northern species that so closely agree with that first described by Dr. Giesbrecht, that the 3 species together form a natural group. The typical species is *G. pungens* Giesbr. from the Pacific Ocean; the other 2 species have been described by the present author from Nansen's Polar Expedition as *Chiridius tenuispinus* and *C. brevispinus*. Both these arctic species subsequently proved to be referable to the Norwegian fauna. The female of the first-named species has already been described in the present Account, and it only remains here to describe the hitherto unknown male of this form. The 2nd species is now for the first time added to the Norwegian fauna.

Gaïdius tenuispinus, G. O. Sars.

(See Pl. XVIII & Suppl. Pl. VI, fig. 1).

Chiridius tenuispinus, G. O. Sars, Crustacea of the Norw. North Polar Expedition, p. 67, Pl. XVIII.
(For the description of the female, see p. 30).

Description of the Male.—Anterior division of body, seen dorsally, oval in form, somewhat attenuated anteriorly, with the greatest width occurring considerably behind the middle. Lateral processes of last segment of metasome well marked, and of the same appearance as in the female. Urosome, as usual, much narrower, and composed of 5 segments, the last of which, however, is very small, almost obsolete. Anterior antennæ of about the same relative length as in female, but transformed in the usual manner, their proximal part being rather dilated, and clothed in front with large curved sensory appendages, terminal part very slender, and forming with the proximal one a somewhat angular curve. First pair of legs with the 1st joint of the outer ramus distinctly separated from the 2nd. Last pair of legs comparatively large, and somewhat resembling in structure those in the male of *Chiridius armatus*, both legs provided with a rudimentary inner ramus, that of right leg pronouncedly club-shaped, that of left much narrower; outer ramus of right leg biarticulate, with the proximal joint rather large and curved, distal joint very narrow, and forming a small rounded lobule inside, beyond the middle; that of left leg 3-articulate, last joint spiniform.

Length of the specimen examined about 2 mm.

Remarks.—It will be seen from the above short description, that the sexual differences in the present form do not materially differ from those found in the genus *Chiridius*, and the last pair of legs in the male even bears a very close resemblance to those in the male of *Chiridius armatus*.

Occurrence.—The above-described specimen was found in the same sample (Stat. 34) in which *Etideopsis armata* occurred, and could at once be recognized as the male of the present species by the slender spiniform processes issuing from the last segment of the metasome.

Gaïdius brevispinus, G. O. Sars.

(Suppl. Pl. VI, fig. 2).

Chiridius brevispinus, G. O. Sars, Crustacea of the Norw. North Polar Expedition, p. 68, Pl. XIX.

Specific Characters.—Female. Body comparatively robust, with the anterior division rather massive and, seen dorsally, oblong oval in form; anterior extremity somewhat contracted near the tip, which appears obtusely truncated, posterior

extremity only slightly attenuated. Rostral prominence exactly as in *G. tenuispinus*, forming a very small conical projection. Lateral lobes of last segment of metasome broadly rounded, spiniform process outside the tip extremely small. Urosome scarcely attaining $^1/_3$ of the length of the anterior division; caudal rami comparatively very short and somewhat divergent. Anterior antennæ slender and elongated, reaching, when reflexed, as far as the tip of the caudal rami. Posterior antennæ and oral parts almost exactly as in *G. tenuispinus*. First pair of legs with the 1st joint of the outer ramus well defined, though, as in *G. tenuispinus*, without any trace of a spine outside; inner ramus of 2nd pair distinctly biarticulate.

Male unknown.

Colour not yet ascertained.

Length of adult female 4.80 mm.

Remarks.—This form is undoubtedly very closely allied to *G. tenuispinus*, though easily distinguishable by its much larger size and somewhat more robust form of body, the more elongated anterior antennæ, and the small size of the spiniform processes issuing from the last segment of the metasome.

Occurrence.—A solitary but well-preserved female specimen of this Arctic form was found in the same sample (Stat. 34), in which the male of *G. tenuispinus* occurred.

Distribution.—Polar basin crossed by Nansen, at 6 different Stations (the present author); Färoe Channel (Norman's Collection).

Page 32. Undinopsis Bradyi, G. O. Sars.

Remarks.—During the past summer I have found this form very plentiful in one place near Aalesund, just at the bottom of a steep incline, on a sandy bottom. Male specimens were by no means rare, and on a renewed examination of the latter, I found that the right last leg is generally wholly absent. In some few specimens from the same locality, otherwise indistinguishable from the others, these legs, however, exhibited exactly the appearance figured on Pl. XIX, a distinct rudiment of the right leg being present.

Page 39. Euchæta norvegica, Boeck.

Distribution.—Scottish coast (Scott).

Page 42. Euchæta barbata, Brady.

Distribution.—Gulf of Guinea (Scott).

Page 47. Xanthocalanus borealis, G. O. Sars.

Distribution.—East of the Shetland Islands (Scott).

Page 53. Amallophora brevicornis, G. O. Sars.

Remarks.—The hitherto unknown male of this species has recently been described by Th. Scott, and the correctness of my opinion in considering this form to be a true *Amallophora*, is fully confirmed by the structure of the last pair of legs, which are built upon the very same type as in *A. magna* Scott.

Distribution.—East of the Shetland Islands (Scott).

Page 66. Parastephos pallidus, G. O. Sars.

Distribution.—I have recently received from Th. Scott an adult male specimen and an immature female of this form, taken by him off the Scottish coast.

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LIST OF PLATES.

The Plates have been marked as far as possible in accordance with those belonging to the 3 previous Volumes (Amphipoda, Isopoda, Cumacea).

The following are the chief signs, with their significance:

♀ female; ♂ male; *C.* cephalosome: *R.* rostrum; *Urs.* urosome with the caudal rami; *gen. S.* genital segment of female: *O.* eye: *a.*^{1} anterior antenna; *a.*^{2} posterior antenna; *or. area* oral area; *L.* anterior lip; *M.* mandible: *m.* maxilla: *mp.*^{1} anterior maxilliped: *mp.*^{2} posterior maxilliped; *p.*^{1}—*p.*^{5} legs of 1st to 5th pairs.

Pl. XXII.
Bryaxis brevicornis, Boeck: female.

Pl. XXIII.
Bryaxis brevicornis; female (continued).

Pl. XXIV.
Euchæta norvegica, Boeck: female.

Pl. XXV.
Euchæta norvegica; female (continued).

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Euchæta norvegica, Boeck; adult male.

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Euchæta glacialis, Hansen; female & male.

Pl. XXVIII.
Euchæta barbata, Brady; female & male.

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Pl. XXXII.
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Pl. XXXIII.
Xanthocalanus propinqvus, G. O. Sars: female & male.

Pl. XXXIV.
Amallophora magna, Scott; female & male.

Pl. XXXV.
Amallophora magna; female (continued).

Pl. XXXVI.
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Pl. XXXIX.
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Pl. XL.
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Pl. XLIII.
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Pl. XLIV.
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Pl. XLVI.
Tharybis macrophthalma; female (continued).

Pl. XLVII.
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Pl. XLVIII.
Pseudocyclopia stephoides; female (continued).

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Pl. L.
Centropages typicus; female (continued).

Pl. LI.
Centropages typicus, Kröyer: adult male.

Pl. LII.
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Isias clavipes, Boeck; female & male.

Pl. LIV.
Isias clavipes; female (continued).

Pl. LV.
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Pl. LVI.
Limnocalanus macrurus; female (continued).

Pl. LVII.
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Pl. LVIII.
Diaptomus castor; female & male (continued).

Pl. LIX.
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Pl. LX.
Diaptomus bacillifer, Koelbel; female & male.

Pl. LXI.
Diaptomus laticeps, G. O. Sars; female & male.

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Metridia longa; female (continued).

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Metridia lucens, Boeck; female & male.

Pl. LXXVIII.
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Heterorhabdus norvegicus (Boeck); female & male.

Pl. LXXXI.
Heterorhabdus norvegicus; female (contin.)

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Haloptilus longicornis (Claus); female.

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1. Haloptilus longicornis; female (continued).
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Anomalocera Patersoni, Templt.; adult male.

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Labidocera Wollastoni; female & male (continued).

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Parapontella brevicornis (Lubbock); female & male.

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Parapontella brevicornis; female & male (continued).

Pl. XCIX.

Acartia longiremis (Lilljeborg); female.

Pl. C.

Acartia longiremis; male & female (continued).

Pl. CI.

Acartia Clausi, Giesbrecht; female & male.

Pl. CII.

Acartia discaudata, Giesbrecht; female & male.

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Pseudocalanus gracilis, G. O. Sars; female & male.

Suppl. Pl. II.

Microcalanus pusillus, G. O. Sars; female.

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1. Microcalanus pusillus; male.
2. Spinocalanus abyssalis, Giesbrecht; adult male.

Suppl. Pl. IV.

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Suppl. Pl. V.

Ætideopsis rostrata; female (continued).

Suppl. Pl. VI.

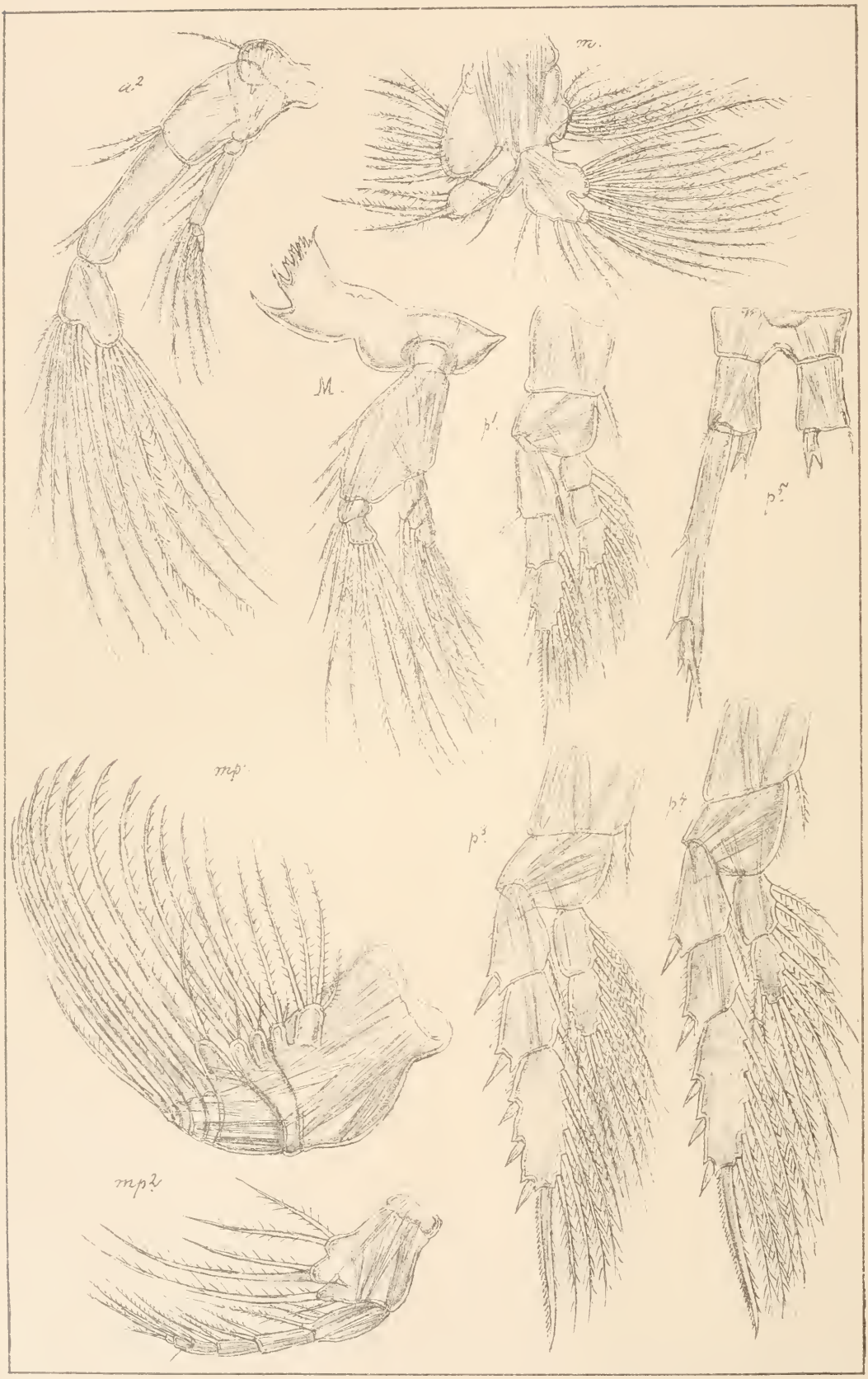
1. Gaïdius tenuispinus, G. O. Sars; adult male.
1. Gaïdius brevispinus, G. O. Sars; female.

Copepoda

Calanoida

Pontellidæ

PI. XCIII



G O Sars autogr

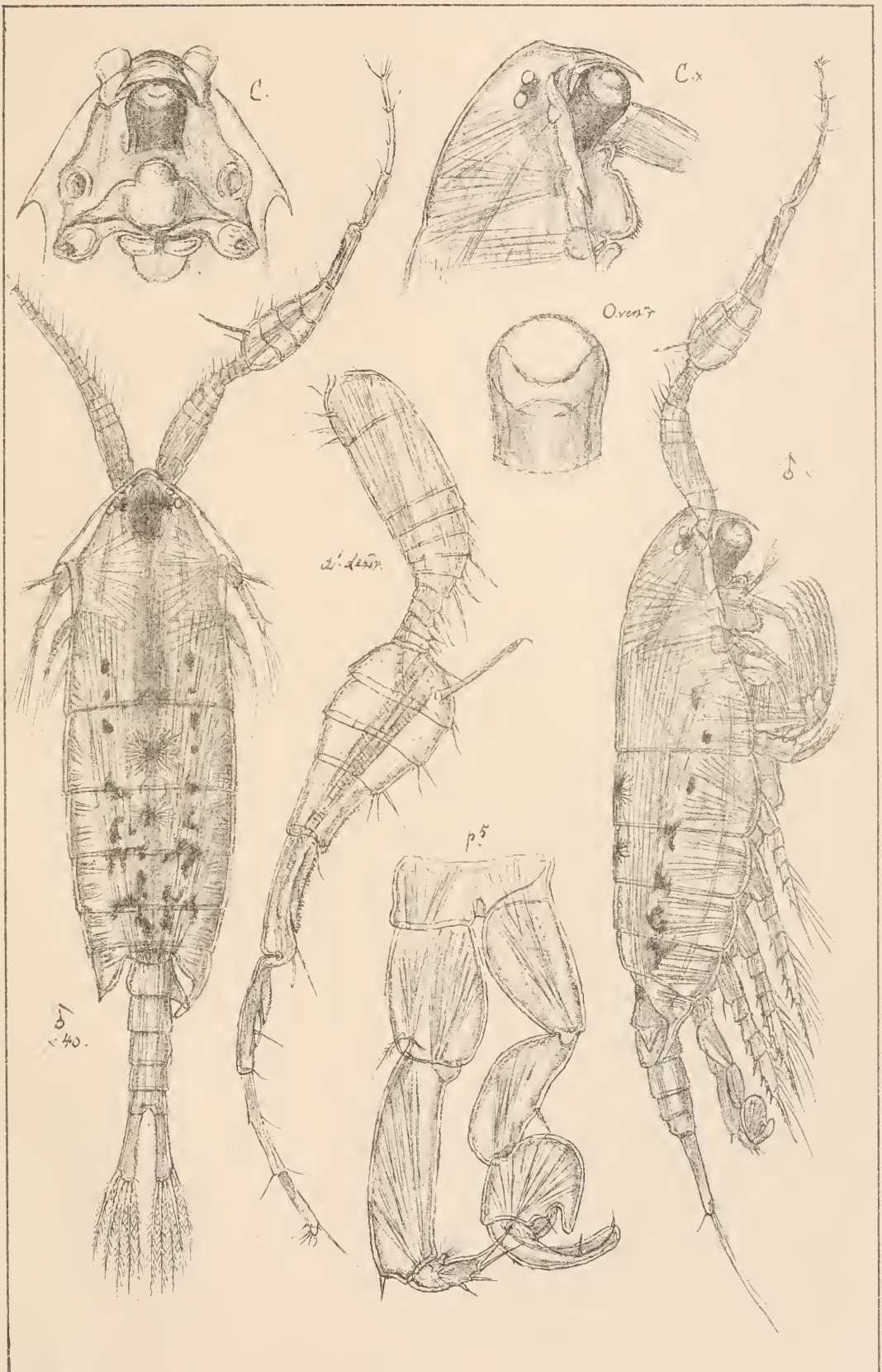
Trykt i den private Opmaaling Chra

Anomalocera Pattersoni, Templt.

(continued,

Copepoda

Pontellidæ — Calanoida. — Pl. XCIV

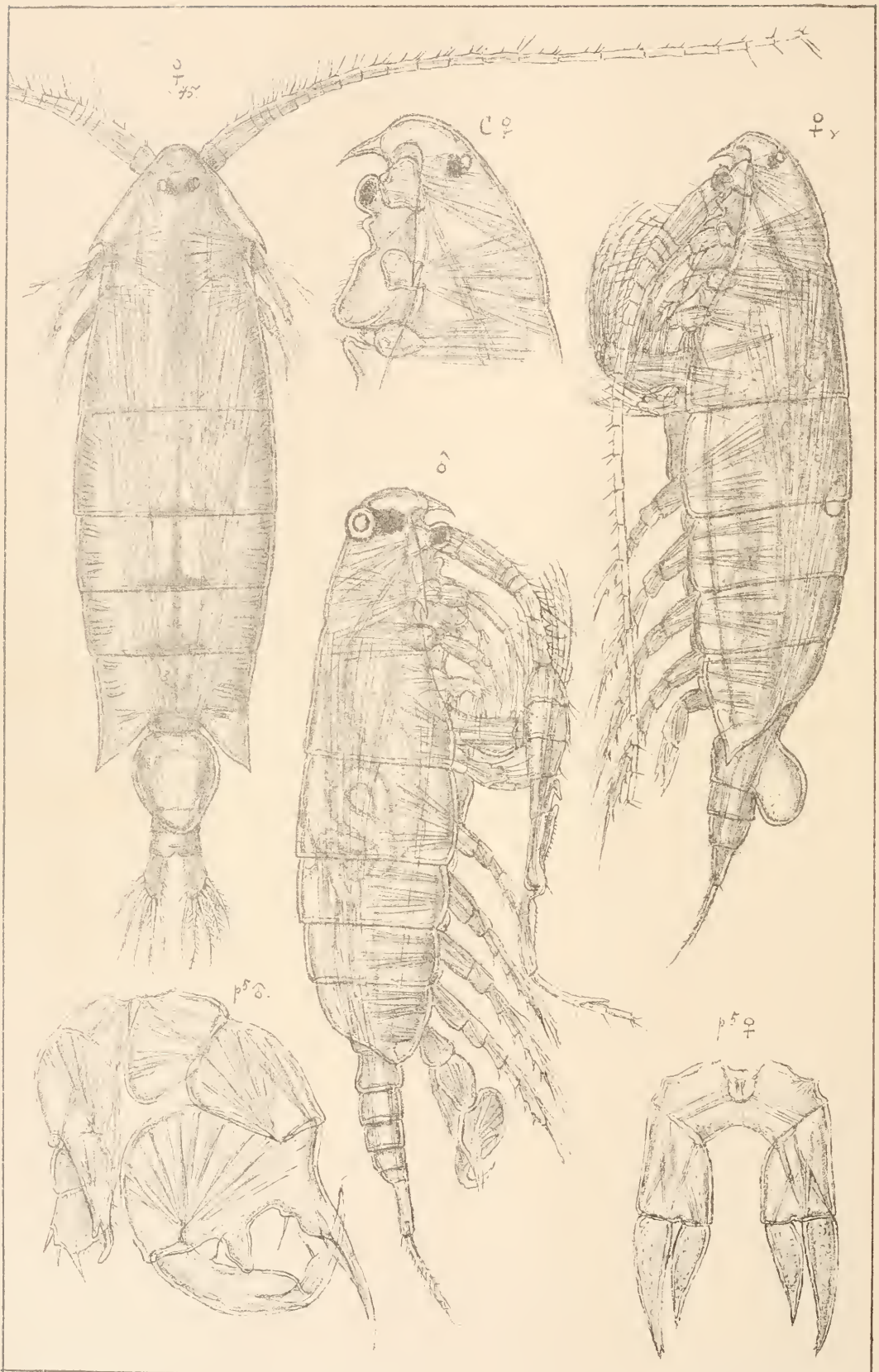


G.O. Sars autogr. — Trykt i den private Opmaaling. Chra

Anomalocera Pattersoni, Templt.
(male)

Copepoda

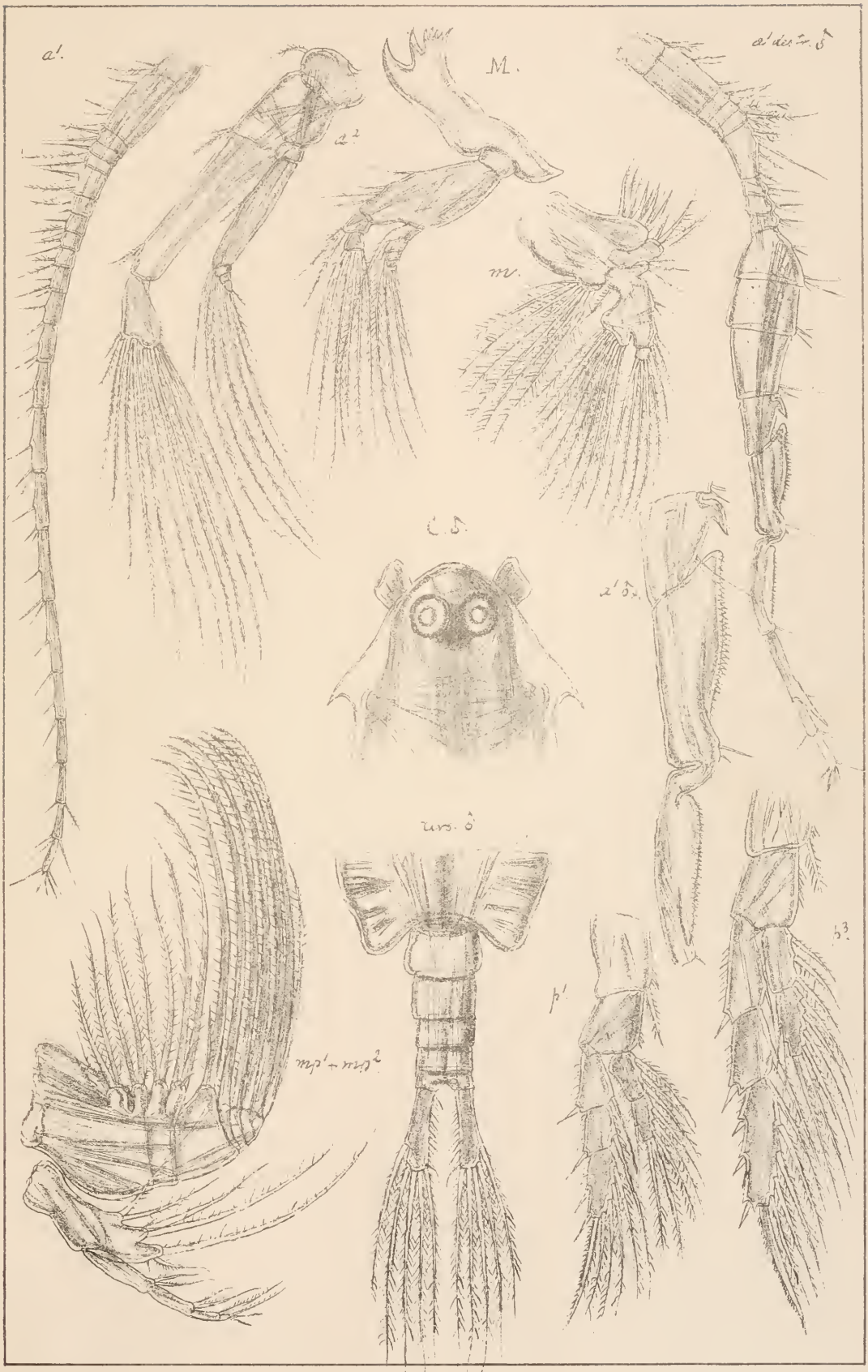
Pontellidæ — Calanoida — PI. XCV



G O Sars autogr

Tryktiden private Opmaaling, Chra

Labidocera Wollastoni (Lubbock)



G.O Sars autogr

Trykt i den private Opmaaling, Chra

Labidocera Wollastoni (Lubbock)
(continued)