AN ACCOUNT

OF THE

CRUSTACEA

OF

NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

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COPEPODA

CALANOIDA

PART VII & VIII

CENTROPAGIDÆ, DIAPTOMIDÆ

WITH 16 AUTOGRAPHIC PLATES

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habitus does not exhibit such great sexual dissimilarity as is often met with in the *Amphascandria*. The males, moreover, occur in about the same number as the females, whereas in the above-mentioned section, male specimens are, as a rule, very rare, and apparently confined to certain seasons.

The subdivision of this section is connected with no small difficulty, owing to the great variation in the structure of the several appendages. In his great work, Dr. Giesbrecht only records 3 families belonging to this section, viz., the *Centropagidæ*, the *Candacidæ* and the *Pontellidæ*, the first being subdivided into 4, and the last into 2 subfamilies. According to the plan followed in the present account, these subfamilies are here raised to the rank of true families, and their number has moreover been considerably increased. I think we must at any rate admit the following 14 families: *Centropagidæ, Diaptomidæ, Pseudodiaptomidæ, Lucicutiidæ, Temoridæ, Metridiidæ, Heterorhabdidæ, Arietellidæ, Candaciidæ, Pontellidæ, Parapontellidæ, Acartiidæ, Tortanidæ, Pseudocyclopidæ.* With the exception of the *Pseudodiaptomidæ*[1]), the *Lucicutiidæ*[2]) and the *Tortanidæ*[3]), all these families are represented in the fauna of Norway, and they will be mentioned in the following pages, short diagnoses being given of each of them.

Fam. 13. Centropagidæ.

Characters.—Cephalosome well defined from the 1st pedigerous segment, front with 2, generally soft appendages below. Last 2 segments of metasome likewise, as a rule, well defined. Urosome consisting in female of 3, in male of 4 or 5 segments; caudal rami more or less elongated, with the full number of setæ. Anterior antennæ consisting in female of 24 or 25 articulations; right antenna in male distinctly geniculate. Posterior antennæ and oral parts on the whole normal. The 4 anterior pairs of legs with both rami 3-articulate. Last pair of legs in female biramous, natatory, outer ramus with a strong unguiform

[1]) In this family, I propose to include the 2 genera *Pseudodiaptomus*, Herrick, and *Poppella*, Richard, which are undoubtedly nearly related, and together form a natural group somewhat intermediate between the *Diaptomidæ* and the *Temoridæ*.

[2]) This family, answering to the sub-family *Leuckartiinæ* of Giesbrecht, contains the following 3 genera: *Lucicutia*, Giesbr., *Isochæta*, Giesbr., and *Disseta*, Giesbr.

[3]) This family is established to include the 2 anomalous genera, *Tortanus*, Giesbr. (= Corynura Brady) and *Mormonilla*, Giesbr.

projection issuing from inside the 2nd joint; those in male with the outer rami more or less transformed and dissimilar, that of right leg, as a rule, the stronger.

Remarks.—In the restriction here adopted, this family is chiefly characterised by the structure of the legs, the 4 anterior pairs having both rami 3-articulate, and the last pair, at any rate in the female, being natatory, like the preceding pairs. The strong unguiform projection always found inside the outer ramus of the last pair of legs in the female is also very characteristic. The family comprises as yet 5 genera, viz., *Centropages,* Kröyer, *Isias,* Boeck, *Limnocalanus,* G. O. Sars, *Osphranticum*, Forbes, and *Boeckella,* Thomson. Of these genera, the first 2 are exclusively marine, whereas the other 3 are chiefly peculiar to fresh water. The first-named 3 genera are represented in the fauna of Norway, and will be treated of below.

Gen. 20. **Centropages,** Kröyer, 1848.

Syn: *Ichtyophorba,* Lilljeborg.

Generic Characters.—Body moderately slender, with the cephalosome somewhat contracted in front, and having a well-marked cervical depression dorsally; rostral appendages in some cases transformed to rigid spikes. Last segment of metasome distinctly defined from the preceding segment, and having the lateral parts, as a rule, expanded and acutely produced. Urosome in female more or less asymmetrical, in male generally composed of only 4 segments. Caudal rami of moderate length, with the setæ comparatively short. Eye well developed, subventral, and generally forming a distinct bulging below. Anterior antennæ very slender, consisting in female of 24 articulations, the last 2 joints being coalesced. Posterior antennæ with the outer ramus longer than the inner, and 6-articulate. Anterior maxillipeds with the distal setæ remarkably elongated, almost claw-like. Terminal joint of outer ramus in the 3 middle pairs of legs with 3 spines outside. Last pair of legs with the inner ramus well developed in both sexes and 3-articulate; outer ramus of left leg in male biarticulate, that of right leg 3-articulate, the last 2 joints forming together a powerful chela. No ovisac present in female.

Remarks.—This genus was established as early as the year 1848 by Kröyer, to include 2 species found by him, the one in the Atlantic Ocean, the other off the coast of Chili. As first shown by Boeck, the genus *Ichtyophorba*

of Lilljeborg is unquestionably identical with Kröyer's genus. The chief distinguishing character of this genus consists in the structure of the last pair of legs, the powerful chela formed by the outer ramus of the right leg in the male being especially very characteristic. We know at present about 13 species of this genus, occurring in different parts of the Oceans. All these species are marine and pelagic in their habits, sometimes occurring in great shoals close to the surface of the sea. Two of the species belong to the fauna of Norway, and will be described below.

30. Centropages typicus, Kröyer.

(Pl. XLIX, L, LI).

Centropages typicus, Kröyer. Nat. Tidsskr. New series, Vol. 2, p. 588, Pl. VI, figs. 22—26.

Syn: *Ichtyophorba denticornis*, Claus.

Specific Characters.—Female. Anterior division of body somewhat depressed, seen dorsally, oblong oval in form, greatest width considerably exceeding $^1/_3$ of the length, anterior extremity conspicuously contracted, posterior scarcely at all attenuated. Cephalosome less distinctly separated laterally from the 1st pedigerous segment, front projecting below into 2 rigid, deflexed spikes. Last segment of metasome with the lateral parts considerably expanded, and projecting at the outer corner into a strong spiniform projection pointing obliquely backwards, and somewhat more extant on right than on left side. Urosome conspicuously asymmetrical, and generally turned more or less to left side, genital segment scarcely longer, and but slightly broader, than the succeeding segment, and carrying near the hind edge 4 somewhat irregularly arranged slender spines, 2 subventral and 2 subdorsal, the latter distinctly denticulate; middle segment with a slight knob-like protuberance on the right side; last segment comparatively short. Caudal rami about twice as long as they are broad, and slightly widening distally, being somewhat divergent and finely ciliated inside; innermost but one of the apical setæ nearly twice as long as the others. Eye forming a very conspicuous bulging below. Anterior antennæ, when reflexed, reaching to about the tip of the caudal rami, 1st, 2nd and 5th articulations each produced in front to a well-developed dentiform projection. Outer ramus of last pair of legs with the unguiform projection of the middle joint very strong, equalling in length the terminal joint.

Male somewhat more slender than female, and having the lateral expansions of last pedigerous segment less divergent, and conspicuously asymmetrical, the left one being much larger than the right. Urosome perfectly symmetrical and rather slender, composed of 4 segments only. Caudal rami somewhat longer than in female, with the outermost seta quite short and spiniform, without cilia.

Right anterior antenna with the middle section rather tumefied, its antepenultimate joint having a strong denticle in the middle of the anterior edge. Chela of last pair of legs very powerful, thumb strongly developed, of about the same length as the dactylus, and unguiformly incurved at the tip.

Colour. Body in both sexes rather pellucid, in female being often tinged with orange or light chestnut in the middle of the anterior division.

Length of adult female reaching 1.75 mm., of male 1.60 mm.

Remarks.—This handsome species was first described by Kröyer under the above name, and was subsequently recorded by Claus, who regarded it as new, and described it as *Ichtyophorba denticornis.* It is easily recognizable from the 2nd Norwegian species by the strong rostral spikes, the form of the lateral expansions of the last pedigerous segment, and that of the urosome in the female, and finally, by the conspicuous dentiform projections on the anterior antennæ, and the very powerful chela of the right last leg in the male.

Occurrence.—This form is found along the whole southern and western coast of Norway, at least up to the Trondhjem Fjord. On the other hand, I have never met with it in any of the numerous samples of plankton from the northern part of the Ocean examined by me, for which reason we are justified in regarding it as a true Atlantic form. Off the Norwegian coast it occurs both in the open sea and in the fjords, being often found in considerable abundance at the very surface of the sea. It moves rather rapidly in the usual manner, now using chiefly the posterior antennæ, now darting about in an abrupt, jerking manner by powerful strokes of the natatory legs and the urosome.

Distribution.—Off Cape Finisterre (Kröyer), coast of France (Canu), British Isles (Brady), Heligoland (Claus), Mediterranean (Giesbrecht), Atlantic Ocean from Lat. 6° S to Lat. 62° N (Cleve).

31. Centropages hamatus (Lilljeborg).

(Pl. LII).

Ichtyophorba hamata, Lilljeborg. De Crustaceis ex ordinibus tribus in Scania occurrentibus, p. 185, Pl. XXI, Pl. XXVI, figs 9—12.

Syn: *Ichtyophorba angustata,* Claus.

Specific Characters.—Female. Body comparatively more slender than in the preceding species, with the anterior division, seen dorsally, somewhat attenuated behind. Cephalosome well defined from the 1st pedigerous segment, front tipped below with 2 soft recurved filaments. Last segment of metasome with the lateral parts less expanded than in *C. typicus,* terminal spine shorter and

remarkably extant on right side. Genital segment slightly asymmetrical and considerably dilated in the middle, lateral edges finely ciliated, ventral face with a recurved spiniform process immediately in front of the genital orifice. The 2 succeeding segments of about equal size and considerably smaller than the genital segment. Caudal rami sublinear in form, about 3 times as long as they are broad, apical setæ more elongated than in *C. typicus*. Anterior antennæ, when reflexed, reaching to the end of the caudal rami, none of the articulations with dentiform projections. Legs comparatively more slender than in the type species, with the terminal spine of outer ramus more coarsely denticulate. Last pair of legs with the unguiform process much shorter than in that species.

Male still more slender than female, and having the lateral parts of last pedigerous segment but slightly expanded and nearly symmetrical. Urosome fully equalling half the length of the anterior division, though, as in the preceding species, composed of only 4 segments. Caudal rami comparatively longer than in female, outermost seta not transformed. Right anterior antennæ with the middle section less tumefied than in the type species, and without any dentiform projection of the antepenultimate joint. Chela of right last leg less powerfully developed, thumb simple spiniform, and shorter than the dactylus.

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

Length of adult female reaching 1.35 mm., of male 1.30 mm.

Remarks.—This form was described by Prof. Lilljeborg in the year 1853 as *Ichtyophorba hamata,* the generic name referring to the significance of this Calanoid as fish-food, the specific name probably to the peculiar recurved process occurring below the genital segment in the female. The *Ichtyophorba angustata* of Claus is unquestionably indentical with Lilljeborg's species. It may be easily distinguished from *C. typicus* by its more slender body, the different form of the lateral parts of the last pedigerous segment and of the genital segment, the soft character of the frontal appendages, the total absence of denticles on the anterior antennæ, and, finally, by the less powerfully developed chela of the right last leg in the male. It is, moreover, rather inferior in size.

Occurrence.—The present Calanoid occurs in great abundance in the Christiania Fjord, even in the immediate neighbourhood of the town, and is also found pretty commonly along the whole southern and western coast of Norway, both in the fjords and in the open sea. North of the Trondhjem Fjord it becomes more scarce; but according to the statements of Dr. Aurivillius, it extends as far as the 70th degree of latitude. Like the preceding species, it is a true pelagic form, occurring, as a rule, close to the surface of the sea, and it no doubt forms

an essential part of the food of several pelagic fishes, for instance the herring and the mackerel.

Distribution.—Coast of France (Canu), British Isles (Brady), Heligoland (Claus), Kattegat (Lilljeborg), the Baltic (Nordqvist), Atlantic Ocean from Lat. 41° to 66° N (Cleve).

Gen. 21. **Isias,** Boeck, 1864.

Generic Characters.—Body moderately slender, with the anterior division somewhat tumid and much vaulted above. Cephalosome well defined from the 1st pedigerous segment, but without any distinct cervical depression, front carrying below 2 very delicate, recurved tentacular filaments. Last segment of metasome confluent with the preceding one, and not expanded laterally. Urosome comparatively slender, especially in male, where it consists of 5 distinct segments, the middle one conspicuously asymmetrical. Caudal rami elongated. Eye rather large, though not protuberant below. Anterior antennæ not much elongated, otherwise of a structure similar to that in *Centropages*. Posterior antennæ likewise rather similar. Anterior lip with the median lobe remarkably prominent. Anterior maxillipeds less powerfully developed than in *Centropages,* and having the distal setæ not prolonged. Oral parts otherwise resembling in structure those in the above genus. Legs comparatively robust, the 3 middle pairs with the 2nd basal joint of a somewhat unusual appearance, being obliquely oval in form; terminal joint of outer ramus in these pairs with 3 spines outside. Last pair of legs in female with the inner ramus very small, uniarticulate; unguiform projection of outer ramus well marked, though rather short; those in male with the inner ramus obsolete on right side, outer ramus of both legs biarticulate, with the distal joint spatulate in form and considerably larger on the right leg. No ovisac present in female.

Remarks.—This genus, established by Boeck, was placed by Dr. Giesbrecht in his subfamily *Temorinæ,* the subfamily *Centropaginæ* only comprising the genus *Centropages*. This arrangement cannot, I think, be admitted, since the present genus in reality exhibits a much closer relation to *Centropages* than to any of the genera comprised within the subfamily *Temorinæ,* the structure of the last pair of legs especially seeming to bring it nearer to that genus. We do not know at present more than a single species belonging to the present genus.

32. Isias clavipes, Boeck.

(Pl. LIII, LIV).

Isias clavipes, Boeck. Oversigt over de ved Norges Kyster iagttagne Copepoder. Chr. Vid. Selsk. Forh. 1864, p. 242.

Syn: *Isias Bonnieri*, Canu.

Specific Characters.—Female. Anterior division of body, seen dorsally, regularly elliptical in outline, greatest width about equalling half the length, and occurring in the middle, anterior extremity narrowly rounded, posterior somewhat blunted; seen laterally, considerably vaulted above. Lateral parts of last segment of metasome rounded off. Urosome exceeding half the length of the anterior division, and slightly asymmetrical, genital segment somewhat tortuous, with a rounded protuberance to the left side of the dorsal face, and carrying below 2 somewhat unequal spiniform, recurved processes, one on each side of the genital area. Caudal rami sublinear in form, being nearly 4 times as long as they are broad, apical setæ not much elongated. Anterior antennæ, when reflexed, scarcely reaching beyond the anterior division, some of the anterior bristles on the proximal part spiniform. Last pair of legs with a strong spine on the hind face of the 2nd basal joint issuing near the outer corner, inner ramus very small, with 3 or 4 natatory setæ; unguiform projection of outer ramus somewhat curved and distinctly denticulated.

Male more slender than female, with the urosome longer and narrower, middle segment produced on right side to a very conspicuous conical projection pointing straight outwards. Right anterior antenna with the middle section moderately tumefied. Last pair of legs with the inner ramus on right side obsolete, on left transformed to a somewhat irregularly folded lamella without any setæ; distal joint of outer rami with 4 marginal spines, that of right leg much the larger and of oval quadrangular form, with an irregular protuberance at the base inside, and with the outermost spine very strong; that of left leg with the inner edge finely ciliated and angularly produced both at the base and at the end.

Colour. Body, as a rule, semipellucid and of whitish colour, sometimes, however, in female exhibiting a light bluish hue.

Length of adult female reaching 1.35 mm., of male about the same.

Remarks.—As observed above, this is the only species of the genus as yet known, the form described by Mr. E. Canu as *Isias Bonnieri* being unquestionably identical with Boeck's species. It may be easily recognized by the general form of the body, the comparatively short anterior antennæ, and the peculiar structure of the last pair of legs, especially in the male.

Occurrence.—Boeck observed this form at Karmö, west coast of Norway. I have myself met with it in several localities both on the south and west coasts, from the Christiania Fjord northwards at least to the Trondhjem Fjord. In none of these localities did it occur, however, in any abundance. In habits it seems to be less pronouncedly pelagic than the species of *Centropages*, being sometimes found close to the shore among algæ. On the other hand, I have never found it in any of the samples of plankton taken in the open sea. Yet it cannot properly be considered as a true bottom-form, as I have found it occasionally, for instance, at the Zoological Station at Dröbak, close to the surface of the sea.

Distribution.—Mediterranean (Giesbrecht), coast of France (Canu), British Isles (Brady), Atlantic Ocean between Lat. 36° and 60° N. (Giesbrecht).

Gen. 22. **Limnocalanus**, G. O. Sars, 1863.

Generic Characters.—Form of body slender and elongated. Cephalosome well defined from the 1st pedigerous segment; front with 2 very small soft appendages below. Last segment of metasome likewise distinctly defined from the preceding one, its lateral parts not expanded. Urosome slender, 3-articulate in female, 5-articulate in male. Caudal rami narrow linear, with the appendicular bristle rather elongated. Eye small, subventral. Anterior antennæ slender, consisting in female of 25 articulations, last joint well defined, but very small; right anterior antenna in male geniculate. Posterior antennæ with both rami slender, the outer one the longer and distinctly 7-articulate. Mandibles with the masticatory part considerably expanded, the 2 outer denticles of the cutting edge simple, unguiform, palp comparatively narrow, with the inner ramus reflexed. Maxillæ quite normal. Anterior maxillipeds powerfully developed, with the distal appendages transformed to long, claw-like spines. Posterior maxillipeds unusually elongated. Legs slender, with the 2nd basal joint rather elongated, inner ramus in all pairs 3-articulate, terminal joint of outer ramus with only 2 spines outside. Last pair of legs in female with the unguiform projection of the outer ramus well marked; those in male with the outer rami biarticulate, distal joint of left leg oblong lamellar with 4 marginal spines, that of right leg somewhat club-shaped and produced inside to a long deflexed spiniform process. No ovisac present in female.

Remarks.—This genus was established by the present author as early as the year 1863, to include a peculiar fresh-water Calanoid found in the largest Norwegian lake, Mjösen. The name refers to the habits of this Calanoid, which somewhat recall those of the marine *Calani*. It is, however, in reality very different, as proved by the structure of the several appendages, and it does not even belong to the same section. In the slender form of the body and the narrow elongated caudal rami, the species of this genus resemble some of the *Temoridæ*, especially the genus *Temorella* of Claus; but the structure of the last pair of legs is very different, and exhibits a much closer resemblance to that in the genus *Centropages*. Indeed, one of the species was on this account referred to that genus by M. de Guerne. There are, however, sufficient reasons for keeping the present genus apart, though it must undoubtedly have a place in the family *Centropagidæ*, as here defined. We know at present of 3 different species belonging to this genus, viz., *L. macrurus*, G. O. Sars, *L. Grimaldii*, de Guerne, and *L. sinensis*, Poppe. The first and last species have hitherto only been found in fresh-water lakes, whereas the 2nd is a more strictly marine form, though also occurring in the Caspian Sea. Only the first-named species belongs to the fauna of Norway.

33. Limnocalanus macrurus, G. O. Sars.

(Pl. LV, LVI).

Limnocalanus macrurus, G. O. Sars. Oversigt af de indenlandske Ferskvandscopepoder. Chr. Vid. Selsk. Forh. 1862, p. 17.

Specific Characters.—Female. Anterior division of body, seen dorsally, narrowly elliptical in outline, greatest width but slightly exceeding $^1/_3$ of the length, anterior extremity narrowly rounded, posterior somewhat contracted; seen laterally only very slightly vaulted above. Cephalosome with a very conspicuous cervical sinus, in front of which the dorsal margin is gibbously convex and declines obliquely to the short rostral protuberance. Urosome (including the caudal rami) exceeding the metasome in length, genital segment somewhat larger and thicker than the middle one, last segment the smallest. Caudal rami narrow linear and scarcely at all divergent, equalling in length the last 2 caudal segments combined, their dorsal face clothed with numerous small spikes; outermost seta shorter than the others, and issuing from the outer edge at some distance from the apical ones. Anterior antennæ, when reflexed, reaching about to the end of the middle caudal segment. Last pair of legs with the unguiform projection of outer ramus shorter than the terminal joint, and distinctly denticulate.

Male of about the same size as the female, and rather similar in appearance, though having the urosome narrower and divided into 5 well-defined segments. Right anterior antenna with the middle section but slightly tumefied. Last pair of legs with the outer rami very unequal, that of left leg much the longer, with the distal joint twice as long as the proximal one, that of right leg with the distal joint quite short, club-shaped, and carrying at the tip, outside the spiniform process, a very small bidentate piece (rudiment of a 3rd joint).

Colour. Body in both sexes highly pellucid and nearly hyaline, though, as a rule, exhibiting within the metasome a rather large oblong oil-bubble of a clear orange hue.

Length of adult female reaching 2.20 mm.; that of male about the same.

Remarks.—This form, which, being the first one described, may be regarded as the type of the genus, is very closely allied to the marine species, *L. Grimaldii* (de Guerne), with which it has been confounded by earlier authors. On a closer comparison, however, it is at once distinguished by the peculiar shape of the cephalosome, as seen laterally. Whereas in *L. Grimaldii* the dorsal margin of this part, as in most other Calanoids, forms an uninterrupted curve up to the rostral prominence, in the present form it is conspicuously insinuated in the middle, bulging out in front of the sinus almost in a gibbous manner, to join the rostral prominence in a very oblique curve, thus giving the frontal part of the body a very peculiar appearance. The size of the present form is also rather inferior to that of the marine species.

Occurrence.—I have found this form very abundantly in some of the larger Norwegian lakes, viz., Mjösen, Tyrifjord, Randsfjord, Storsjö and Femsjö. It did not occur in any of these lakes except at some distance from the margin, and, as a rule, not at the very surface of the water, but only at some depth below it. In all the specimens collected (during the summer months) a large orange-coloured oil-bubble was constantly found within the metasome, whereas the ovarial tubes appeared, as it were, skrunk, so as to be detected only with great difficulty. This circumstance, in connection with the fact that all the specimens taken were fully grown, seems to prove that the propagation of this form must be confined to a different season of the year, perhaps the winter. It has been conjectured that this Calanoid might more properly be regarded as a relict marine form, a supposition which, however, was chiefly based upon the erroneous confusion of the 2 nearly-allied species, *L. macrurus* and *L. Grimaldii*. I think, however, that we must admit a near genealogical relationship between these 2 forms, the former being in all probability a direct descendant of the latter, though at present it

ought to be regarded as specifically distinct. It may be worthy of note in this connection, that the present Calanoid is only found in the lowland lakes, never at a height of more than 130 feet above the level of the ocean.

Distribution.—The great lakes of Sweden (Lilljeborg), Finland, and Russia (Nordquist), as also those of North America (Forbes).

Fam. 14. Diaptomidæ.

Characters.—Cephalosome well defined from the 1st pedigerous segment, with a more or less distinct cervical depression above, front unarmed, or carrying below 2 soft appendages. Last segment of metasome with the lateral parts in female more or less expanded. Urosome comparatively short, consisting in female of 2 or 3 segments, in male of 5 segments. Caudal rami not much prolonged, and carrying the full number of setæ. Eye distinct, subventral. Anterior antennæ in female consisting of 25 articulations; right one in male distinctly geniculate. Posterior antennæ with the outer ramus generally longer than the inner, and distinctly 7-articulate. Oral parts on the whole normal. Posterior maxillipeds, however, in some cases exceedingly powerfully developed. Legs comparatively strongly built, inner ramus in 1st pair biarticulate, in the 3 succeeding pairs 3-articulate. Outer ramus of 1st pair of legs with the 2nd joint unarmed outside; terminal joint of this ramus in the 3 middle pairs comparatively short, with only a single spine outside. Last pair of legs in female not natatory, though distinctly biramous, inner ramus, however, very small and simple in structure, outer ramus, as a rule, 3-articulate, penultimate joint produced at the end inside to a strong claw-like projection, terminal joint very small, in some cases obsolete. Last pair of legs in male very asymmetrical, right leg much the larger, and carrying at the tip a slender, movable claw. Ovisac present in female.

Remarks.—In the restriction here adopted, this family is chiefly characterised by the structure of the legs, and especially of those of the last pair in both sexes, partly also by the shape of the urosome and the presence in the female of a well-developed ovisac. It comprises exclusively inland forms, occurring more generally in fresh-water lakes and ponds, but sometimes also in lakes

containing saline water; but no true marine forms have as yet been met with. We know at present of at least 2 distinct genera belonging to this family, viz., *Diaptomus,* Westwood, and *Paradiaptomus,* G. O. Sars[1]). Only the former genus is represented in the fauna of Norway.

Gen. 23. **Diaptomus,** Westwood, 1836.

Syn: *Glaucea*, Koch.
„ *Cyclopsina*, M.-Edw. (part).

Generic Characters.—Body more or less slender, with the anterior division evenly vaulted above. Cephalosome with a well-marked cervical depression at about the middle of the dorsal face, front tipped below with 2 soft appendages of comparatively small size. Last segment of metasome in female generally imperfectly separated from the preceding one, lateral parts more or less expanded, and, as a rule, biangular, with a small denticle at each corner. Urosome in female generally 3-articulate, genital segment much the largest, and more or less dilated in front, middle segment small and often imperfectly separated from the anal segment. Caudal rami not very large, with the setæ scarcely transformed in male. Anterior antennæ generally slender, their length in some cases exceeding that of the body. Posterior antennæ with the outer ramus considerably longer than the inner. Posterior maxillipeds of moderate size, terminal part 5-articulate with none of the setæ unguiform. Terminal joint of outer ramus in the 1st pair of legs with only a single spine outside. Last pair of legs in female with the terminal joint of the outer ramus generally distinct and carrying 2 apical spines, those in male of somewhat varying structure in the several species.

Remarks.—This genus was established by Westwood as early as in the year 1836. The name *Glaucea* of Koch seems to date from about the same year, but Westwood's name is that now generally accepted by carcinologists. The chief distinguishing characters from the nearly-allied genus *Paradiaptomus* consist in the presence of distinct, though small tentacular appendages to the front, the somewhat different structure of the urosome, the fuller development of the

[1]) As shown by the present author, this genus is identical with the genus *Broteas* of Lovén; but as the latter name had been appropriated in Zoology at an earlier date, that of *Paradiaptomus* ought to be restored, and according to the rules of priority, the name *Lovenula* recently proposed by Dr. Schmeil must cede to that given to the genus by the present author.

outer ramus of the posterior antennæ, the much less powerful structure of the posterior maxillipeds, the presence of only a single spine outside the terminal joint of the outer ramus in the 1st pair of legs, and finally, the somewhat different appearance of the last pair of legs in the female. The genus comprises a very great number of species from all parts of the world, amounting to about 80 in all. Some of these species are rather anomalous, and it is therefore very probable, that in future it will be found advisable to subdivide this genus into several distinct genera. The determination of the species is connected with no small difficulty, owing to the imperfect manner in which they have generally been illustrated, most authors having contented themselves with only figuring some anatomical details of each species, generally the last pair of legs in the two sexes. To the fauna of Norway belong 7 species, to be described below. Besides some detail-figures, I have given carefully drawn habitus-figures of both sexes of all these, hoping thus to make the Norwegian species at least easily determinable for students.

34. Diaptomus castor (Jurine).

(Pl. LVII, LVIII).

Monoculus castor, Jurine. Histoire des Monocles qui se trouvent aux environs de Genève, p. 50, Pl. IV, figs. 1, 6, Pl. V, figs. 1, 5, Pl. VI, figs. 1, 17.

Syn: *Glaucea rubens*, Koch.

Specific Characters.—Female. Body somewhat robust, with the anterior division, seen dorsally, oblong oval in outline, greatest width somewhat in front of the middle, and considerably exceeding $^1/_3$ of the length, anterior extremity obtusely rounded, posterior but slightly attenuated. Cervical depression very conspicuous. Lateral expansions of last pedigerous segment not very large, and divided into 2 acute lappets. Urosome distinctly 3-articulate, middle segment well defined, genital segment somewhat asymmetrical and considerably dilated, forming on each side a triangular expansion tipped with a short denticle, the right one somewhat larger than the left, and placed more posteriorly. Caudal rami comparatively short, about twice as long as they are broad. Anterior antennæ unusually short, when reflexed reaching but slightly beyond the anterior division of the body. Posterior maxillipeds more robust than in most other species, 2nd basal joint rather broad, terminal part much shorter than this joint, and having the anteriorly-curving setæ partly spiniform. Last pair of legs with a conspicuous triangular projection on the hind face of the 1st basal joint, inner ramus somewhat shorter than the 1st joint of the outer, and distinctly biarticulate, carrying

on the tip 2 unequal spines, one of them rather slender and elongated; terminal joint of outer ramus well defined though very small, inner apical spine about 3 times as long as the outer. Ovisac very large and oval in form.

Male considerably smaller and more slender than female, with the lateral parts of last pedigerous segment less expanded, though, as in the female, bifurcate at the tip. Right anterior antenna with the middle section considerably tumefied, terminal section without any projections or denticles. Last pair of legs with the inner ramus developed almost equally on both sides, that of right leg reaching beyond the 1st joint of the outer ramus, 2nd basal joint of same leg with a hyaline lamella inside in the middle, proximal joint of outer ramus acutely produced at the end outside, distal joint with the spine of the outer edge placed in front of the middle; apical claw very strong and evenly curved. Left leg scarcely reaching beyond the penultimate joint of the right, terminal joint rounded, finely ciliated inside and projecting at the tip in a quite short, digitiform process, inside which a short blunt spine is fixed.

Colour of female generally yellowish or orange, that of male more reddish. Usual length of adult female 2.10 mm., of male 1.90 mm.

Remarks.—This form was described as early as the year 1820 by Jurine as *Monoculus castor*. The *Glaucea rubens* of Koch seems to be the same species, and it is very probable that the 3 forms recorded by O. Fr. Muller as *Cyclops cœruleus, rubens* and *lacinulatus* are also referable to the present species. It is the largest of our Diaptomi, and is moreover easily recognized by its comparatively robust body, the form of the lateral expansions of the last pedigerous segment, and that of the genital segment in the female, and finally, by the unusually short anterior antennæ.

Occurrence.—I have hitherto only met with this form in 4 localities, 3 of which belong to the southern part of Norway, viz., Sandösund, Fredriksværn, Mærdö, whereas the 4th, Tjötö, is located much farther north, on the Nordland coast. In all 4 places it only occurred in shallow pools of small dimensions.

Distribution.— Sweden (Lilljeborg), British Isles (Brady), Germany (Schmeil), Switzerland (Jurine), France (Richard), Spain (Bolivar).

35. Diaptomus denticornis, Wierzejski.

(Pl. LIX).

Diaptomus denticornis, Wierzejski, O. krajowych skorupiaksach zrodziny Calanidæ. Nozgrawn i Spraw. Wydz, matem. przyr. Akad. Unnej. Vol. XVI, p. 8.

Syn: *Diaptomus castor*, G. O. Sars (not Jurine).
„ „ *gracilis var.*, Wierzejski.
„ „ *hamatus*, Lilljeborg, M. S.

Specific Characters.—Female. Body somewhat less robust than in *D. castor*, and less strongly vaulted above. Anterior division, seen dorsally, oblong in form, greatest width but slightly exceeding 1/3 of the length, and occurring in the middle, anterior extremity considerably contracted, posterior subtruncate. Lateral expansions of last pedigerous segment rather large, biangular, outer angle more prominent than inner. Urosome comparatively short, but slightly exceeding 1/3 of the length of the anterior division, genital segment much longer than the other 2 combined, and but very slightly dilated in front, without any distinct lateral denticles; the last 2 segments imperfectly separated dorsally. Caudal rami very short, not nearly twice as long as they are broad. Anterior antennæ, when reflexed, reaching to about the end of the genital segment. Posterior maxillipeds not nearly so robust as in *D. castor*, 2nd basal joint much narrower, terminal part considerably exceeding this joint in length. Last pair of legs without any prominence on the hind face of the 1st basal joint, inner ramus very narrow, uniarticulate, and fully as long as the 1st joint of the outer ramus, terminal joint of the latter obsolete, and replaced by a slender spine. Ovisac large, subcordate in form.

Male of the usual slender form, and having the lateral parts of last pedigerous segment scarcely at all expanded. Right anterior antenna with the middle section considerably tumefied, antepenultimate joint of terminal section bordered in front by a hyaline rim projecting at the end to a triangular prominence, last joint terminating in a hook-like anteriorly-curving projection. Last pair of legs with the inner ramus very small, that of right leg not even reaching to the middle of the proximal joint of outer ramus, this joint obtusely produced at the end outside, with a small denticle on the hind face of the projection, distal joint with the spine of the outer edge situated beyond the middle, apical claw slender and but slightly curved. Left leg scarcely projecting beyond the penultimate joint of the right, terminal joint rounded, projecting at the end to a short, blunt, digitiform process, on the outer side of which there is a small simple spine.

Colour of female generally bluish, of male reddish orange.

Length of adult female 2.00 mm., of male 1.50 mm.

Remarks.—This form was at first (in the year 1863) erroneously described by the present author as *D. castor* (Jurine). The same form was subsequently examined by Mr. Wierzejski, who at first regarded it as only a variety of *D. gracilis*. G. O. Sars, but in a subsequent paper recorded it as a distinct species under the above name. Prof. Lilljeborg assigned to this form the provisional name *D. hamatus*, on account of the hook-like projection of the last joint of the right anterior antennæ in the male, and the name proposed by Mr. Wierzejski also refers to the same character. In addition to this character, the present species may be easily recognized by the form of the lateral expansions of the last pedigerous segment in the female, and also by that of the genital segment. The last pair of legs, moreover, exhibit in both sexes several well-marked peculiarities.

Occurrence.—I have found this form very abundantly in the neighbourhood of Christiania, especially in small ponds, but sometimes also in larger lakes. It also occurs in many other places in Norway, both in the lowland and in the mountain districts, and extends northwards as far as Bodö.

Distribution.—Sweden (Lilljeborg), Tatras Mountains (Wierzejski), Switzerland, France (Richard), territory of Akmolinsk, Central Asia (Lepeschkin).

36. Diaptomus bacillifer, Koelbel.

(Pl. LX).

Diaptomus bacillifer, Koelbel, Carcinologisches. Sitzungsber. d. K. K. Akad. Wiss. Wien, Vol. XC.

Syn: *Diaptomus montanus*, Wierzejski.

„ — *retusus*, Lilljeborg, M. S.

Specific Characters.—Female. Body somewhat robust, with the anterior division, seen dorsally, oblong oval in form, greatest width considerably exceeding $^1/_3$ of the length, and occurring somewhat in front of the middle. Lateral expansions of last pedigerous segment somewhat resembling those in *D. denticornis*, but less distinctly biangular. Genital segment fully twice as long as the other 2 caudal segments combined, and slightly dilated in front, with a very small denticle on each side. Caudal rami about twice as long as they are broad. Anterior antennæ, when reflexed, reaching about to the middle of the genital segment. Last pair of legs with the inner ramus much shorter than the 1st joint of the outer, but distinctly biarticulate, tip blunted and somewhat incurved, with a very small hair

outside; terminal joint of outer ramus well defined, with the apical spines of moderate length. Ovisac rounded.

Male considerably smaller and more slender than female, with the lateral parts of last pedigerous segment only very slightly expanded, though on right side distinctly biangular. Right anterior antenna in male with the middle section moderately tumefied, antepenultimate joint of terminal section produced at the end anteriorly to a straight rod-like process obtuse at the tip and extending somewhat beyond the penultimate joint. Last pair of legs with the inner rami well developed, though uniarticulate and acute at the tip, that of right leg extending nearly to the middle of the distal joint of the outer ramus, 2nd basal joint of this leg with a small hyaline lamella in the middle of the inner edge, proximal joint of outer ramus produced at the end outside to a triangular projection, distal joint with the spine of the outer edge situated about in the middle, apical claw considerably curved. Left leg extending beyond the middle of the terminal joint of the right, 2nd basal joint with an appressed spiniform projection inside, terminal joint produced at the end to a rather long and narrow digitiform process, inside which stands a slender denticulated spine.

Colour of female yellowish orange, that of male dark red.

Length of adult female 1.80 mm., of male 1.40 mm.

Remarks.—In its external appearance, this form somewhat resembles *D. denticornis*. On a closer examination, however, it may be easily distinguished by the more robust form of the body, and the comparatively shorter anterior antennæ, but especially by the peculiar rod-like projection of the antepenultimate joint of the right anterior antenna in the male. Moreover, the last pair of legs in both sexes exhibit several well-marked differences.

Occurrence.—The only place where I have met with this form is in the farthest north of Norway, at Vardö, Finmark. It occurred here rather abundantly in a shallow tarn situated close to the town. In the same tarn the arctic Phyllopod, *Branchinecta paludosa,* was very common, and the water was moreover peopled with large shoals of *Daphina magna.*

Distribution.—Mountain lakes of Central Europe (Koelbel, Wierzejski), British Isles (Brady), Siberia (Lilljeborg) as far north as the New Siberian Islands (the present author), territory of Akmolinsk (Lepeschkin).

37. Diaptomus laticeps, G. O. Sars.

(Pl. LXI).

Diaptomus laticeps, G. O. Sars. Oversigt af de indenlandske Ferskvandscopepoder. Chr. Vid. Selsk. Forh. 1862, p. 10.

Specific Characters—Female. Body moderately slender, with the anterior division, seen dorsally, oblong in form, greatest width somewhat exceeding $^1/_3$ of the length, and occurring quite in front, across the middle of the cephalosome, anterior extremity broadly rounded, posterior gradually attenuated; seen laterally, considerably dilated in front, with the dorsal margin of the cephalosome boldly curved. Lateral expansions of last pedigerous segment comparatively small and scarcely at all extant, outer corner distinct, inner obsolete. Genital segment more than twice as long as the other 2 caudal segments combined, and slightly dilated in front, with a very small denticle on each side. Caudal rami fully as long as the last 2 caudal segments combined, and slightly widening distally. Anterior antennæ, when reflexed, extending about to the base of the caudal rami. Last pair of legs with a well-marked triangular projection on the hind face of 1st basal joint, inner ramus very short and uniarticulate, scarcely reaching beyond the middle of the 1st joint of the outer ramus, terminal joint of the latter well defined, though rather small, apical spines comparatively short. Ovisac rounded.

Male much smaller and more slender than female, resembling that of the preceding species, but somewhat more dilated anteriorly. Right anterior antenna with the antepenultimate joint produced at the end anteriorly to a somewhat securiform projection extending about to the middle of the penultimate joint. Both legs of last pair with a small hyaline lamella inside the 2nd basal joint, inner ramus well developed, acuminate, that of right leg reaching beyond the middle of the distal joint of outer ramus, proximal joint of the latter produced at the end outside to a remarkably strong spiniform projection, distal joint with the spine of the outer edge situated about in the middle, apical claw sharply curved, sub-sigmoid. Left leg extending to about the middle of the terminal joint of the right, last joint produced at the end to a very narrow and elongated digitiform process, and carrying inside it a still longer setiform spine.

Colour generally bluish.

Length of adult female reaching 1.80 mm., of male 1.40 mm.

Remarks.—This species may be easily recognized by the strongly dilated cephalosome, the small size of the lateral expansions of the last pedigerous segment in the female, and the structure of the last pair of legs in both sexes. The right anterior antenna of the male is moreover distinguished by the shape of the projection of its antepenultimate joint.

Occurrence.—I have met with this form in several of the Norwegian mountain lakes, for instance, Aursundsjö, Afsjö, Gaavelivand, Lesjevand, as also in some lakes in the districts of Romsdal and Trondhjem; and Mr. Huitfeldt-Kaas has recently found it in several lakes in the western part of the country.

Distribution.—Jemtland, Sweden (Lilljeborg).

38. Diaptomus laciniatus, Lilljeborg.

(Pl. LXII).

Diaptomus laciniatus, Lilljeborg, in J. de Guerne and J. Richard, Révision des Calanides d'eau douce, p. 47, Pl. 1, figs. 22, 24, 25.

Specific Characters.—Female. Body somewhat robust of form. Anterior division, seen dorsally, oblong oval in outline, greatest width considerably exceeding $^1/_3$ of the length and occurring somewhat in front of the middle, anterior extremity rounded, posterior somewhat irregular. Last 2 segments of metasome confluent dorsally, and each produced laterally to very conspicuous extant linguiform lobes, the anterior pair obtuse at the tip, the posterior acuminate. Urosome comparatively short, genital segment slightly dilated in front, but without any lateral denticles. Caudal rami scarcely twice as long as they are broad. Anterior antennæ, when reflexed, extending to about the base of the caudal rami. Last pair of legs with a distinct triangular projection on the hind face of 1st basal joint, inner ramus uniarticulate and extending almost to the end of the 1st joint of the outer, tip acutely produced, terminal joint well defined, with the apical spines comparatively short. Ovisac rounded and, as a rule, containing only a limited number of ova.

Male of the usual appearance, with the last 2 pedigerous segments well defined and not expanded laterally. Terminal part of right anterior antenna simple, without any projection of the antepenultimate joint. Last pair of legs with the inner edge of 2nd basal joint quite smooth, without any projecting lamella, inner ramus of right leg somewhat larger than that of left, and extending almost to the tip of the distal joint of the outer ramus, proximal joint of the latter produced at the end outside to a comparatively short triangular projection, distal joint with the spine of the outer edge situated about in the middle, apical claw greatly curved. Left leg extending beyond the middle of the terminal joint of the outer, last joint produced at the end to a comparatively short and blunt digitiform process, on the inner side of which there is a similarly short spine.

Colour sometimes dark bluish, sometimes reddish orange.

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

Remarks.—The female of this species is at once recognized by the peculiar shape of the last 2 pedigerous segments, both of which are produced laterally to very conspicuous, freely-projecting expansions separated on each side by a narrow incision. Otherwise it is nearly allied to *D. laticeps,* differing somewhat, however, in the structure of the last pair of legs in both sexes, as also in the total absence of any projection on the antepenultimate joint of the right anterior antenna in the male.

Occurrence.—Prof. Lilljeborg first found this form in a small lake situated on the summit of the Flöifjeld near Bergen, and also received it from the Österdal through Miss B. Esmark. I have myself met with it in many places in the country, both in lowland and in mountain lakes, and, according to the recent investigations of Mr. Huitfeldt-Kaas, it is generally distributed in the lakes of western Norway. The most northern locality where I have found it is the mainland opposite Vardö, Finmark. It here occurred very abundantly in shallow tarns together with *Heterocope borealis* and 2 Phyllopods, viz., *Branchinecta paludosa* and *Polyartemia forcipata.* All the specimens occurring here were of a dark reddish orange hue, whereas those from other tracts more generally exhibited a bluish colour.

Distribution.—Scotland (Scott), Lake of Geneva (Cleve), Russian Lapland and the Kola Peninsula (Lilljeborg).

39. Diaptomus gracilis, G. O. Sars.

(Pl. LXIII).

Diaptomus gracilis, G. O. Sars. Oversigt af de indenlandske Ferskvandscopepoder. Chr. Vid. Selsk. Forh. 1862, p. 9.

Syn: *Diaptomus Westwoodi,* Lubbock.

Specific Character—Female. Body very slender in form, with the anterior division, seen dorsally, narrow oblong in form, greatest width not attaining $^1/_3$ of the length, and occurring about in the middle, anterior extremity considerably contracted, posterior subtruncate. Lateral expansions of last pedigerous segment very distinctly biangular, each corner tipped with an acute denticle, the outer one rather produced and pointing straight outwards. Genital segment somewhat longer than the other 2 caudal segments combined, and gradually dilated in front, with a very conspicuous acute denticle on each side. Caudal rami comparatively short, being scarcely more than twice as long as they are broad. Anterior antennæ exceedingly slender and elongated, extending, when reflexed, far beyond the caudal rami, in some cases by as much as the 4 or 5 outer joints, in other cases by only 3 of the joints.

Last pair of legs with a well-marked triangular projection on the hind face of 1st basal joint, inner ramus uniarticulate and rather short, not extending nearly to the end of the 1st joint of the outer ramus, terminal joint of the latter well defined and of larger size than usual, inner apical spine rather elongated, reaching as far as the tip of the claw-like projection of the preceding joint. Ovisac in some cases rather large, sub-cordate, in other cases comparatively small, with only a limited number of ova

Male still more slender than female, with the lateral parts of last pedigerous segment less expanded, though somewhat more prominent on right side. Right anterior antenna with the middle section not much tumefied, antepenultimate joint of terminal section produced at the end anteriorly to a hook-like process, in some cases very prominent, in other cases much reduced in size. Last pair of legs comparatively very large, with the inner rami rather dissimilar, that of right leg being much the larger and somewhat tumefied, almost fusiform in shape, extending far beyond the middle of the distal joint of the outer ramus, proximal joint of the latter produced at the end outside to a comparatively short triangular projection, distal joint very large and broad, with the spine of the outer edge occurring somewhat in front of the middle, apical claw considerably curved in its distal part. Left leg extending scarcely as far as the penultimate joint of the right, inner edge of 2nd basal joint angularly produced beyond the middle, terminal joint with a comparatively small lamellar expansion inside the base, and gradually tapering to a simple digitiform process, inside which there is a small seta, standing out from the joint at a right angle, and terminating in a brush of delicate diverging cilia.

Colour. Body generally very pellucid and almost colourless, in some cases, however, ornamented with a broad transverse band of a chocolate hue across the anterior division.

Length of adult female 1.40 mm., of male 1.20 mm.

Remarks.—This form is easily recognizable from the 5 preceding species by its slender form, but especially by the exceedingly elongated anterior antennæ. Moreover the shape of the lateral expansions of the last pedigerous segment in the female, and the structure of the last pair of legs in both sexes is rather characteristic. Two varieties of this species occur in Norway, the one with the anterior antennæ quite extraordinarily prolonged, the other with these appendages somewhat shorter, but otherwise exactly agreeing with the former, no difference whatever being found in the structure of the last pair of legs in either of the sexes. The form described by Lubbock as *D. Westwoodi* seems more properly to be referable to the latter variety.

Occurrence.—In the southern part of Norway this is one of the commonest Diaptomi, occurring very abundantly in almost all the larger lowland lakes, and constituting there the essential bulk of the zoöplankton.

Distribution.—Sweden (Lilljeborg), Finland (Nordquist), British Isles (Lubbock), Germany (Schmeil), Switzerland (Imhof), Hungary (Daday), Italy (Pavesi).

40. Diaptomus graciloides, Lilljeborg.

(Pl. LXIV).

Diaptomus graciloides, Lilljeborg. Description de deux nouvelles espèces de Diaptomus du Nord de l'Europe. Bull. Soc. Zool. France, Vol. XIII, p. 156.

Specific Characters—Female. Very like the preceding species, but somewhat less slender in form, and also of rather inferior size. Lateral parts of last pedigerous segment but very slightly expanded and not at all extant, being rounded off at the tip, though exhibiting the 2 usual denticles, which however are much smaller than in *D. gracilis*. Genital segment rather narrow, being far less dilated in its anterior part than in the above species, lateral denticles extremely small. Caudal rami about as in *D. gracilis* Anterior antennæ very slender and elongated, reaching, when reflexed, considerably beyond the caudal rami (by about the 2 or 3 outer joints). Last pair of legs with a very small, somewhat linguiform projection on the hind face of the 1st basal joint, inner ramus imperfectly biarticulate, and reaching somewhat beyond the 1st joint of the outer ramus, terminal joint of the latter well defined, though somewhat smaller than in *D. gracilis*, inner apical spines, as in that species, very slender, extending as far as the tip of the unguiform projection of the preceding joint. Ovisac small, with a very limited number of ova.

Male resembling that of *D. gracilis*, though somewhat less slender. Antepenultimate joint of right anterior antenna without any trace of a projection at the end. Last pair of legs comparatively less powerful than in *D. gracilis*, inner rami of about equal size and simple cylindric in form, that of right leg not extending to the middle of the distal joint of the outer ramus, proximal joint of the latter very slightly produced at the end outside, distal joint much smaller than in *D. gracilis*, with the spine of the outer edge situated beyond the middle, apical claw irregularly flexuous. Left leg extending far beyond the penultimate joint of the right, inner edge of 2nd basal joint perfectly smooth, terminal joint of a similar form to that in *D. gracilis*, but with the seta of the inner edge not penicillate, and extended straight downwards.

Colour. Body generally very pellucid and almost colourless, in some cases, however, of a dark bluish hue.

Length of adult female 1.30 mm., of male 1.00 mm.

Remarks.—I am by no means prepared to agree with Prof. Brady in regarding this form as only a variety of *D. gracilis.* True, it is nearly allied to this species; but on a closer comparison, several well-marked differences are found to exist, which seem to be fairly constant and prove this form to be in reality a well-defined species. I was also long ago aware of the existence of this form, and had assigned to it the provisional name *D. microlobatus,* on account of the small size of the lateral expansions of the last pedigerous segment in the female.

Occurrence.—I have met with this form occasionally in the lake Femsjö, situated at the south-eastern corner of Norway, and also not unfrequently in small tarns at Hammerfest and at Matsjok, Finmark. According to Mr. J. Richard, it has also been found in great abundance, by Mr. Ch. Rabot in the great lake, Rösvand, in Nordland.

Distribution.—Sweden (Lilljeborg), British Isles (Brady), mountain lakes of the Eifel, Germany (Zacharias), Kola Peninsula (Lilljeborg), territory of Akmolinsk, Central Asia (Lepeschkin).

Fam. 15. Temoridæ.

Characters.—Body of varying form, in some cases rather short and stout, in other cases comparatively slender. Cephalosome well defined from the 1st pedigerous segment, front unarmed, or provided with 2 soft tentacular appendages. Last 2 segments of metasome confluent, or at any rate imperfectly defined. Urosome consisting in female of 3, in male of 5 segments; caudal rami of different structure in the different genera. Anterior antennæ consisting in female of 24 or 25 articulations; right antenna in male distinctly geniculate. Posterior antennæ and oral parts on the whole normal. The 4 anterior pairs of legs with the joints of the inner rami more or less reduced in number. Last pair of legs in both sexes simple, not natatory, without any trace of inner rami; those in male, as usual, larger than in female, and prehensile. Ovisac in some cases present, but more frequently wanting.

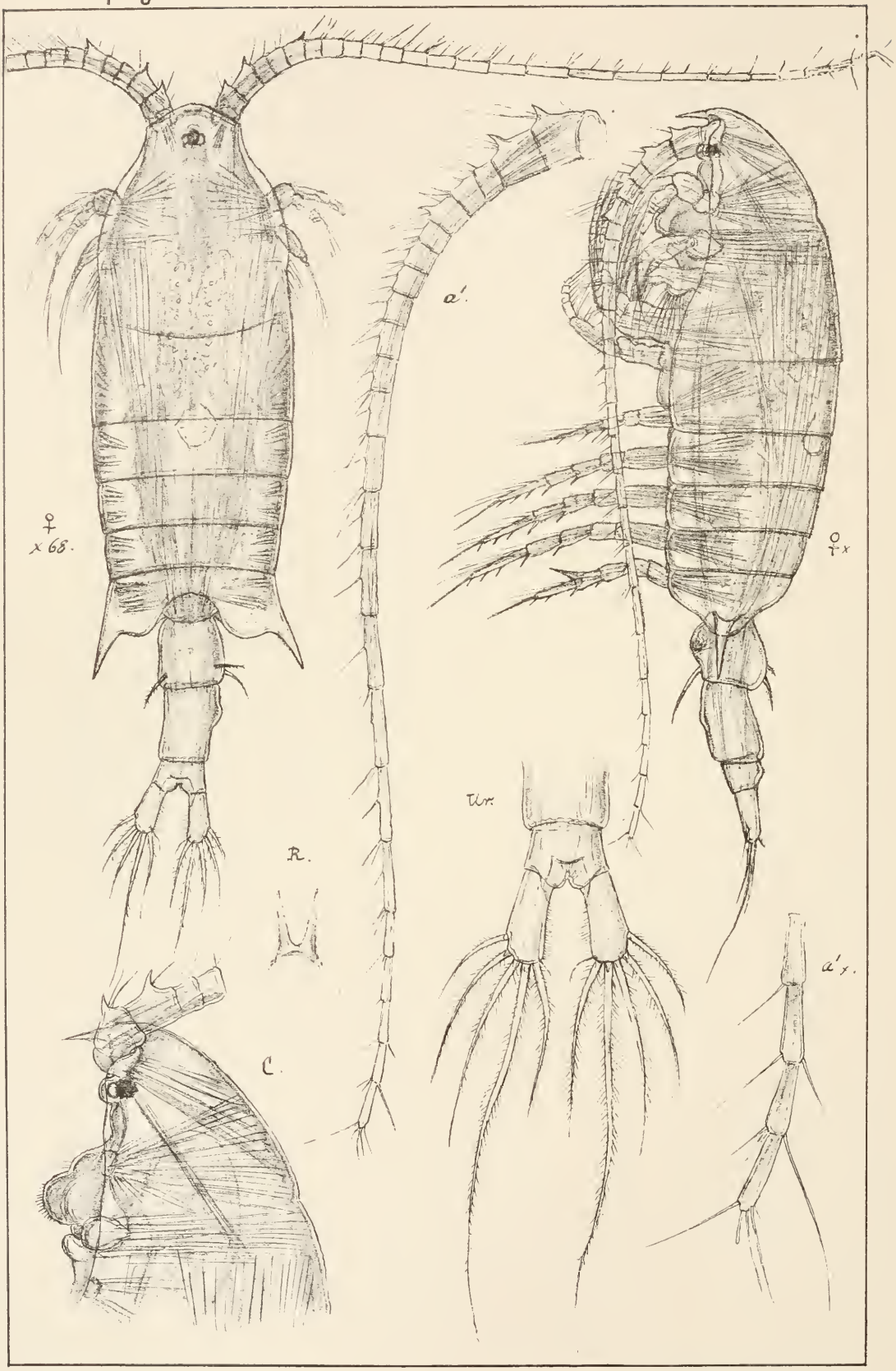
Remarks.—This family, as defined above, is chiefly distinguished from the *Centropagidæ* and *Diaptomidæ* by the structure of the legs, and more particularly those of the last pair, which never are natatory, nor exhibit in either of the sexes any trace of inner rami. In the 4 anterior pairs these rami are moreover, as a rule, much reduced in size, constituting in some cases small uniarticulate pieces. The family comprises as yet 7 well-defined genera, viz, *Temora,* Baird, *Temoropia,* Scott, *Temorites,* G. O. Sars, *Eurytemora,* Giesbrecht, *Heterocope,* G. O. Sars, *Epischura,* Forbes, and *Lamellipodia,* Schmeil. Of these genera, the first 3 comprise exclusively marine species, the 4th chiefly brack-water forms, whereas the last 3 genera are peculiar to inland lakes. In the Norwegian fauna 3 of the genera are represented, and will be treated of below.

Gen. 24. **Temora,** Baird, 1850.

Syn: *Halitemora,* Giesbrecht.

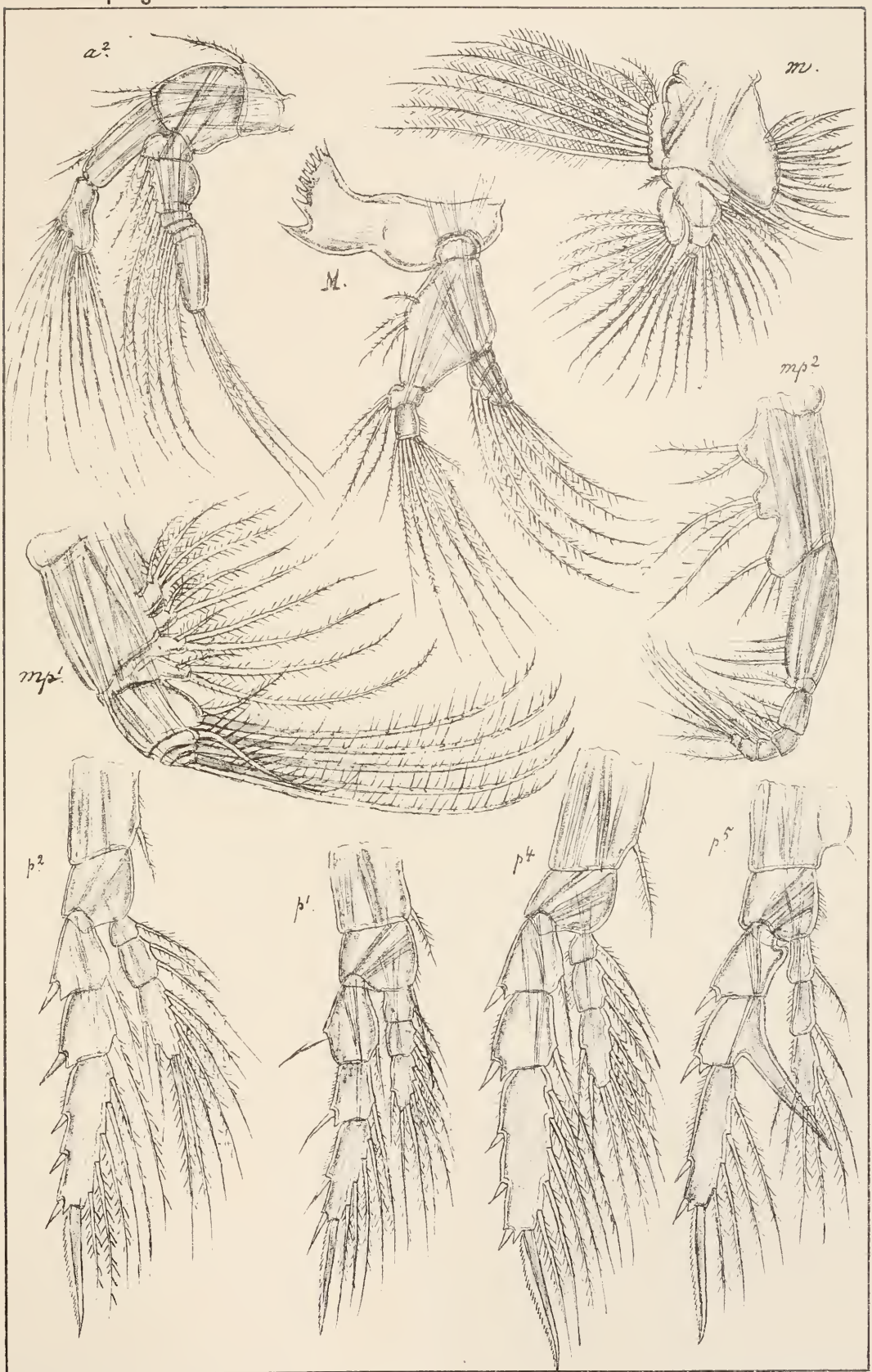
Generic Characters.—Form of body short and compact, with the anterior division considerably vaulted above. Cephalosome remarkably dilated and exhibiting at the end dorsally a gibbous prominence; front tipped with 2 very slender and delicate, recurved tentacular appendages. Last 2 segments of metasome confluent. Urosome with the genital segment in female comparatively short and scarcely at all protuberant below. Caudal rami narrow and elongated, being remarkably divaricate, and in some cases asymmetrical, setæ comparatively short and present in the normal number, the outermost one being attached to the outer edge at some distance from the others. Eye very small. Anterior antennæ slender and elongated, composed in female of 24 articulations only, the last 2 being confluent. Posterior antennæ with the outer ramus scarcely longer than the inner, and 7-articulate. Anterior lip not much prominent, rounded below. Oral parts of quite normal structure. Natatory legs with the inner rami comparatively small and biarticulate; 2nd to 4th pairs with the first 2 joints of the outer ramus imperfectly separated in female, terminal joint with 3 spines outside, apical spine coarsely serrate. Last pair of legs in female very small, 3-articulate, first 2 joints simple, last one dentate at the tip; those in male very asymmetrical, left leg much the larger, 4-articulate, and distinctly forcipate, 2nd joint being produced inside to a long curved thumb-like process, against which the outer part admits of being impinged; right leg 3-articulate, with the terminal joint unguiform, incurved. No ovisac present in female.

Copepoda



G. O. Sars autogr. Trykt i den norske Opmaaling Chra

Centropages typicus, Kröyer.



G O Sars autogr.

Trykt i den private Opmaaling Chra

Centropages typicus, Kröyer.

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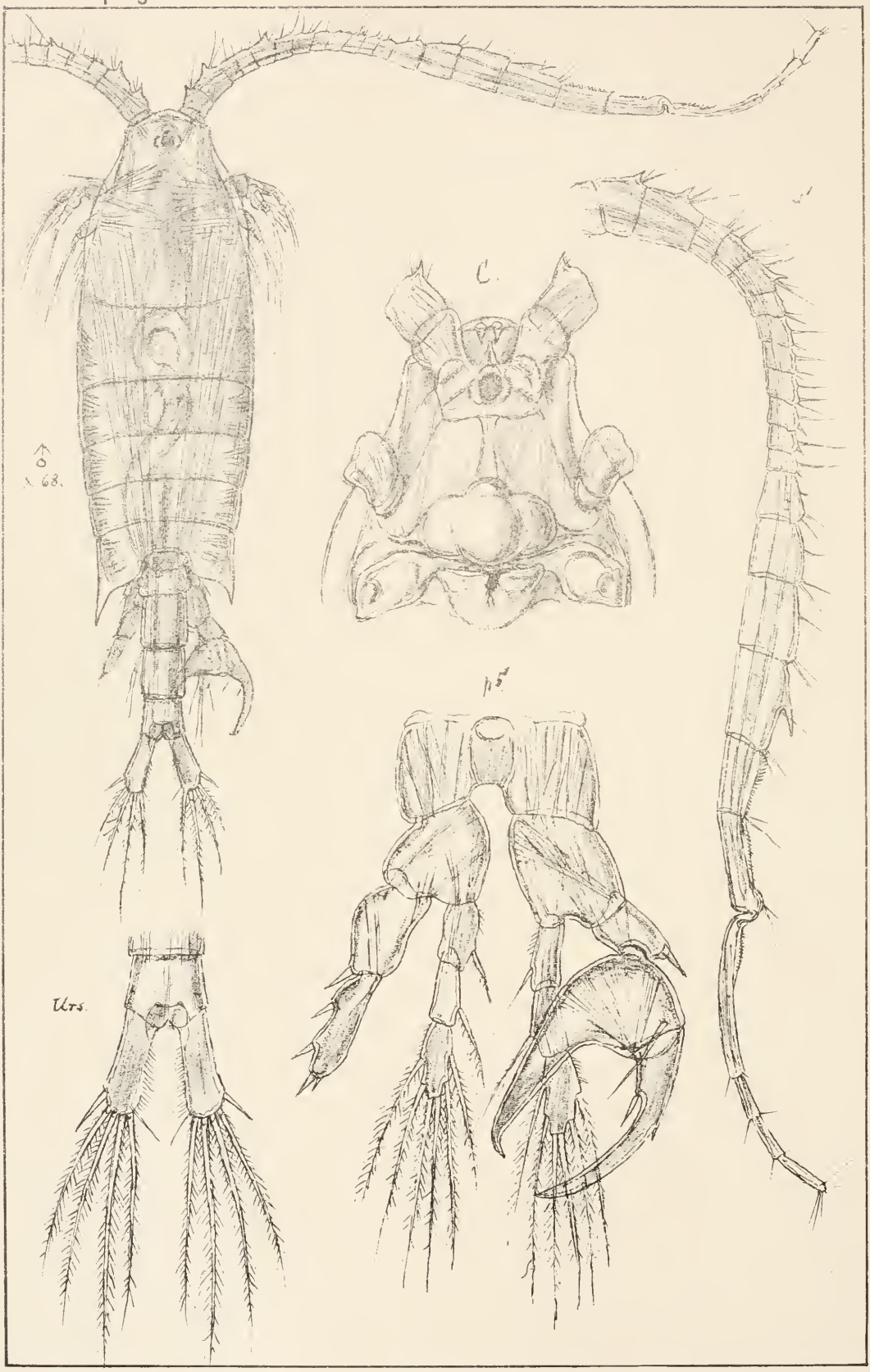
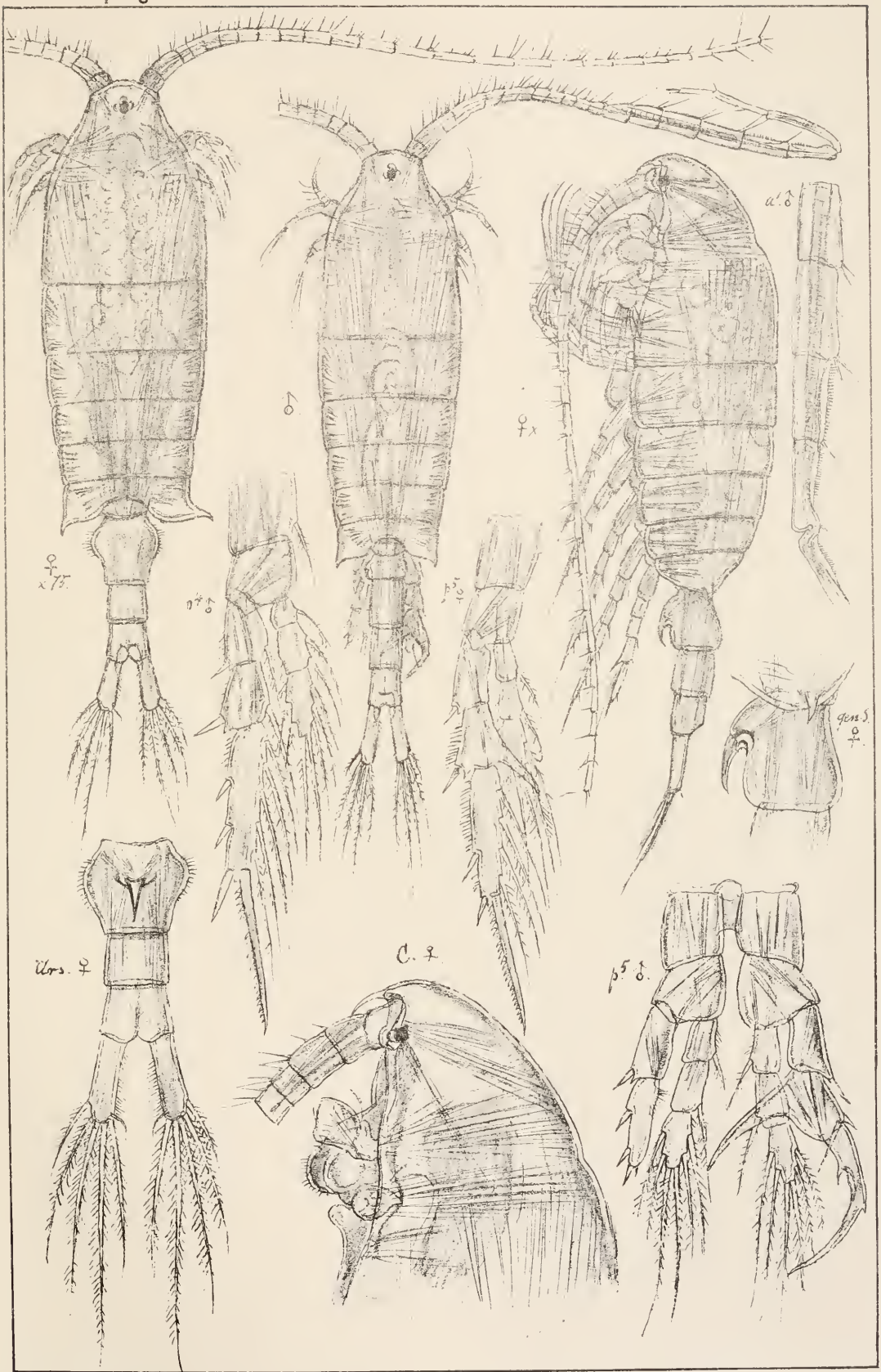


G.O. Sars autogr

Trykt i den private Opmaaling, Chra

Centropages typicus, Kröyer.
(male.)

Copepoda



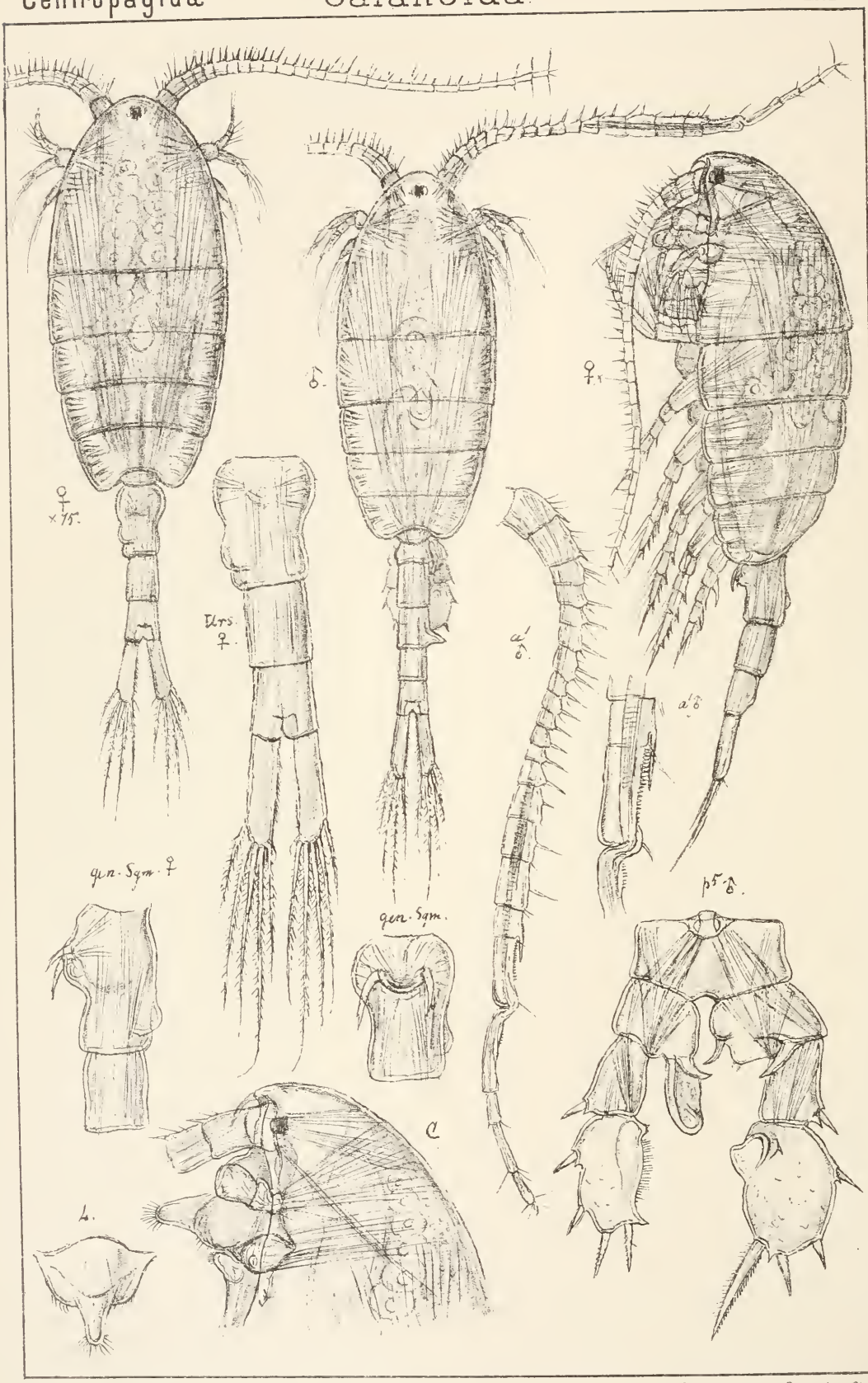
G O. Sars autogr

Trykt i den private Opmaaling Chra

Centropages hamatus, (Lilljeb.)

Copepoda

Centropagidæ — Calanoida. — PI. LIII.

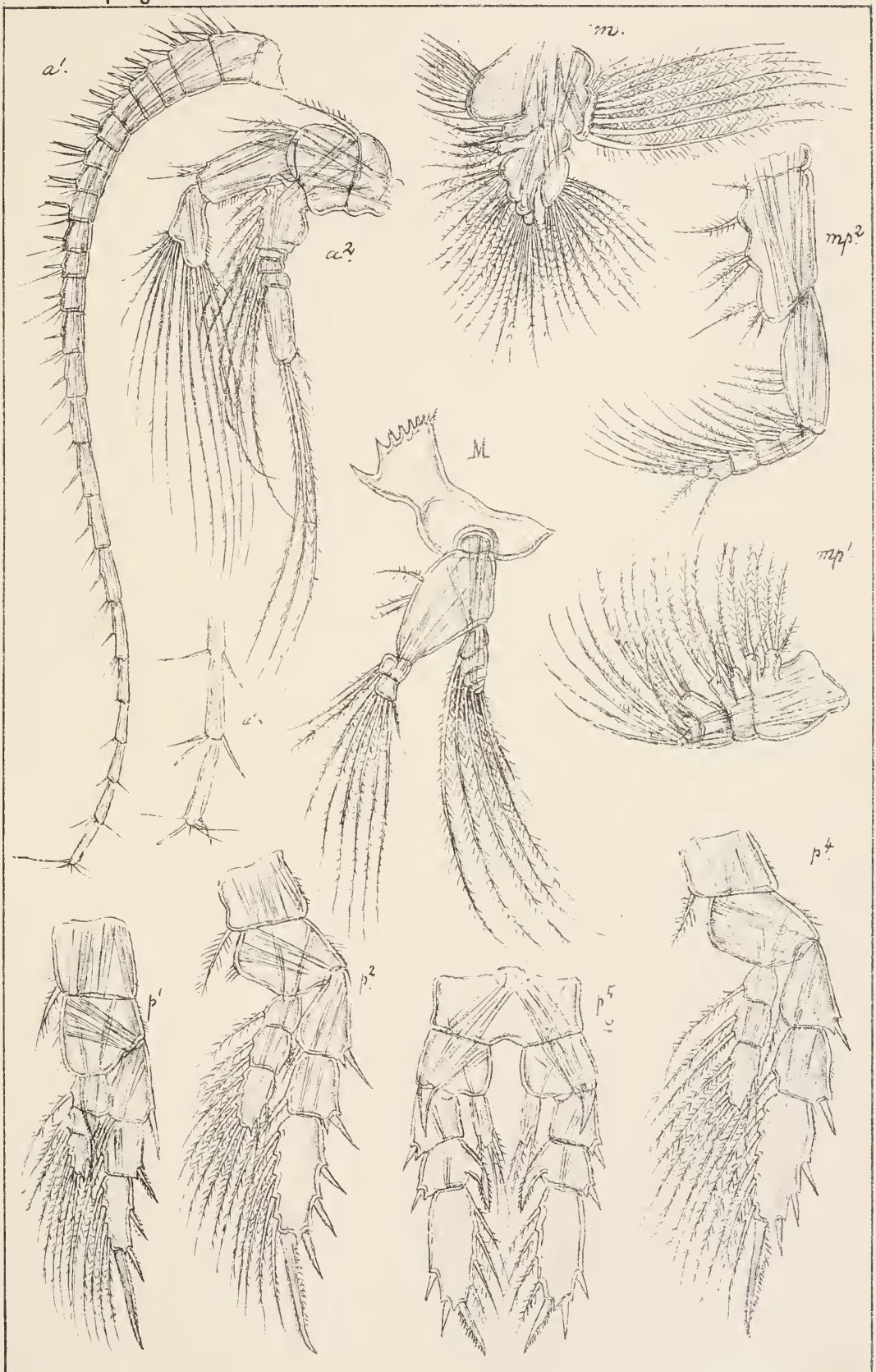


G.O. Sars autogr.

Trykt i den private Gomaaling, Chra

Isias clavipes, Boeck.

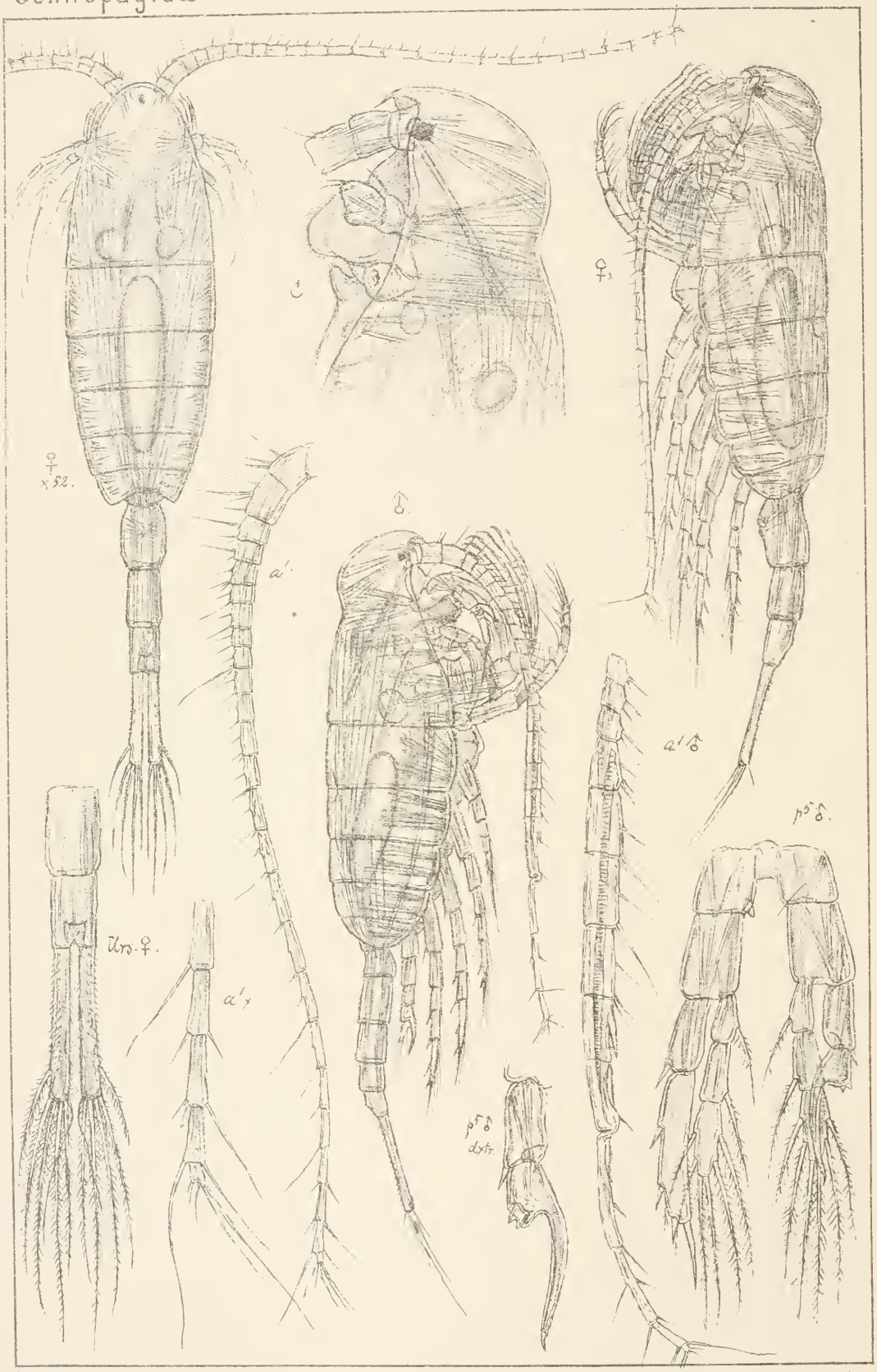
Copepoda



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

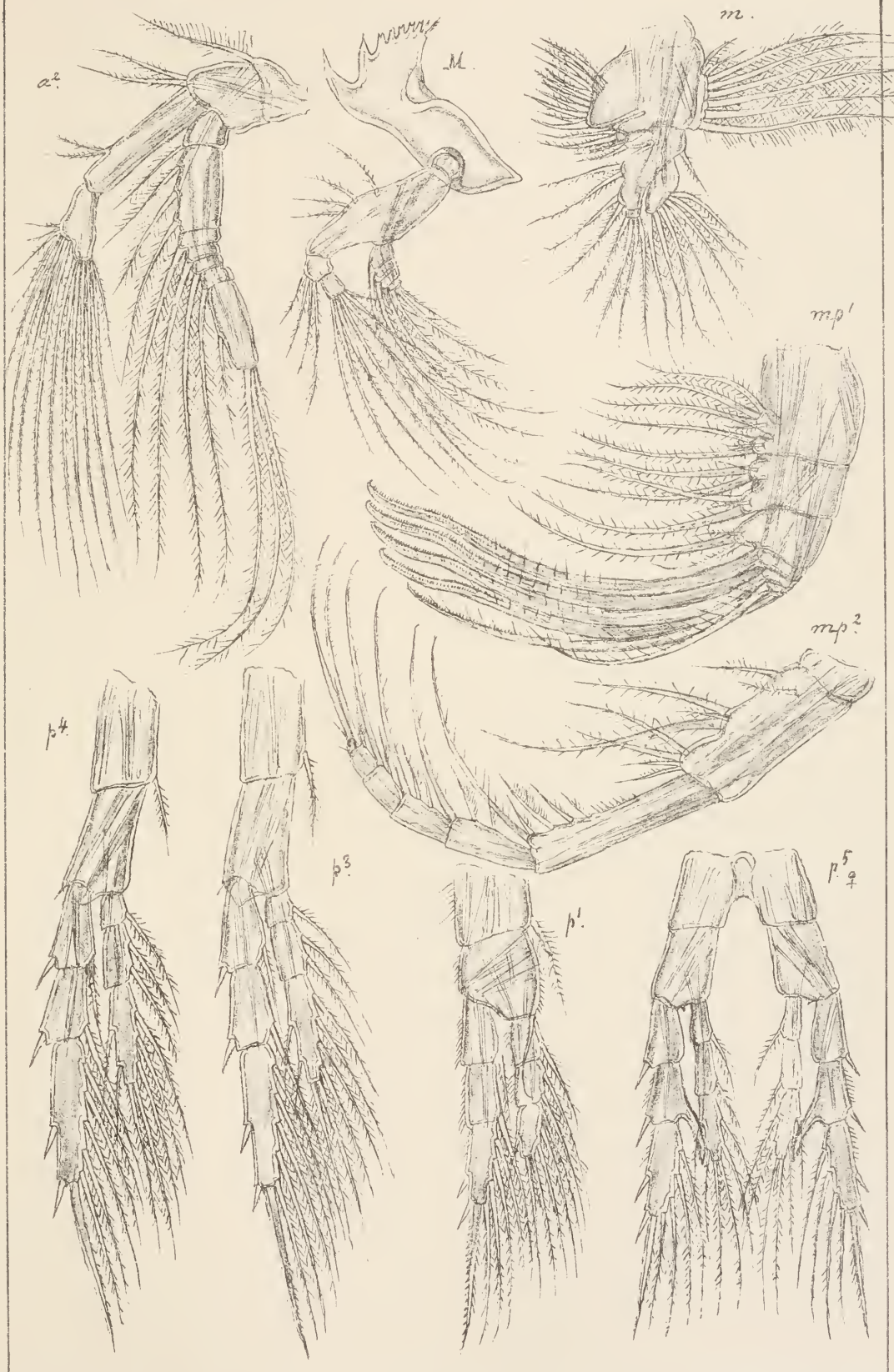
Isias clavipes, Boeck.

(continued.)



G O Sars autogr
Trykt i den private Opmaaling Chra

Limnocalanus macrurus, G.O.Sars..

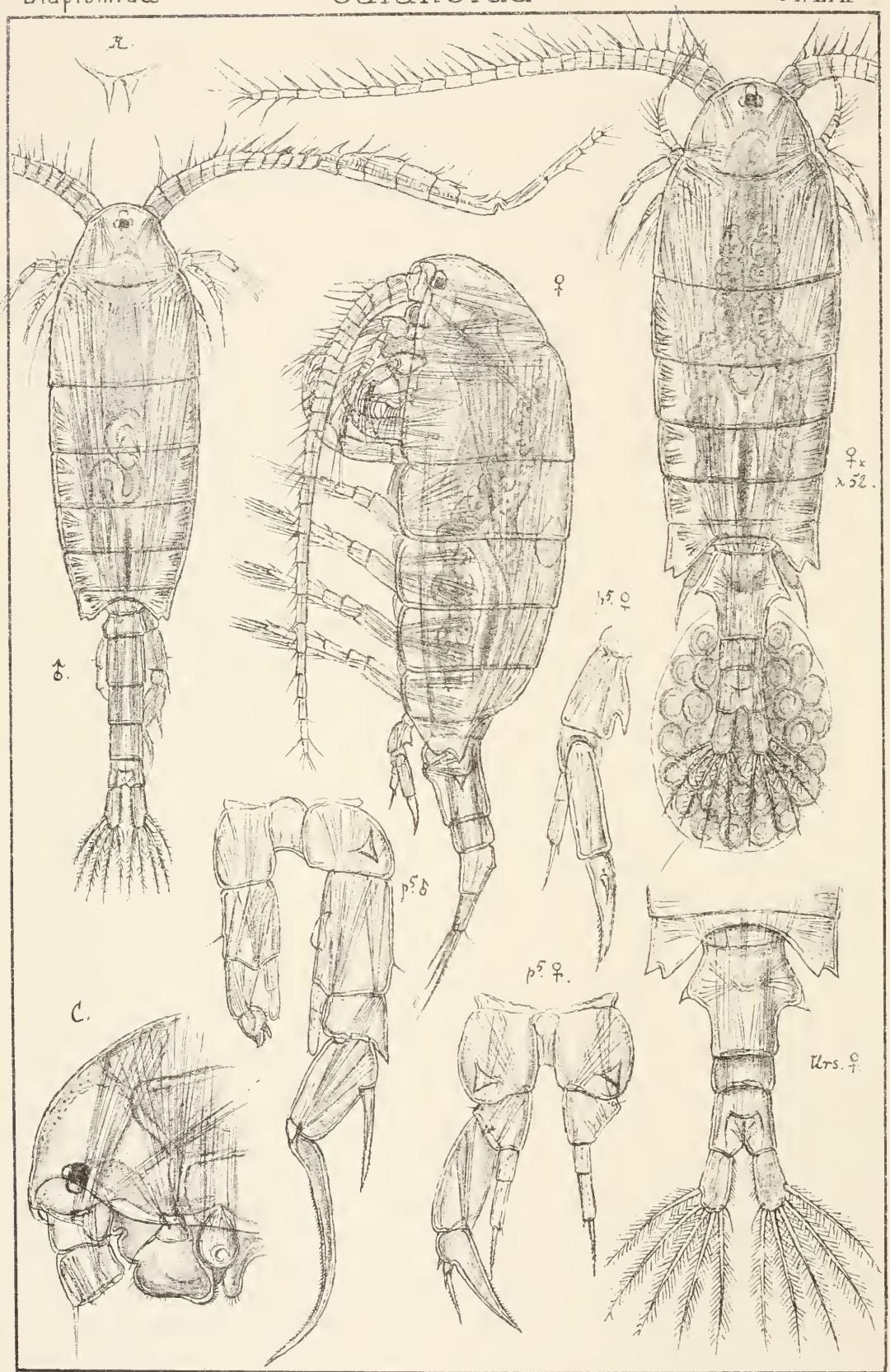


G O Sars autogr.

Trykt i den private Opmaaling Chra

Limnocalanus macrurus, G. O. Sars.
(continued.)

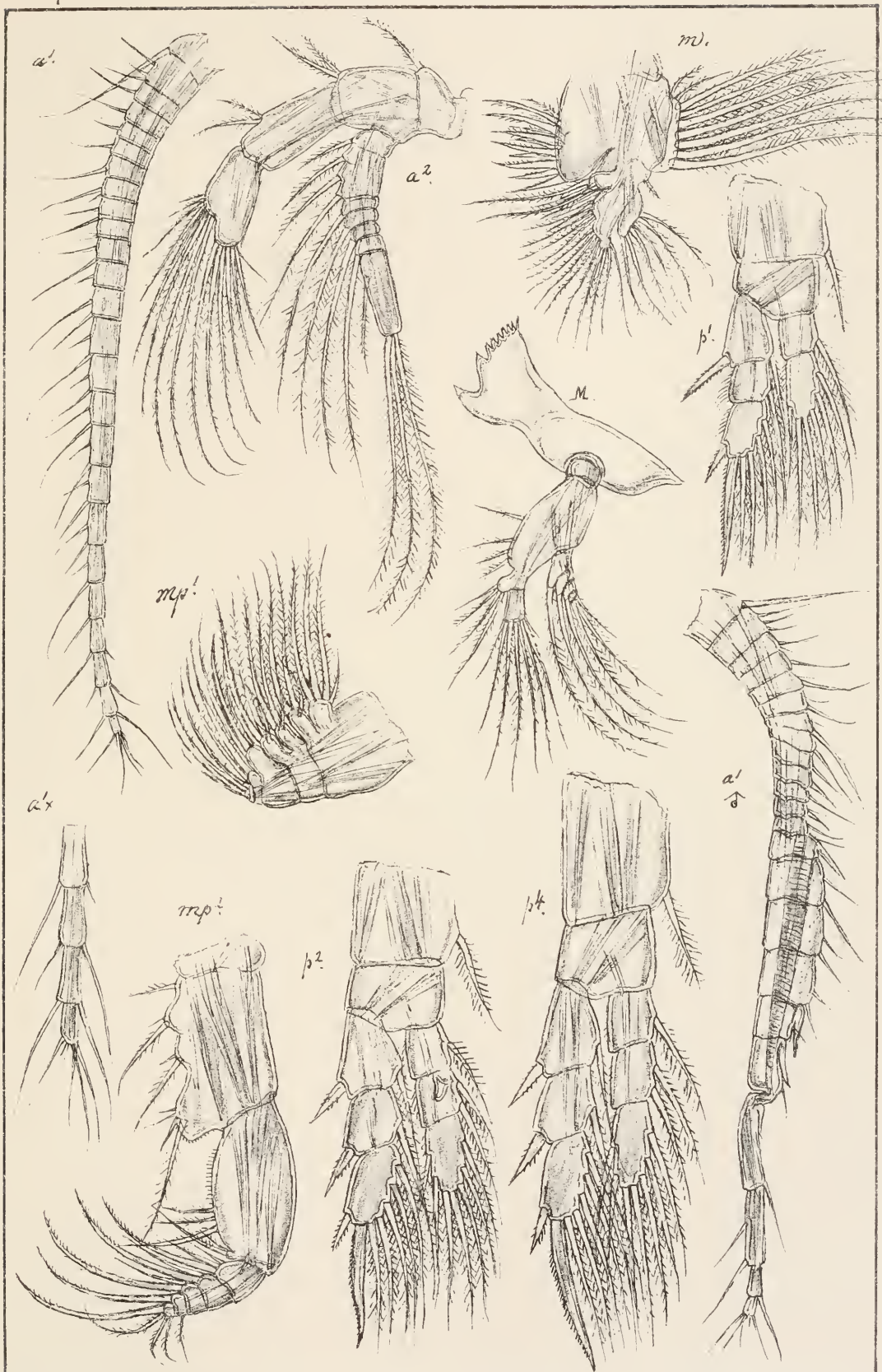
Copepoda
Calanoida



G.O Sars autogr.

Trykt i den private Opmaaling, Chra

Diaptomus castor (Jurine.)

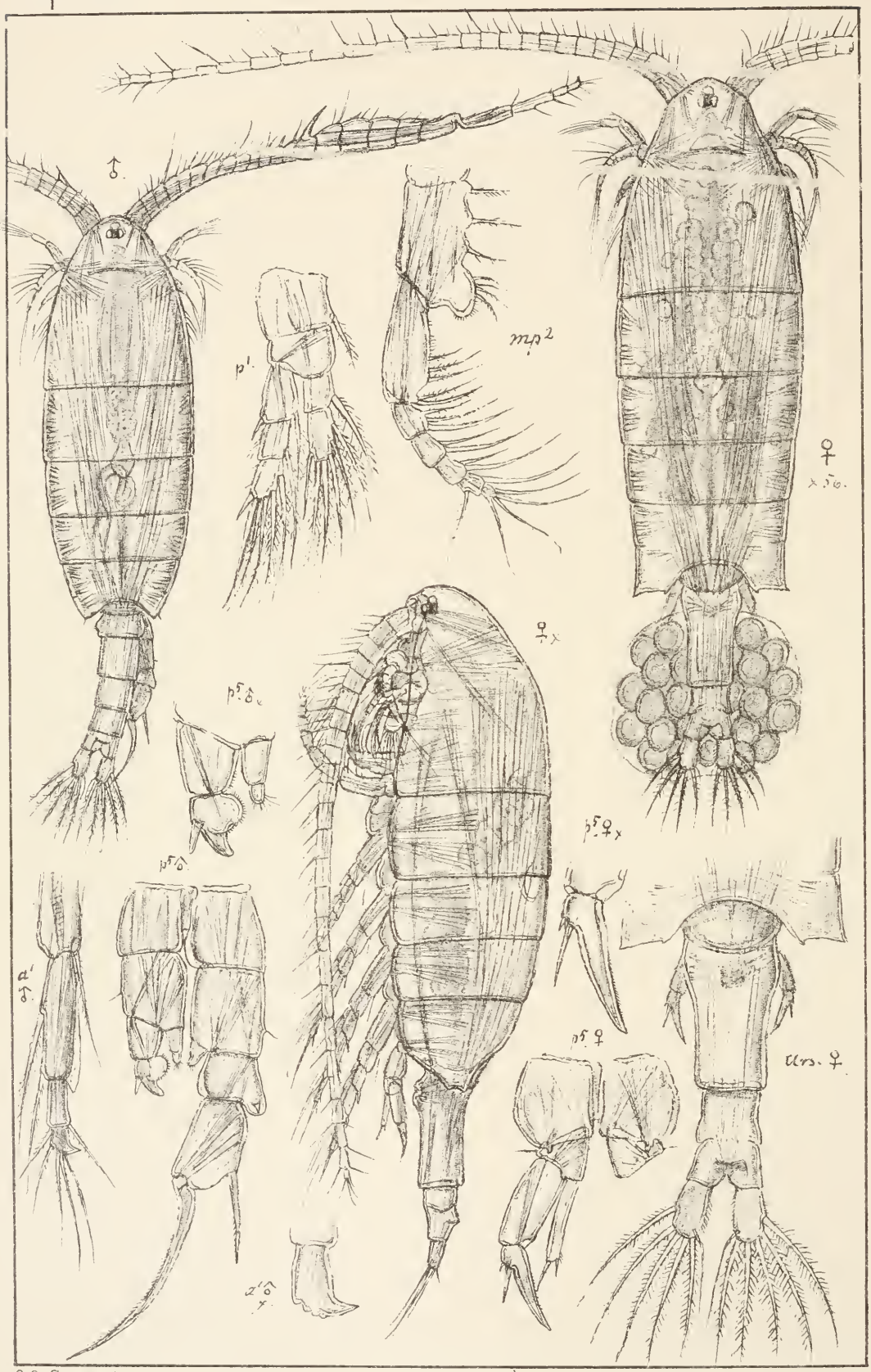


G O Sars autogr. Trykt i den private Opmaaling, Chra.

Diaptomus castor (Jurine.)
(continued.)

Copepoda

Diaptomidæ — Calanoida — Pl. LIX.



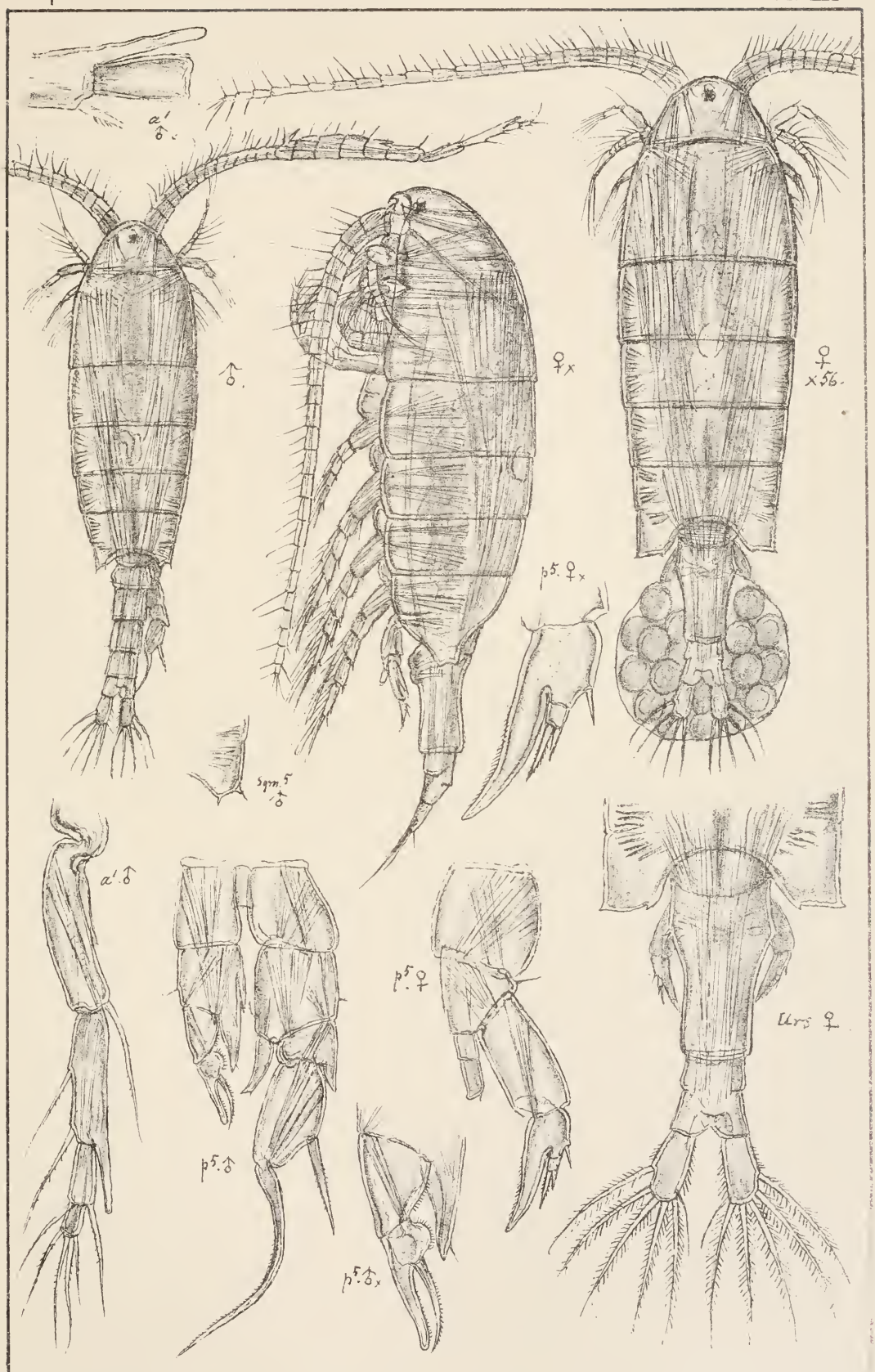
G O Sars autogr

Trykt i den private Opmaaling, Chra

Diaptomus denticornis, Wierzejski

Copepoda

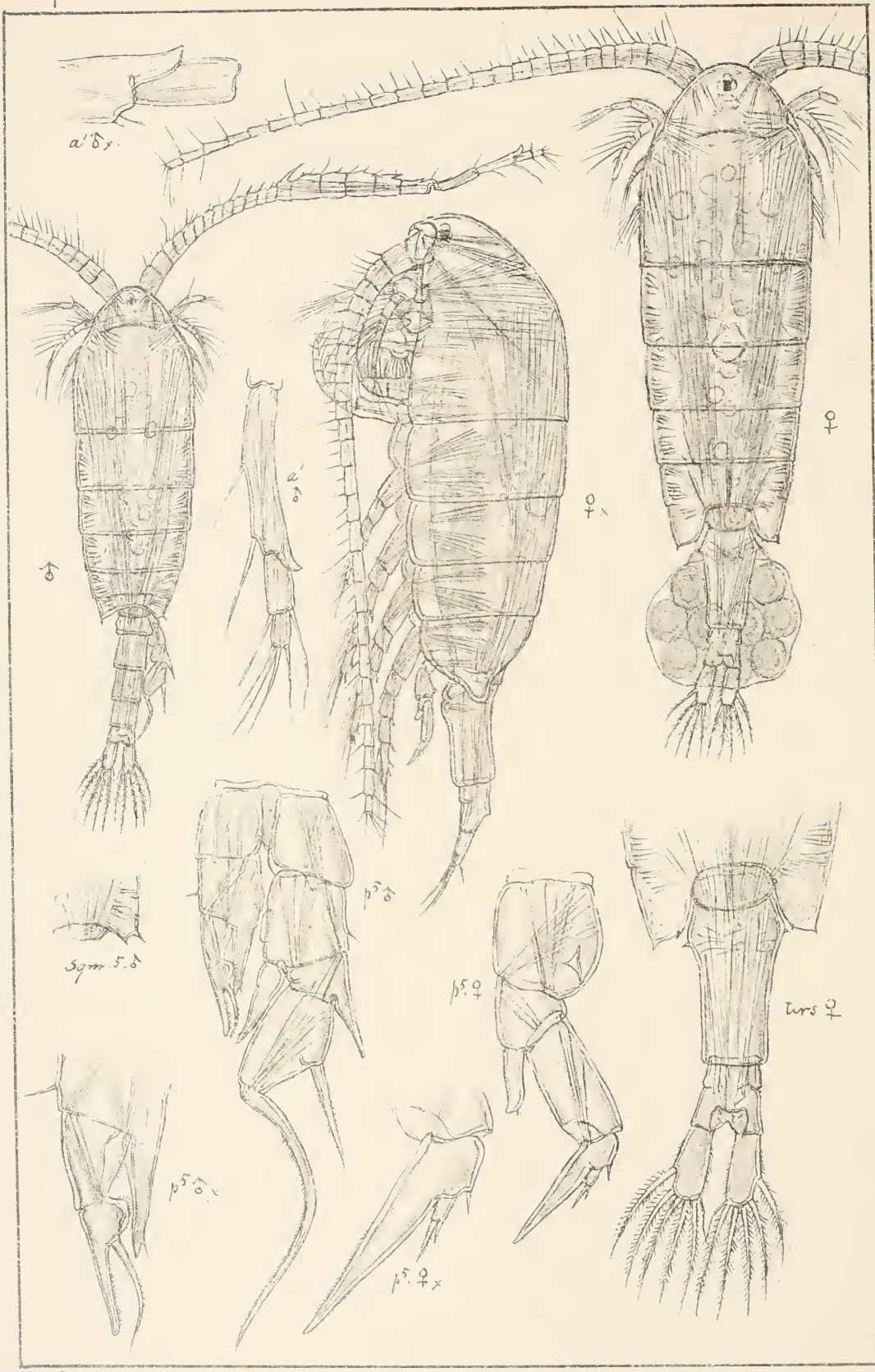
Diaptomidæ — Calanoida — PI. LX



G O Sars autogr

Diaptomus bacillifer Koelbel

Copepoda
Calanoida



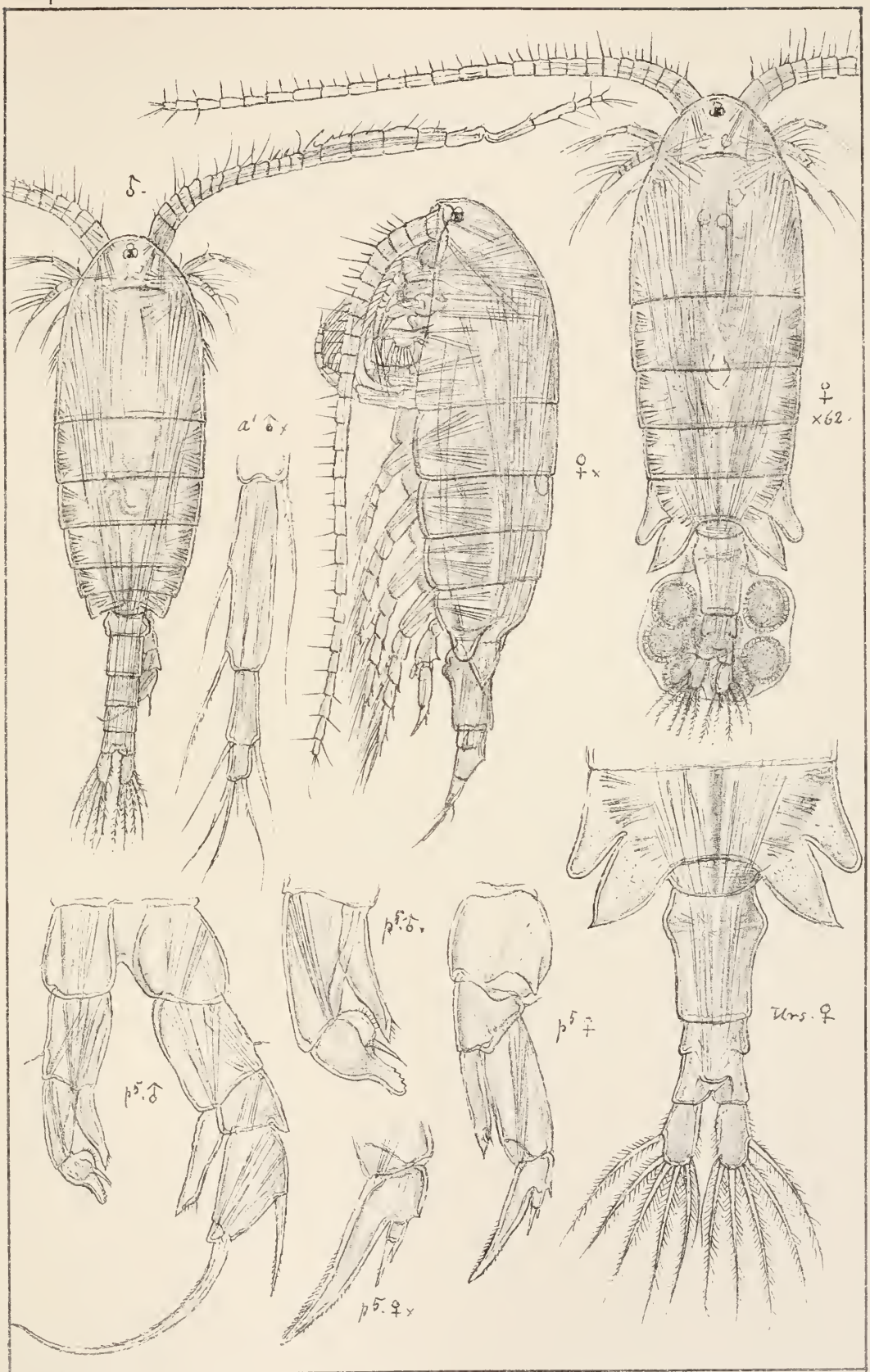
G. O. Sars autogr.

Trykt i den private Opmaaling, Chra

Diaptomus laticeps, G. O. Sars.

Copepoda

Diaptomidæ — Calanoida — Pl. LXII



G O Sars autogr

Trykt i den private Opmaaling Chra

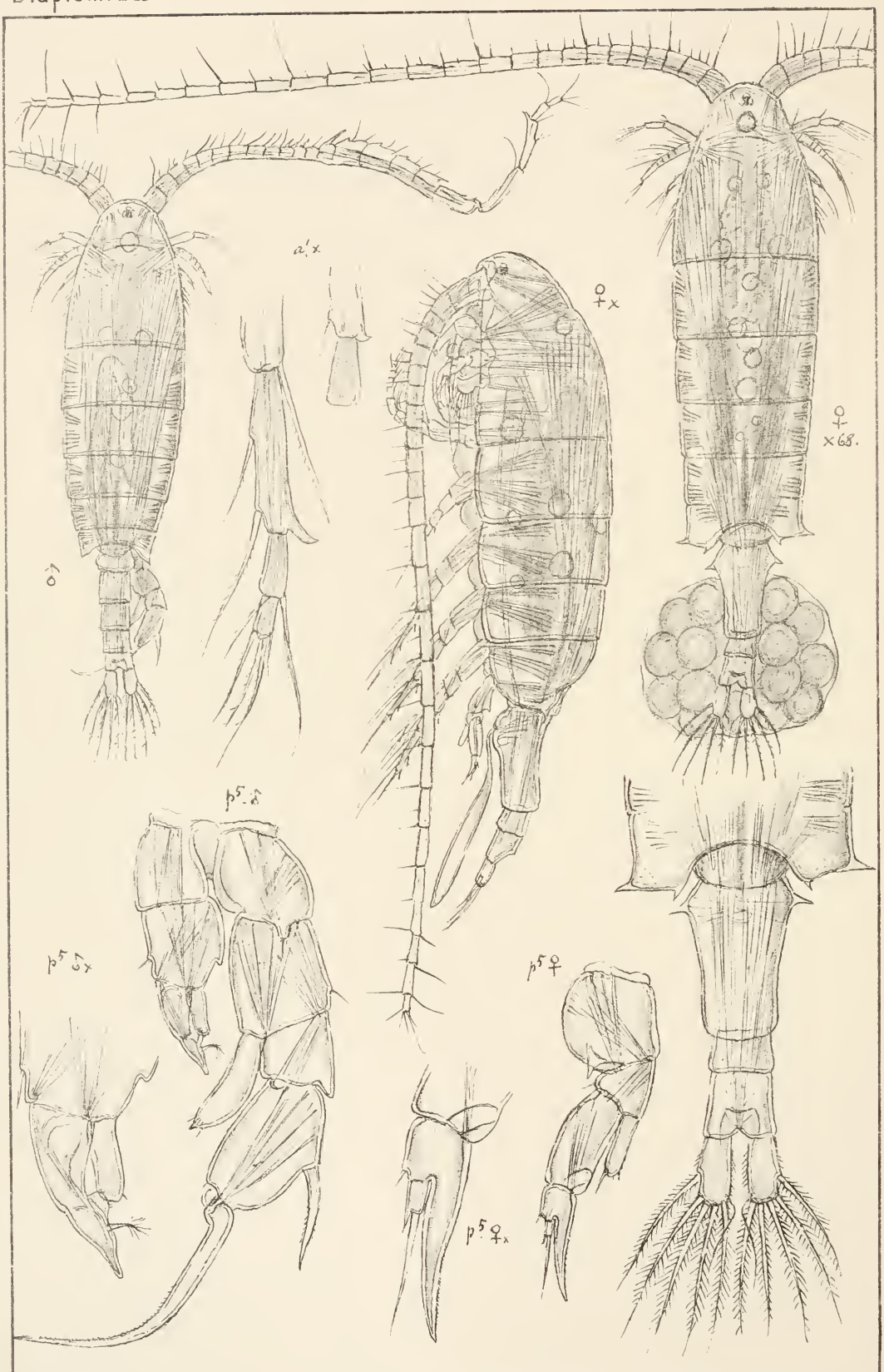
Diaptomus laciniatus, Lilljeb.

Copepoda

Calanoida

Diaptomidæ

Pl. LXIII



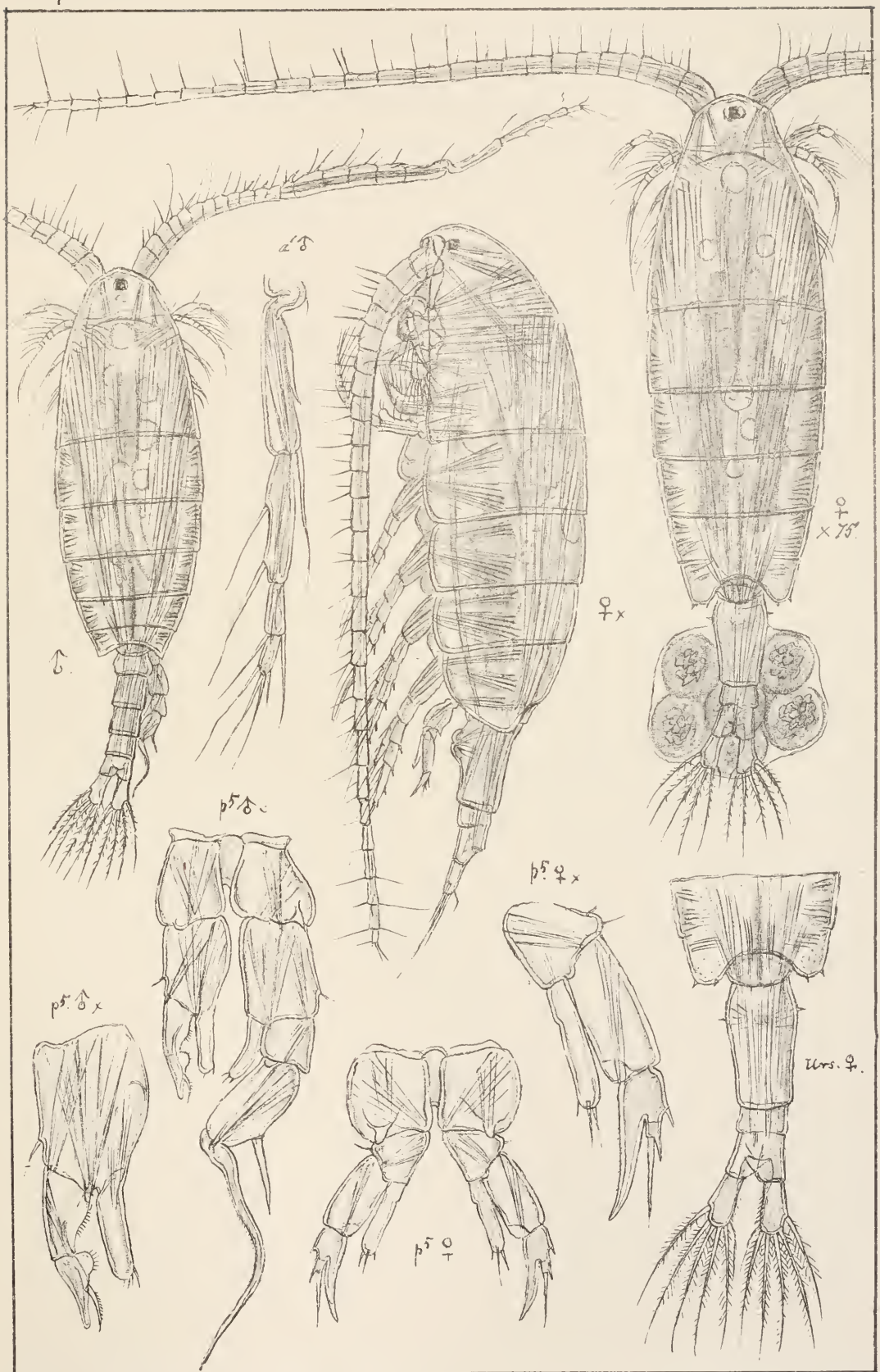
G O Sars autogr

Trykt i den private Opmaaling. Chra

Diaptomus gracilis G.O. Sars.

Copepoda

Diaptomidæ — Calanoida — Pl. LXIV.



G O Sars autogr

Tryktiden private Opmaaling. Chra

Diaptomus graciloides, Lilljeb