AN ACCOUNT

OF THE

CRUSTACEA

OF

NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

G. O. SARS

VOL. V

COPEPODA

HARPACTICOIDA

PARTS XXVII & XXVIII

CLETODIDÆ (concluded), ANCHORABOLIDÆ,
GYLINDROPSYLLIDÆ, TACHIDIIDÆ (part)

WITH 16 AUTOGRAPHIC PLATES

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201. Huntemannia jadensis, Poppe.

(Pl. CCIX).

Huntemannia jadensis. S. A. Poppe, Die freilebenden Copepoden des Jadebusens. Abhandl. d. naturw. Vereins zu Bremen, Bd. IX, p. 201, Pl. VII, figs. 10—23.

Specific Characters.—Female. Body not very slender, but gradually tapering from front to back, without any sharp demarcation between the two divisions, hind edges of the segments finely denticulate. Cephalic segment nearly as long as the 4 succeeding segments combined, and produced in front to a narrow conical rostral projection clothed at the somewhat blunt tip with fine hairs. Last pedigerous segment scarcely smaller than the preceding one. Urosome much shorter than the anterior division, and tapering rapidly behind, last segment somewhat bulging at the end, with the anal opercle perfectly smooth. Caudal rami about the length of the anal segment, and of nearly equal width throughout, extending straight backwards, each produced at the end to a strong flattened spine of about the same length as the ramus itself, and slightly bent outwards at the tip, being accompanied outside by a short denticle, inside by a spiniform seta arising from a knob-like prominence; outer edge of the ramus with 2 short setæ near the base, dorsal face with another seta issuing from about the middle. Anterior antennæ much shorter than the cephalic segment, 5-articulate, 1st joint very large and broad, about the length of the 2 succeeding joints combined, terminal part scarcely longer than 3rd joint, though composed of 2 well-defined joints. Posterior antennæ with the terminal joint shorter than the basal one, and gradually widening distally, being armed with 5 strong blunt spines, inside which is a short seta accompanied by a number of small spinules, outer ramus attached near the end of the basal joint in the form of a small lamella carrying 4 setæ. 1st pair of legs remarkably short and stout, with the 1st basal joint dilated in a peculiar manner, forming a lamellar expansion covering over the succeeding joint in front, outer ramus distinctly 3-articulate, with the joints successively diminishing in size, last joint very short and armed at the end outside with 2 somewhat unequal spines accompanied by 2 setæ, the inner of which is much the longer; inner ramus consisting of a single rather coarse joint tipped with 2 short, blunt spines. The 3 succeeding pairs of legs comparatively small, outer ramus composed of only 2 joints defined by an oblique suture, the distal one spatulate in form and carrying at the end from 5 to 6 long setæ assuming outside gradually the character of slender spines; inner ramus much reduced, especially on the posterior pairs, forming a small nodiform joint tipped with a slender seta. Last pair of legs comparatively small, distal joint short, lamelliform, edged with 5 short setæ; inner expansion of proximal joint rounded,

with 5 similar setæ. Ovisacs oval pyriform in shape, and projecting on each side beyond the lateral edges of the urosome.

Colour not yet ascertained.

Length of adult female 0.96 mm.

Remarks.—This form was described by Poppe in the above-quoted paper as the type of a new Copepod-genus, but its systematic place within the group Harpacticoida was not discussed by that author. Th. Scott, in his List of Crustacea of the Clyde area, places it next to *Platychelipus littoralis* Brady. It is an easily recognisable form, which cannot be confounded with any of the other Harpacticoida.

Occurrence.—The only place where I have met with this peculiar Copepod, is in the immediate neighbourhood of Trondhjem, 2 or 3 female specimens having been taken there, many years ago, from shallow tidal pools on the flat, sandy beach east of the town. Canon A. M. Norman has kindly sent me some specimens taken by him, apparently in the very same place.

Distribution.—Jade Bay, on the North Sea coast of Germany (Poppe). Scottish coast (Scott).

Gen. 65. **Nannopus**, Brady, 1880.

Syn: *Ilyophilus*, Lilljeborg.

Generic Characters.—Body comparatively stout, with no sharply marked boundary between the anterior and posterior divisions, all the segments sharply marked off from each other. Cephalic segment large, and produced in front to a lamellar rostral projection not defined behind. Urosome tapered behind, with the genital segment in female distinctly subdivided. Caudal rami comparatively narrow, with one of the apical setæ very strong, spiniform. Anterior antennæ short and thick, 5-articulate and thickly clothed with coarse diverging setæ. Posterior antennæ strongly built and armed at the tip with strong claw-like spines, outer ramus short, uniarticular, attached near the end of the proximal joint. Oral parts somewhat resembling in structure those in the genus *Huntemannia*. Natatory legs short and stout, with the outer ramus distinctly triarticulate, inner ramus much shorter than the outer, and in the 3 anterior pairs biarticulate, in the 4th pair very small, uniarticulate; 1st pair only slightly differing in structure from the 2 succeeding pairs. Last pair of legs, with the distal joint small, in some

cases confluent with the proximal one, inner expansion of the latter not produced. A single ovisac present in female.

Remarks.—This genus was established in the year 1880 by Prof. Brady, to include a peculiar Copepod, *N. palustris*, found by him off the British coast. It was described and figured, but very imperfectly, in his well-known Monograph, and was considered the type of a separate sub-family *Nannopinæ*, to which he also referred a 2nd genus, viz. *Platychelipus*. As stated above, the latter genus ought to be included in the family, *Laophontidæ*, and I find no reason for excluding the present genus from the family *Cletodidæ*, exhibiting, as it does, all the essential features of that family. Its nearest ally seems to be the genus *Huntemannia*, from which however it differs pronouncedly in the structure of the legs and in the presence of only a single ovisac in the female. The genus *Hyophilus* of Lilljeborg is identical with Brady's genus. It contains as yet 2 well defined species, one of which belongs to the fauna of Norway, the other, *N. perplexus* G. O. Sars, being found in the great lake Tanganyika of Central Africa.

202. Nannopus palustris, Brady.

(Pl. CCIX).

Nannopus palustris, Brady, Monograph of British Copepoda, Vol. II, p. 101, Pl. LXXVII, figs. 18—20.

Syn: *Hyophilus flexibilis*. Lilljeborg.

Specific Characters.—Female. Body very flexible with rather thin integuments, and gradually tapering behind, all segments marked off from each other by deep constrictions, and fringed at the posterior edge with fine spinules. Cephalic segment rather expanded and occupying nearly half the length of the anterior division, rostral plate broadly rounded at the end and densely fringed with delicate cilia; lower edges of the segment likewise finely ciliated. Epimeral plates of the 3 succeeding segments rounded off. Last pedigerous segment, as usual, without distinct epimeral plates. Urosome somewhat exceeding half the length of the anterior division, last segment longer than the preceding one, and slightly produced at the end between the caudal rami, anal opercle small and perfectly smooth. Caudal rami about twice as long as they are broad, and scarcely divergent, each with a slender bristle at about the middle of the outer edge, middle apical seta about half the length of the urosome, and somewhat dilated in its proximal part, which is produced outside to a dentiform projection. Eye rather large and conspicuous in the living animal, and of light red colour. Anterior antennæ about half the length of the cephalic segment, and gradually tapering

distally, 1st joint much the largest and very thick, 3rd joint shorter than 2nd, terminal part about half the length of the proximal one, with its 1st joint very small. Posterior antennæ with the terminal joint shorter than the proximal one and spatulate in form, being armed at the tip with 4 strong, claw-like spines: outer ramus somewhat lamellar and carrying on the tip 4 subequal setæ. Mandibular palp comparatively large, with 4 coarse plumose setæ. Anterior maxillipeds with the digitiform lobes rather short and thick. Posterior maxillipeds of moderate size, hand narrow oblong in form and densely ciliated inside, dactylus armed at the inner edge with a row of slender spinules. Natatory legs coarsely spinulose, with the setæ much reduced; spines of outer ramus however very coarse. Last pair of legs with the distal joint well defined and short spatulate in form, carrying 5 marginal setæ, 2 of which are very thin, the other 3 strong and densely plumose: proximal joint with a transverse row of 4 coarse spinules at the junction with the distal joint, its inner expansion not at all produced, the hind edge being almost straight and provided with 4 coarse plumose setæ. Ovisac of moderate size, rounded oval in form.

Colour reddish brown.

Length of adult female 0.70 mm.

Remarks.—The above-described form is undoubtedly identical with that recorded by Lilljeborg as *Hyophilus flexibilis*. This author considered it to be both specifically and generically different from *Nannopus palustris* of Brady, and I was at first of the same opinion myself. Seing however that Dr. Canu, in his work on the Copepoda of Boulonnais, has described the very same form under the name of *Nannopus palustris* Brady, I have again carefully compared the imperfect description and figures given in Brady's Monograph, and have thereby been induced to believe that in all probability the identification of the species by Dr. Canu will prove to be correct. The habitus-figure given by Brady (dorsal view of the animal) has apparently been made from a mounted specimen in which, by the pressure of the cover-glass, the form of the body has been somewhat injured. The 2 detail-figures (a leg of the 1st and 4th[1]) pairs) do not, on the other hand, exhibit any essential difference from the structure found in the present form.

Occurrence.—I have only met with this form in a single locality near Christiania. It occurred there occasionally in a shallow creek of the Fjord, on a muddy bottom close to the shore. As observed by Prof. Lilljeborg, the movements of the animal are very slow, and it seems to be quite devoid of

[1]) Not the 3rd pair, as indicated both in the text and in the explanation of the plate.

swimming power, as might also be guessed from the imperfect development of the natatory setæ on the legs.

Distribution.—British Isles (Brady), coast of France (Canu), shores of the Baltic near Stockholm, and occasionally in fresh water (Lilljeborg).

Gen. 66. **Pontopolites,** Scott 1894.

Generic Characters.—Body short and stout, sub-cylindrical in form, with the segments less sharply marked off from each other than in most other Cletodidæ. Cephalic segment of moderate size, and produced in front to a comparatively small rostral projection. Urosome scarcely at all attenuated behind, genital segment in female imperfectly subdivided; caudal rami short and thick. Anterior antennæ short, 5-articulate, and clothed with slender setæ, some of which are ciliated; those in male strongly hinged. Posterior antennæ moderately strong, outer ramus biarticulate and attached near the base of the proximal joint. Mandibular palp slender, biarticulate, with a slight rudiment of an outer ramus. Maxillæ and maxillipeds normal. 1st pair of legs differing conspicuously from the 3 succeeding pairs, inner ramus well developed, extending beyond the outer, and biarticulate. Inner ramus of the 3 succeeding pairs very small, uniarticulate. Last pair of legs with the distal joint quite confluent with the proximal one, both forming together a broad transverse lamella fringed behind with long setæ. A single ovisac present in female.

Remarks.—This genus, established by Th. Scott, differs somewhat, it is true, from the other Cletodidæ, both as regards the outward appearance of the body and the structure of some of the appendages. I think, however, that it will more properly find its place in the present family, as the antennæ and legs are built essentially upon the same type as in the other members of this family. It contains as yet only a single species, to be described below.

203. Pontopolites typicus, Scott.

(Pl. CCX).

Pontopolites typicus, Th. Scott, Additions to the Fauna of the Firth of Forth. Twelfth Ann. Rep. of the Fishery Board for Scotland. Part III, p. 251, Pl. VIII, figs. 9—17.

Specific Characters.—Female. Body very short and compact, of nearly uniform width throughout, all the segments quite smooth. Cephalic segment

nearly as long as the 4 succeeding segments combined, rostral projection triangular, acute at the tip. Epimeral plates of the 3 succeeding segments rounded off. Last pedigerous segment rather short, but scarcely narrower than the preceding segment. Urosome a little shorter than the anterior division, genital segment about the length of the 2 succeeding segments combined, and somewhat protuberant below, last segment much larger than the preceding one, and having the anal opercle rather small and perfectly smooth. Caudal rami very thick at the base and tapering somewhat distally, each with 2 successive bristles on the outer edge, the distal one unusually long and slender, extending generally straight outwards: middle apical seta of normal structure, and scarcely longer than the urosome. Anterior antennæ about half the length of the cephalic segment, the 3 joints of the proximal part of about equal size, terminal part scarcely longer than the last joint of the proximal, and having some of the setæ rather strong and distinctly ciliated. Posterior antennæ with the distal joint a little shorter than the proximal, and gradually widening towards the end; outer ramus comparatively small, with the distal joint quite short. 1st pair of legs with the joints of the outer ramus of nearly equal size, the last one armed with 2 spines and 2 slender geniculate setæ; inner ramus fully as long as the outer, proximal joint rather broad, with a slender seta inside, distal joint a little longer and much narrower, carrying on the tip a strong claw-like spine and a slender seta. The 3 succeeding pairs of legs with the terminal joint of the outer ramus much produced, being about as long as the 2 preceding joints combined, and armed with 3 strong spines and a small apical seta, inner edge of the joint in the 2nd and 3rd pairs carrying a single seta near the base, in the 4th pair 2 setæ, middle joint in this pair with another seta inside, which is wanting in the other pairs. Inner ramus in 2nd to 4th pairs very small, with a single apical spine; that of 4th pair quite rudimentary. Last pair of legs forming each an obliquely transverse plate fringed with 10 slender setæ, the outermost one attached to a knob-like prominence.

Male, as usual, smaller than female, and having the anterior antennæ very strongly hinged, 6-articulate. Inner ramus of 2nd and 3rd pairs with the apical spine comparatively longer than in female. Last pair of legs of somewhat smaller size, but otherwise of much the same structure as in the female.

Colour whitish grey.

Length of adult female 0.53 mm.

Remarks.—This form may be easily recognized by its short, stout, cylindrical body, and by the thick caudal rami, with the very slender bristle springing from their outer edge.

Occurrence.—I have met with this small Copepod occasionally at Farsund, and more frequently at Korshavn, near Lindesnæs, the southernmost point of Norway. It occurs in moderate depths, ranging from 6 to 20 fathoms.

Distribution.—Scottish coast (Scott).

Fam. 15. Anchorabolidæ.

Characters.—Body slender, tapering behind, with no sharply marked boundary between the anterior and posterior divisions. All the segments very sharply defined and, excepting the last 2 or 3, produced to peculiar horn-like projections, either dorsal or lateral, or both dorsal and lateral, cephalic segment somewhat flattened in front, with the antero-lateral corners generally produced, rostral projection of varying shape in the different genera, in some cases wanting. Genital segment imperfectly subdivided in female. Caudal rami long and slender, with one of the apical setæ much elongated. Eye wholly absent. Anterior antennæ with the number of joints much reduced, terminal part (in female) uniarticulate. Posterior antennæ without any trace of an outer ramus. Oral parts poorly developed, but on the whole of normal structure. Natatory legs slender and projecting more or less laterally, 2nd basal joint obliquely produced; 1st pair generally differing in structure from the others, but never prehensile. Last pair of legs with the distal joint long and slender, proximal joint generally produced outside to a long narrow process tipped with a slender bristle. A single ovisac present in female.

Remarks.—The present new family, the type of which is the remarkable Copepod, *Anchorabolus mirabilis*, described by Norman, in some respects strongly resembles the genus *Laophontodes* among the *Laophontidæ*. The structure of the 1st pair of legs, however, is very different, and agrees better with that in the *Cletodidæ*, where they are not prehensile at all. The remarkable armature of the body is another character distinguishing the present family very conspicuously from most other Harpacticoida. In addition to the typical species described by Norman, 3 other forms will be described below, each of them exhibiting a very characteristic armature of the body, and also differing so much in other particulars from each other and from the type, that I have felt justified in regarding them as types of as many separate genera.

Gen. 67. **Anchorabolus,** Norman. 1903.

Generic Characters.—Body armed with numerous horn-like, partly branched processes curving backwards, and forming several rows, dorsal, sub-dorsal and lateral. Rostral projection well defined, narrow linear. Anterior antennæ in female composed of only 3 joints, in male 5-articulate and distinctly hinged. Posterior antennæ with the distal joint very slender, linear. Mandibular palp small, uniarticulate. Posterior maxillipeds very slender. 1st pair of legs differing conspicuously in structure from the succeeding ones, both rami biarticulate, the inner one being the longer. Inner ramus of the 3 succeeding pairs much smaller than the outer, but distinctly biarticulate, 1st joint very short, 2nd narrow linear: outer ramus slender, 3-articulate. Inner ramus of 2nd pairs of legs in male slightly transformed. Last pair of legs with a well-defined setiferous expansion inside the proximal joint, wanting, however, in male.

Remarks.— This is the typical genus from which the present family has been named It differs conspicuously from the 3 other genera treated of below, in the armature of the body, as also in the structure of some of the appendages. Only a single species is known to me, but Mr. Norman mentions having also observed a second species of the present genus.

204. Anchorabolus mirabilis, Norman.

(Pl. CCXI).

Anchorabolus mirabilis, Norman. Notes on the Nat. Hist. of East Finmark. Ann. & Mag. Nat. Hist. Ser. 7, Vol. XI. pag. 2.

Specific Characters.—Female. Body comparatively slender, sub-linear in form, though at first sight appearing rather broad, on account of the numerous processes flanking it both dorsally and laterally. Cephalic segment scarcely longer than the 2 succeeding segments combined, and slightly contracted in front, anterior edge almost transversely truncated, though projecting in the middle in a narrow horizontal rostrum minutely bifid at the tip, and provided on each side with a knob-like projection tipped with a small hair: antero-lateral corners of the segment produced to a short spine pointing straight outwards; dorsal face carrying 2 pairs of horn-like, posteriorly-curving processes, the anterior one simple, the posterior trifid. On each side of this segment, moreover, 3 successive processes are seen, the 2 anterior ones lateral and bifurcate, the posterior one sub-dorsal and tripartite. Each of the 4 succeeding segments provided with one pair of dorsal processes, one pair of sub-dorsal, and one pair of lateral, the dorsal

and lateral processes being simple, the sub-dorsal bifurcate, except in the last segment. Urosome, including the caudal rami, almost as long as the anterior division and without any dorsal processes, but with 3 successive pairs of simple lateral and sub-dorsal processes of considerable length and curving abruptly backwards. All the processes minutely denticulate in their outer part. Last caudal segment rather small, with the anal opercle smooth. Caudal rami considerably produced, exceeding half the length of the urosome, and very narrow, each exhibiting at about the middle of the outer edge a slender bristle, middle apical seta exceeding half the length of the body. Anterior antennæ rather slender, being fully as long as the cephalic segment, 2nd joint slightly exceeding the 1st in length, but much narrower and (in some specimens) provided near the base posteriorly with a short incurved dentiform projection; terminal joint shorter than the 2nd, and linear in form. Posterior antennæ with the distal joint longer than the proximal one, the latter carrying 2 small setæ anteriorly. Posterior maxillipeds very slender, hand sublinear in form, dactylus long and setiform. 1st pair of legs with the inner ramus nearly twice as long as the outer, distal joint scarcely more than $^1/_3$ as long as the proximal one, and carrying on the tip 2 slender setæ, and inside them a small spine; distal joint of outer ramus armed with 3 slender spines and 2 geniculate setæ. Inner ramus of the 3 succeeding pairs scarcely half as long as the outer, and narrow linear in form, carrying on the tip 2 or 3 slender setæ; outer ramus with the spines of the outer edge very long and slender, terminal joint without any setæ inside. Last pair of legs with the distal joint linear in form, and edged with 5 setæ, 2 on the outer edge, 2 on the tip, and 1 on the inner edge, inner apical seta much the longest; proximal joint with the digitiform process exceedingly long and slender, inner expansion about half the length of the distal joint and rather narrow, carrying 4 setæ of moderate length. Ovisac broadly rounded and somewhat flattened.

Male, as usual, smaller than female, and with the anterior antennæ distinctly hinged, 5-articulate, 3rd joint slightly dilated, last joint claw-like. Inner ramus of 2nd pair of legs armed at the tip, with a somewhat flexuous claw-like spine in addition to the setæ. Last pair of legs much smaller than in female, one of the setæ wanting on the outer edge of the distal joint, proximal joint without any expansion inside.

Colour whitish grey.

Length of adult female 0.78 mm.

Remarks.—This form was described, but not figured, by Norman, from specimens collected off the Finmark coast, and its resemblance to the species

of the genus *Laophontodes* was noted, as also its material difference from those species as regards the structure of the 1st pair of legs.

Occurrence.—I have been long acquainted with this remarkable form, which I have come across in many different places on the Norwegian coast, though always quite by chance. It is found in depths ranging from 16 to 30 fathoms and, as noted by Norman, generally in places where otherwise animal life proves to be very scanty. The specimens are generally so thickly covered with muddy particles adhering to the numerous curved processes of the body, that it is rather difficult at first sight to obtain a correct idea of their true forms and wonderful armature. They move through the water in a somewhat jerky manner, and never for long together.

Distribution.—Scottish coast, at Cumbrae (Norman).

Gen. 68. Echinopsyllus, G. O. Sars, n.

Generic Characters.—Body provided with dorsal and lateral projections, but wanting a sub-dorsal series. Rostrum very small, but well defined. Anterior antennæ in female distinctly 4-articulate; posterior antennæ about as in *Anchorabolus*. Oral parts resembling in structure those ist the said genus: posterior maxillipeds, however, less slender. 1st pair of legs of nearly the same structure as the 3 succeeding ones, inner ramus in all pairs very small and rudimentary, uniarticulate. Last pair of legs without any inner expansion of the proximal joint, digitiform process of this joint very slender and elongated.

Remarks.—This new genus differs very conspicuously from *Anchorabolus*, both as regards the armature of the body and the structure of some of the appendages; yet it exhibits an unmistakable general affinity to that genus, so that it ought undoubtedly to be included in the same family.

205. Echinopsyllus Normani, G. O. Sars, n. sp.

(Pl. CCXII).

Specific Characters.—*Female.* Body comparatively slender, rapidly tapering behind, with the segments sharply defined. Cephalic segment rather large, fully as long as the 3 succeeding segments combined, and produced on each side in 2 successive acuminate processes of considerable size and pointing straight outwards, antero-lateral corners conically produced, as in *Anchorabolus;* dorsal face exhibiting

in the middle a deep transverse depression partly covered by 2 peculiar horn-like hairy processes arising from the anterior part of the segment and curving abruptly backwards; posterior part of the dorsal face armed with 2 small juxtaposed prominences. Rostrum very small, terminating in 2 juxtaposed knob-like prominences, each tipped with a delicate hair. The 4 succeeding segments without any lateral projections, but each armed with a pair of simple erect dorsal processes. Urosome rather narrow and shorter than the anterior division, anterior part of genital segment unarmed, posterior part, as also the succeeding segment, armed with 2 rather large and closely juxtaposed dorsal processes curving gently backwards. Last caudal segment about the size of the preceding one, anal opercle smooth. Caudal rami rather produced, exceeding in length the last 3 segments combined, and somewhat bent in the middle, where each carries outside a thin bristle, and somewhat dorsally another much larger bristle arising from a knob-like prominence; middle apical seta scarcely longer than the ramus itself. Anterior antennæ rather slender, being about the length of the cephalic segment, 1st and 3rd joints of nearly equal length, 2nd joint much shorter, terminal joint very narrow and not quite the length of the preceding joint. Posterior antennæ with the distal joint shorter than the proximal one. Posterior maxillipeds with the hand oblong oval in form, dactylus of moderate length and slightly curved in its outer part. 1st pair of legs resembling in structure the 3 succeeding pairs, but of somewhat smaller size, outer ramus triarticulate, though the boundary between the 2 last joints appears somewhat less sharply marked, middle joint without any seta inside, terminal joint with a slender spine and 3 still more slender geniculate setæ; inner ramus, as in the 3 succeeding pairs, quite rudimentary, with a single small seta on the tip. Outer ramus in these pairs well developed, with a seta inside the middle joint, terminal joint in all pairs smooth inside. Last pair of legs comparatively small, distal joint narrow linear, with 4 unequal setæ, inner edge smooth; proximal joint with a small bristle inside, but not forming any distinct expansion, digitiform process exceedingly long and narrow.

Male unknown.

Body of whitish colour, with a yellowish tinge.

Length of adult female 0.76 mm.

Remarks.—This is the only species of the genus as yet known, and it may be easily recognised by the peculiar and very conspicuous armature of the body. I have much pleasure in dedicating this extraordinary form to the well known distinguished naturalist, Canon A. M. Norman, to whom we are indebted for so many important contributions in nearly all branches of Zoology.

Occurrence.—I have as yet seen only 2 female specimens of this interesting form, the one taken at Farsund, the other at Korshavn, both localities on the south coast of Norway. It occurred in both places in a depth of about 20 fathoms, on a muddy bottom covered with decaying algæ.

Gen. 69. Ceratonotus, G. O. Sars, n.

Generic Characters.—Body armed with a double series of peculiar, highly chitinized dorsal processes, lateral and sub-dorsal processes wanting. Rostrum wholly absent. Anterior antennæ slender, 4-articulate, 1st joint much the largest. Posterior antennæ and oral parts about as in the preceding genus. 1st pair of legs differing conspicuously in structure from the 3 succeeding ones, both rami biarticulate and subequal in size. Inner ramus of the 4 succeeding pairs very small, uniarticulate. Last pair of legs comparatively simple, biarticulate, resembling in structure those in the genus *Laophontodes*.

Remarks.—This genus also is characterised by a most peculiar armature of the body, and moreover differs from the 2 preceding ones in the total absence of a rostrum, and also somewhat in the structure of the anterior antennæ and legs.

206. Ceratonotus pectinatus, G. O. Sars, n. sp.
(Pl. CCXIII).

Specific Characters.—Female. Body very narrow and slightly attenuated behind, with the segments somewhat less sharply defined than in the other species of the present family. Cephalic segment nearly as long as the 3 succeeding segments combined, and abruptly constricted anteriorly, frontal margin without any trace of a rostrum, being even slightly concave in the middle; antero-lateral corners produced each to a strong, minutely spinulose process, turned somewhat upwards; dorsal face armed behind the middle with a pair of very strong, horn-like processes diverging somewhat to each side, and exhibiting along the anterior edge a regular comb-like series of about 8 spinules gradually diminishing in size distally. Each of the 4 succeeding segments provided with a pair of similar dorsal processes. Urosome much shorter than the anterior division, and of nearly uniform width throughout, posterior part of genital segment armed with a pair

of dorsal processes similar to those on the anterior division, though a little smaller, the other segments unarmed; last segment shorter than the preceding one. Caudal rami slender and narrow, though not attaining the length of the 3 preceding segments combined, each with 2 successive bristles on the outer edge, middle apical seta rather strong, about the length of the urosome, including the caudal rami. Anterior antennæ comparatively slender, attaining the length of the cephalic segment, 1st joint much produced, occupying half the length of the whole antenna, 2nd joint small and imperfectly defined from the 3rd, terminal joint about the length of these joints combined. Posterior antennæ very slender, distal joint fully as long as the proximal one, and exhibiting near the end posteriorly 2 successive dentiform projections, spines of anterior edge unusually slender. Mandibular palp somewhat more fully developed than in the other species of this family, though uniarticulate. Posterior maxillipeds of moderate size, hand narrow oblong in form, dactylus slender and gently curved. 1st pair of legs with the inner ramus about the length of the outer, distal joint the longer and tipped with 2 very slender setæ, outer ramus with the spine of the proximal joint very long and narrow, distal joint armed with 2 slender spines and 3 still more slender curved setæ. Inner ramus of the 2 succeeding pairs consisting of a single very small joint tipped with a long seta and a small hair-like bristle; that of 4th pair quite rudimentary; outer ramus in these pairs with the spines unusually long and slender, middle joint with a seta inside, terminal joint in 2nd and 4th pairs with a similar seta, in 3rd pair with 2 such setæ. Last pair of legs forming each a simple, slightly curved, biarticulate stem projecting from each side of the last segment of the anterior division, and tipped with 3 subequal setæ, proximal joint shorter than the distal one, and provided on either side with a slender bristle.

Male unknown.

Colour not yet ascertained.

Length of the specimen examined 0.54 mm.

Remarks.—This form also exhibits a most extraordinary appearance, owing to the peculiar pectinate processes arising from the dorsal face of the body, a character which indeed has given rise both to the generic and specific names here proposed.

Occurrence.—A single female specimen of this remarkable form was found in a sample taken at Flekkerö, south coast of Norway, from a depth of about 12 fathoms, muddy bottom.

Gen. 70. Arthropsyllus, G. O. Sars, n.

Generic Characters.—Body without any dorsal or sub-dorsal processes, but flanked on each side by a uniform series of acutely produced lappets arising from the lateral parts of all the segments except the last 2. Cephalic segment rather broad, and produced in front to a broadly triangular rostral projection, antero-lateral corners rounded off. Anterior antennæ less slender than in the preceding genera, and in female composed of only 3 joints; those in male strongly hinged. Posterior antennæ likewise rather robust. Oral parts exhibiting the structure characteristic of the family. Natatory legs with the 2nd basal joint less produced than in the 3 preceding genera, 1st pair with both rami biarticulate and subequal in size. Inner ramus of the 3 succeeding pairs well developed, biarticulate, though shorter than the outer; that of 2nd pair slightly transformed in the male. Last pair of legs of normal appearance, with the distal joint slender and narrow, proximal joint with a well-defined setiferous expansion inside, wanting however in male.

Remarks.—This genus, like the 3 preceding ones, is based upon a single species, which in spite of the rather different external appearance of the body, in all anatomical details exhibits a near relationship to those genera, and more particularly to the typical genus, *Anchorabolus*. The generic name here proposed refers to the sharp demarcation of the segments, due to the acutely produced lateral parts.

207. Arthropsyllus serratus, G. O. Sars, n. sp.

(Pl. CCXIV).

Specific Characters.—Female. Body moderately slender and somewhat depressed, tapering gradually behind, with all the segments very sharply defined. Cephalic segment consparatively broad, and about the length of the 3 succeeding segments combined, rostral projection triangular, broad at the base and terminating in 2 small prominences, dorsal face of the segment smooth and slightly vaulted, antero-lateral corners evenly rounded, lateral edges each exhibiting beyond the middle a small notch, and behind it produced to an acute lappet pointing obliquely backwards. Each of the 4 succeeding segments produced on each side to a similar, though somewhat larger lappet. Urosome somewhat shorter than the anterior division, and provided with 3 pairs of lateral lappets similar to those on the anterior part of the body, though somewhat diminishing successively in size, the 2 posterior segments being

unarmed. Last segment a little shorter than the preceding one, and slightly constricted in the middle. Caudal rami slender, exceeding in length the last 3 segments combined, and somewhat attenuated distally, outer edge minutely spinulose and carrying, somewhat in front of the middle, a small bristle, dorsal seta issuing much nearer the end of the ramus, middle apical seta very long and slender, attaining half the length of the body. Anterior antennæ comparatively stout, much shorter than the cephalic segment, and clothed with rather strong setæ, the 3 joints of about equal length, but diminishing successively in width. Posterior antennæ with the distal joint a little shorter than the proximal one. Posterior maxillipeds of moderate size, hand oblong oval in form, dactylus exceedingly long and slender. 1st pair of legs, with the inner ramus of about the same length as the outer, but somewhat narrower, distal joint a little shorter than the proximal one, and tipped with 2 slender setæ, distal joint of outer ramus armed with 3 spines and 2 geniculate setæ. Inner ramus of the 3 succeeding pairs about the length of the first 2 joints of the outer ramus combined, its distal joint much the longest and carrying inside a comparatively short seta, at the tip 2 very long setæ, and outside them again, in the 3rd and 4th pairs, another smaller seta; terminal joint of outer ramus without any setæ inside. Last pair of legs with the distal joint long and narrow, though a little dilated at the end, marginal setæ 5 in number, 2 rather small on the outer edge and 3 much coarser on the tip, the middle one rather elongated; proximal joint with the digitiform process rather produced, inner expansion narrow and about half the length of the distal joint, marginal setæ of moderate length and 4 in number.

Male with the anterior antennæ rather strongly built and apparently composed of 6 joints, the 4th rather dilated, terminal part claw-like. Inner ramus of 2nd pair of legs armed at the tip with a strong claw-like spine in addition to the 2 apical setæ. Last pair of legs much smaller than in female, distal joint without any setæ on the outer edge, inner expansion of proximal joint obsolete.

Body of whitish colour, with dark bluish green intestine.

Length of adult female 0.80 mm.

Remarks.—The present form is at once distinguished from any of the other species included in this family, by the total absence of dorsal and subdorsal processes; whereas the lateral parts of the body are divided into a regular series of acute lappets giving them a pronouncedly jagged appearance, hence the specific name here proposed. In the structural details, as above stated, this form exhibits a close relationship to the type of the present family, *Anchorabolus mirabilis* Norman.

Occurrence.—I have met with this form not unfrequently in one locality, namely Bejan in the outer part of the Trondhjem Fjord, and occasionally also in

some other places on the south and west coasts of Norway, in depths ranging from 12 to 30 fathoms, muddy bottom. A single male specimen was moreover found in a sample taken by Mr. Nordgaard at Repvaag, East Finmark.

Fam. 16. Cylindropsyllidæ.

Characters.—Body narrow, vermiform, with no distinct boundary between the anterior and posterior divisions, the former not being at all dilated. All segments smooth, without any armature whatever. Rostral projection comparatively small. Anterior antennæ with the proximal part composed of 4 well-defined joints. Posterior antennæ with a very small, but well-defined uniarticulate outer ramus. Oral parts on the whole normal, except the posterior maxillipeds, which in some cases are very anomalous or quite rudimentary. Natatory legs of comparatively feeble structure; 1st pair not prehensile, and more or less resembling the 3 succeeding pairs. Last pair of legs imperfectly developed, with no visible subdivision. 2 ovisacs generally present in female.

Remarks.—This new family is established to comprise the peculiar genus *Cylindropsyllus* of Brady and some allied genera, all of them conspicuously distinguished by the extremely narrow, vermiform shape of the body. In the structural details some resemblance may be found to exist to certain genera of the family *Canthocamptidæ*, especially to the genus *Tetragoniceps* Brady; but the 1st pair of legs are never prehensile as in that family, and there are also some other features which would seem to preclude a union of these 2 families. In addition to the 3 genera treated of below, the genus *Leptocaris* of Scott is undoubtedly referable to the present family.

Gen. 71. Cylindropsyllus, Brady, 1880.

Syn: *Cylindrosoma* Brady (name already appropriated).

Generic Characters.—Body slender, cylindrical in form, with rather coarse integuments exhibiting a minutely pitted structure. Rostral projection well defined

at the base. Genital segment in female scarcely subdivided at all. Caudal rami comparatively short. Anterior antennæ slender, 7-articulate, with the 2nd joint much the largest, and the terminal part distinctly 3-articulate; those in male slightly hinged. Posterior antennæ with the outer ramus very small and rudimentary. Mandibular palp small, uniarticulate. Maxillæ and anterior maxillipeds normal. Posterior maxillipeds quite rudimentary, being replaced by 2 small immobile lamellæ intercalated between the bases of the anterior maxillipeds. Natatory legs with the inner ramus distinctly bi-articulate, that of 1st pair larger than that of the 3 succeeding pairs; 4th pair exceeding the other pairs in size, the outer ramus being considerably elongated. Outer ramus of 2nd pair and inner ramus of 3rd pair conspicuously transformed in male. Last pair of legs very small lamelliform. 2 ovisacs present in female.

Remarks.—This genus was removed by Prof. Brady from the *Harpacticoida*, and described under the head of the group *Poecilostoma* Thorel. There cannot be any doubt that such an arrangement is quite untenable, and the genus has subsequently been placed by Th. Scott among the Harpacticoida. The structure of the mouth-organs was not made out by Prof. Brady, and Th. Scott, who carefully examined these organs, has fallen into a strange error, as regards the interpretation of these parts. What he describes, though with some hesitation, as the maxillæ, are evidently the lateral lobes of the posterior lip, and the parts described as the anterior and posterior maxillipeds are in reality respectively the maxillæ and the anterior maxillipeds, the slight rudiments of the posterior maxillipeds having apparently escaped his attention, or being perhaps wrongly represented as parts of the so-called "labium" (fig. 8).

208. Cylindropsyllus lævis, Brady.

(Pl. CCXV).

Cylindropsyllus lævis. Brady, Monograph of British Copepoda, Vol. III, p. 30, Pl. LXXXIV, figs 1—8.

Specific Characters.—Female. Body exceedingly slender and elongated, and perfectly cylindrical, being of the very same width throughout. Cephalic segment somewhat exceeding in length the 2 succeeding segments combined, rostrum small, triangular in form. The 3 succeeding segments without any distinct epimeral plates; last pedigerous segment somewhat larger than the preceding one. Urosome slightly exceeding in length the anterior division, genital segment not much larger than the others, and without any visible subdivision; last segment a little longer than the preceding one, and having the anal opercle rather prominent, and

semilunar in form. Caudal rami about twice as long as they are broad, and slightly divergent, outer edge with a slender bristle near the tip, middle apical seta of moderate length, with the proximal part somewhat thickened and sharply marked off from the thin setiform terminal part, dorsal seta issuing near the inner edge of the ramus, which here forms a slight bulging. Eye inconspicuous. Anterior antennæ nearly as long as the cephalic segment, and clothed in their outer part with slender bristles, 1st joint scarcely more than half as long as the 2nd, both together exceeding in length the remaining part of the antenna, sensory filament, as usual, issuing from the 4th joint. Posterior antennæ with the distal joint much shorter than the proximal one, outer ramus very small, issuing near the base of the proximal joint, and tipped with a single slender seta. 1st pair of legs with the inner ramus nearly as long as the outer, proximal joint with a slender seta inside, distal joint a little longer, linear in form, and carrying on the tip 2 unequal geniculate setæ accompanied inside by a small bristle, outer ramus with its 3 joints of about equal size, the terminal one armed at the end with 2 spines and 2 geniculate setæ. The 2 succeeding pairs of essentially the same structure and size, both with the inner ramus scarcely more than half the length of the outer. 4th pair of legs conspicuously larger than the preceding ones, the outer ramus being almost twice as long, with its first 2 joints considerably produced, terminal joint somewhat incurved and armed at the end with 4 coarsely spinulose setæ of unequal length; inner ramus shorter than the 1st joint of the outer, and tipped with a single spiniform seta finely ciliated in its outermost part. Last pair of legs extremely small, each forming a subtriangular lamella edged with 8 unequal setæ. Ovisacs narrow oblong in form, each containing only 3 large ova arranged in a single row.

Male somewhat smaller than female, and having the genital segment distinctly subdivided. Anterior antennæ more strongly built and slightly hinged, 4th joint a little dilated and subdivided near the end. Outer ramus of 2nd pair of legs carrying at the tip a very large, incurved, falciform claw, exceeding in length the whole ramus, and clothed inside with slender spinules. Inner ramus of 3rd pair of legs peculiarly transformed, exhibiting 2 unequal appendages issuing from a short basal part, the outer one forming a thin plate exserted into 2 finely ciliated setæ, the inner one a straight spine with 2 hook-like ledges inside near the end. Last pair of legs still smaller than in female, with the marginal setæ less developed.

Colour yellowish grey.

Length of adult female 1.20 mm.

Remarks.—This is the only species as yet known of the present genus. 2 other forms have certainly been referred to the same genus; but one of these, *C. fairliensis* Scott, has recently been raised by that author to the type of a new genus, *D'Arcythompsonia*, and the other *C. minor* Scott, is undoubtedly referable to the next genus to be treated of below.

Occurrence.—Some few specimens of this peculiar Copepod were taken last summer at Korshavn, near Lindesnæs, the southernmost point of Norway. The specimens occurred in a depth of about 20 fathoms on a bottom covered with muddy sand.

Distribution.—British Isles (Brady).

Gen. 72. **Stenocaris**, G. O. Sars, n.

Generic Characters.—Body of a slender narrow form similar to that in the preceding genus, but with the integuments rather thin and without any visible sculpturing. Rostrum well defined at the base. Genital segment in female scarcely subdivided. Caudal rami comparatively larger than in *Cylindropsyllus*. Anterior antennæ resembling in structure those in that genus. Posterior antennæ, however, with the outer ramus less rudimentary. Mandibular palp distinctly biarticulate. Posterior maxillipeds normally developed, terminating in a clawed hand. Inner ramus of 1st and 4th pairs of legs biarticulate, that of 2nd and 3rd pairs (in female) uniarticulate; 4th pair, as in *Cylindropsyllus*, larger than the others. 2nd pair of legs in male with both rami conspicuously transformed, 3rd pair with the inner ramus of comparatively simple structure. Last pair of legs more fully developed than in *Cylindropsyllus*, each armed inside with a strong spine, wanting, however, in male. 2 ovisacs present in female.

Remarks.—This new genus is closely allied to *Cylindropsyllus*, though differing rather materially in some particulars, and more especially in the altogether normal development of the posterior maxillipeds. The *Cylindropsyllus minor* of Scott is undoubtedly referable to the present genus.

209. Stenocaris gracilis, G. O. Sars, n. sp.

(Pl. CCXVI).

Specific Characters.—Female. Body very slender and narrow, cylindrical in form, though a little thickened in the genital region. Rostrum small, trian-

gular in form. Urosome about the length of the anterior division, genital segment scarcely larger than the preceding one, last segment with the anal opercle less prominent than in *Cylindropsyllus*. Caudal rami somewhat fusiform in shape and rather divergent, each with a slender bristle outside near the tip, middle apical seta of normal structure. Eye inconspicuous. Anterior antennæ rather slender, about equalling in length the cephalic segment, and 6-articulate, 1st joint short and thick, 2nd joint 3 times as long and somewhat tapering distally, terminal part composed of only 2 joints. Posterior antennæ with the proximal joint imperfectly subdivided in the middle, outer ramus narrow linear in form, with 2 slender setæ on the tip. Mandibular palp with the distal joint short but well defined from the proximal one. Posterior maxillipeds comparatively small, but exhibiting all the parts well defined. 1st pair of legs with the inner ramus shorter than the outer, and having its 2 joints of about equal length. 2nd and 3rd pairs with the inner ramus very small and tipped with a slender spine accompanied by a small bristle, its inner edge in 3rd pair smooth, in 2nd pair carrying a moderately long seta. 4th pair of legs much larger than the others, and resembling in structure those in *Cylindropsyllus;* inner ramus, however, considerably exceeding in length the 1st joint of the outer and carrying on the tip a strong spine with a broad fringe of cilia at the extremity. Last pair of legs forming each an oval lamella produced inside to a strong spiniform process, outer part of the lamella fringed with 6 slender setæ, within them being an elongated spine.

Male still more slender than female, and having the genital segment distinctly subdivided. Anterior antennæ transformed in much the same manner as in *Cylindropsyllus*. 2nd pair of legs much larger than in female, and having the 2nd basal joint produced between the 2 rami to an acute lobe curving outwards, terminal joint of outer ramus very large, nearly twice as long as the other 2 combined, and slightly incurved in its distal part, inner edge exhibiting in front of the middle 2 successive nodiform prominences, outer edge armed distally with 3 slender spines, tip carrying a moderately long straight spine terminating in a hook-like point; inner ramus distinctly biarticulate, with a short seta at the tip, and another inside the proximal joint. 3rd pair of legs much less transformed, inner ramus, however, as in 2nd pair, biarticulate, with the proximal joint very short, distal joint acutely produced at the tip, and carrying inside a small bristle. Last pair of legs smaller than in female, and without the spiniform process inside.

Colour whitish.

Length of adult female 1.75 mm.

Remarks.— This form, in all essential anatomical details, agrees very closely with the species described by Th. Scott as *Cylindropsyllus minor*. It is, how-

ever, of much larger size and more slender form of body, differing moreover very conspicuously in the structure of the caudal setæ, the middle of which, in Scott's species, has the form of a comparatively short and stout lancet-shaped lamella.

Occurrence.—Several specimens of this form, males and females, were found last summer at Korshavn in the same places where *Cylindropsyllus laevis* occurred.

Gen. 73. D'Arcythompsonia, Scott. 1906.

Generic Characters.—Body, as in the 2 preceding genera, slender cylindrical in form, with rather soft, thin integuments. Rostral projection small, not defined behind. Genital segment in female distinctly subdivided. Caudal rami small, but with one of the apical setæ much elongated. Anterior antennæ comparatively short, but composed of 7 well-defined joints, the 2nd not much prolonged. Posterior antennæ likewise more robust than in the preceding genera, with the outer ramus very small. Mandibular palp small, uni-articulate. Maxillæ with an oval setiferous lamella outside, masticatory lobe rather coarse, intermediate lobe apparently wanting. Anterior maxillipeds strongly built, with 2 short digitiform lobes inside the claw-shaped terminal joint. Posterior maxillipeds peculiarly transformed and very small, each forming a vertical immobile lamella armed with 2 claw-like recurved spines, and having a small nodiform appendage outside, tipped with a minute bristle. Natatory legs comparatively small, but with very long apical setæ, 1st pair only slightly differing from the others, inner ramus in all pairs distinctly biarticulate. Last pair of legs very small and rudimentary.

Remarks.—This genus has recently been established by Th. Scott, to include the form previously described by him as *Cylindropsyllus fairliensis*. This form, indeed, exhibits several well marked differences in its structural details, both from *Cylindropsyllus* and *Stenocaris*, though its right to a place in the same family with them is evident. The peculiar structure of the posterior maxillipeds has quite escaped the attention of Th. Scott, who erroneously describes the anterior maxillipeds as the posterior ones.

210. D'Arcythompsonia fairliensis, Scott.

(Pl. CCXVII).

Cylindropsyllus fairliensis, Th. Scott, in the Seventeenth Ann. Rep. of the Fishery Board for Scotland, Part. III, p. 258, Pl. X, figs 11—14, Pl. XI, figs 1—4.

Specific Characters.—Female. Body very slender and flexible, cylindrical in form, though a little wider posteriorly than anteriorly (the reverse of what is

generally found in Copepoda). Cephalic segment of moderate size and projecting in front to a very small rostral prominence. The 4 succeeding segments gradually increase in size, and are without distinct epimeral plates. Urosome considerably exceeding in length the anterior division, and composed of 5 well-defined segments, the genital segment being distinctly subdivided in the middle; last segment about the size of the preceding one, and having the anal opercle only slightly indicated. Caudal rami comparatively short and rather broad in their proximal part, but abruptly contracted distally, the outer edge forming in the middle a nearly rectangular bend, inner edge straight; middle apical seta very long, attaining nearly half the length of the body, and extended straight backwards. Eye inconspicuous. Anterior antennæ rather small, scarcely more than half as long as the cephalic segment, and clothed with comparatively short setæ, the 4 joints of the proximal part rather thick and of nearly equal length, terminal part narrowing abruptly, with the last joint longer than the other 2 combined. Posterior antennæ short and robust, with the distal joint scarcely as long as the proximal one, and armed with 7 claw-like spines, 2 on the outer edge and 5 on the blunted end; outer ramus very small, and tipped with a single spiniform seta. Mandibular palp likewise very small, and provided with only 2 apical setæ. 1st pair of legs with the inner ramus somewhat shorter than the outer, distal joint about the length of the proximal one, and armed at the tip with a strong claw-like spine and 2 very unequal setæ; terminal joint of outer ramus shorter than either of the 2 preceding joints, and armed at the end with 2 spines and 2 curved setæ. The 3 succeeding pairs of essentially the same appearance, inner ramus about the length of the first 2 joints of the outer combined, and provided at the end with a spine and 2 exceedingly long setæ, carrying moreover inside near the end a short seta, and in the 3rd pair another similar seta inside the proximal joint; terminal joint of outer ramus in 2nd pair with 1, in the 2 succeeding pairs with 2, comparatively small setæ inside. Last pair of legs extremely small, with 3 unequal setæ at the end, and another very slender seta attached to a knob-like projection outside.

Colour not yet ascertained.

Length of adult female 1.50 mm.

Remarks.—This form, as stated above, was at first referred by Th. Scott, though with some hesitation, to the genus *Cylindropsyllus* of Brady, to which it certainly bears a general external resemblance. Having, however, subsequently renewed his examination of both sexes, he became fully convinced of the generic distinctness of this form.

Occurrence.—I have seen only 2 female specimens of this remarkable form, taken many years ago off the west coast of Norway, the exact locality not being noted. One of these specimens, the one here figured, was provided with greatly developed ovarial tubes, the structure of which seemed to differ conspicuously from that generally found in this group of Copepoda. As seen from the 2 habitus-figures here given, in which these organs are represented as exactly as possible, the posterior parts of the tubes extending through the urosome are greatly dilated and contain each 4 large ovarial cells lying end to end, and exactly corresponding in the 2 tubes. At the junction of the anterior and posterior divisions of the body, or more correctly in the anterior part of the genital segment, the tubes become abruptly contracted, lying also somewhat more dorsally, and the enclosed cells rapidly diminish in size anteriorly. It is very probable that the large ovarial cells in the caudal part were ready to be discharged from the genital openings, to form 2 separate ovisacs, each with 4 ova arranged in a single row. Ovigerous specimens of this form have not, however, as yet been observed.

Distribution.—Scottish coast (Scott).

Fam. 17. Tachidiidæ.

Characters.—Body of somewhat varying shape, in some cases depressed, in other cases more cylindrical or fusiform. Anterior antennæ comparatively short, with the number of joints in some cases much reduced; those in male strongly hinged. Posterior antennæ with the outer ramus generally well developed. Oral parts on the whole more fully developed than in the 4 preceding families, the mandibular palp being always distinctly biramous. 1st pair of legs not prehensile, but generally resembling in structure the 3 succeeding ones; inner ramus of the latter well developed and 3-articulate, like the outer. Last pair of legs in some cases simple, lamelliform, but more generally of normal structure, with both joints well defined. Only a single ovisac present in female.

Remarks.—In this family I comprise a number of genera, which more or less distinctly group themselves around the well-known genus *Tachidius* of Lilljeborg, and which agree with those belonging to the 3 preceding families in the non-prehensile nature of the 1st pair of legs, but differ materially in the much fuller development of the oral parts and of the natatory legs. In addition to

the genera referred by Prof. Brady to his sub-family *Tachidiinæ*, the genus *Danielssenia* Boeck (= Jonesiella Brady) and *Fultonia* Scott are included in this family, and moreover 3 new genera, to be treated of further on.

Gen. 74. **Tachidius**, Lilljeborg, 1853.

Generic Characters.—Body short, sub-depressed, with the anterior division broader than the posterior. Rostral projection not defined behind. Genital segment in female imperfectly subdivided in the middle. Caudal rami of moderate size. Anterior antennæ comparatively short and thick, though composed of 6 or 7 well defined joints; those in male very strong, subcheliform. Posterior antennæ with the proximal joint distinctly subdivided, outer ramus comparatively small, bi-articulate. Oral parts comparatively less fully developed than in most other Tachidiidæ, though of normal structure. Natatory legs very powerful and somewhat resembling in structure those in the *Cylopoida*. 1st pair differing only slightly from the succeeding pairs, and having the inner ramus distinctly 3-articulate; 2nd and 3rd pairs somewhat transformed in male. Last pair of legs simple, lamelliform, with no boundary between the distal and proximal joints.

Remarks.—This genus was established as early as the year 1853 by Prof. Lilljeborg, and is the type of the present family. In addition to the species originally described by Lilljeborg, 2 other species have been recorded in recent times, viz., *T. littoralis* Poppe, and *T. crassicornis* Scott. I am acquainted with only the type species.

211. Tachidius brevicornis, Lilljeb.

(Pl. CCXVIII & CCXIX).

Tachidius brevicornis, Lilljeborg, De crustaceis ex ordinibus tribus in Scania occurrentibus, p. 196, Pl. XXII, figs. 12–16, Pl. XXIII, figs. 112, 9, Pl. XXVI, figs. 17 & 18.

Syn: *Tachidius discipes*, Giessbrecht.

Specific Characters.—Female. Body comparatively short and stout, rapidly tapering behind, with the anterior division oblong oval in outline, and distinctly depressed in front. Cephalic segment large, exceeding in length the 3 succeeding segments combined, rostral projection obtusely conical in form. Last pedigerous segment considerably narrower than the preceding one. Urosome short, not attaining even half the length of the anterior division, and gradually tapering behind,

all the segments fringed at the posterior edge with delicate spinules; last segment about the length of the preceding one, and having the anal opercle finely spinulose at the edge. Caudal rami about as long as they are broad, and transversely truncated at the end, outer corner armed with a slender spine, middle apical seta exceeding half the length of the body. Eye large and very conspicuous in the living animal. Anterior antennæ much less than half the length of the cephalic segment, and distinctly 7-articulate, tapering gradually towards the end, and densely clothed with setæ, some of which are coarsely ciliated, 1st joint much the largest, terminal part exceeding half the length of the proximal one. Posterior antennæ with the outer ramus much shorter than the distal joint, and carrying 3 setæ, one lateral and 2 apical. Natatory legs with the basal part very broad and flattened; inner ramus of 1st pair slightly longer than the outer, that of the 3 succeeding pairs a little shorter, middle joint of this ramus rather large and expanded, in the 2nd and 3rd pairs carrying 2 setæ inside. Last pair of legs forming each a broad, rounded, quadrangular lamella edged with 9 comparatively short setæ. Ovisac large, oval in form, and projecting far beyond the caudal rami.

Male somewhat smaller than female, and having the urosome narrower and more elongated. Anterior antennæ very powerful, subcheliform, 4th joint of considerable size and globularly inflated, terminal part short, unguiform. 2nd and 3rd pairs of legs comparatively more strongly built than in female, inner ramus of 2nd pair with a conical deflexed process issuing from the end of the middle joint inside, outer ramus of 3rd pair of very coarse structure, with the setæ of the inner edge much reduced in size. Last pair of legs smaller than in female, with only 7 marginal setæ.

Body of whitish colour, with a slight yellow or orange tinge.

Length of adult female 0.60 mm.

Remarks.—I do not find it necessary to reject the specific name *brevicornis* under which the present form was first described. It may be that Lilljeborg's identification of this species with *Cyclops brevicornis* of O. Fr. Müller is untenable, but any difficulty in this respect will be avoided by simply annexing to the species the author-name of Lilljeborg instead of that of Müller.

Occurrence.—I have met with this form very abundantly in the neighbourhood of Christiania in shallow creeks of the Fjord, sometimes in brackish water. It also occurs under similar circumstances in many other places both on the south and west coasts of Norway, and Th. Scott also records it from East Finmark. It is a very active little animal, being almost constantly in motion, and running about with considerable speed. Males and young females are often found tied

together in copula, the female being firmly grasped in the middle by the powerful anterior antennæ of the male.

Distribution.—Baltic (Lilljeborg), British Isles (Brady), coast of France (Canu).

Gen. 75. **Pseudotachidius**, Scott, 1898.

Generic Characters.—Body robust, with the anterior division considerably expanded and rather sharply marked off from the posterior. Rostral projection conically produced, genital segment in female distinctly subdivided. Caudal rami very short. Anterior antennæ short and stout, 6-articulate, and clothed with strong ciliated setæ; those in male less strongly hinged than in *Tachidius*. Posterior antennæ with the proximal joint not subdivided, outer ramus rather large 3-articulate. Oral parts on the whole more fully developed than in *Tachidius*. Natatory legs densely spinulose: 1st pair with the inner ramus distinctly 3-articulate and much larger than the outer, being rather dilated at the base and angularly bent in the middle; inner ramus of 2nd and 3rd pair in male slightly transformed. Last pair of legs very small, but with the distal joint well defined.

Remarks.—This genus, established by Th. Scott, differs conspicuously in some respects from *Tachidius*, though exhibiting a general resemblance to that genus as regards outward appearance and the structure of the natatory legs. Only a single species is as yet known.

212. Pseudotachidius coronatus, Scott.

(Pl. CCXX).

Pseudotachidius coronatus. Th. Scott, Additions to the Fauna of Loch Fyne: Sixteenth Annual Report of the Fishery Board for Scotland. Part III, p. 267. Pl. XIII, figs. 22—26, Pl. XV. figs. 1—4.

Specific Characters.—Female. Body short and stout, with the anterior division oblong quadrangular in outline and much broader than the posterior. Cephalic segment large, almost equalling in length the 4 succeeding segments combined; rostral projection rather prominent and obtusely acuminate at the tip, which carries 2 delicate hair-like bristles. Last pedigerous segment much narrower than the preceding ones, and slightly produced on either side. Urosome about half the length of the anterior division, and of almost uniform width throughout, posterior edge of the segments minutely spinulose: last segment

shorter than the preceding one, and having the anal opercle smooth. Caudal rami very short, being scarcely half as long as they are broad, outer corner armed with a short spine, the 2 middle apical setæ very slender and coarsely ciliated in the middle, the inner one fully twice as long as the urosome. Eye wholly absent. Anterior antennæ scarcely attaining half the length of the cephalic segment, and only slightly tapering distally, 2nd joint the largest, terminal part biarticulate and very short, blunt at the tip. Posterior antennæ rather short and stout, with a strong seta issuing from the proximal joint in front; outer ramus very fully developed, and attached near the end of the proximal joint, extending considerably beyond the distal joint, and provided with 6 plumose setæ, 2 apical and 4 lateral. Basal part of mandibular palp forming a rather large expansion inside, carrying 4 densely plumose setæ. Maxillæ with the epipodal lobe comparatively large, lamelliform, and edged with 4 setæ. Anterior maxillipeds having the basal part unusually broad, but with the digitiform lobes small and wide apart. Posterior maxillipeds of moderate size, hand oval in form and densely spinulose inside, dactylus shorter than the hand. 1st pair of legs with the inner ramus almost twice as long as the outer, 1st joint considerably dilated, and carrying inside a comparatively short plumose seta, 2nd joint somewhat obliquely truncated at the end, and provided inside with a strong spiniform seta, terminal joint somewhat longer than the preceding one, with 2 unequal spiniform setæ on the tip, and another inside; all the joints clothed outside with slender spinules. The 3 succeeding pairs resembling in structure those in *Tachidius*, but more coarsely spinulose. Last pair of legs, however, very different, distal joint well defined but rather small, obliquely truncated at the tip, and fringed with 4 comparatively short setæ, proximal joint provided outside with the usual digitiform process, innermost part of the joint forming a narrow linguiform expansion carrying on the tip a slender bristle accompanied by 2 or 3 small spines. Ovisac very small, only containing 2 juxtaposed ova.

Male with the anterior antennæ, as usual, hinged, but not nearly so strongly built as in *Tachidius*, the 4th joint being of much smaller size. Inner ramus of 2nd pair of legs with the terminal joint more tapered than in female, and carrying on the tip 2 unequal spines, spine of outer edge wanting; inner ramus of 3rd pair of legs having the outer corner of the middle joint produced to a short, somewhat hamiform process. Last pair of legs of a similar structure to that in female, but of smaller size.

Colour whitish grey.

Length of adult female 0.97 mm.

Remarks.—This form was described by Th. Scott in the year 1898 as the type of the present genus. It may easily be recognized by its short, stout form and the abrupt contraction of the posterior division of the body, as also by the stout and densely hirsute anterior antennæ.

Occurrence.—I have taken this form rather abundantly in 2 places on the Norwegian coast, viz., at Bukken and in the Lyngdal Fjord, near Farsund. It is a true deep-water form, only occurring in greater depths ranging from 40 to 100 fathoms, muddy bottom.

Distribution.—Scottish coast (Scott).

Gen. 76. **Tachidiella**, G. O. Sars, n.

Generic Characters.—Body short, sub-depressed, with the anterior division very much broader than the posterior. Rostral projection not defined behind. Genital segment in female imperfectly subdivided. Caudal rami very short, but with the apical setæ rather coarse. Anterior antennæ short, 8-articulate, and densely clothed with partly ciliated setæ. Posterior antennæ with the proximal joint distinctly subdivided, outer ramus comparatively small, bi-articulate. Mandibles, maxillæ and anterior maxillipeds of normal structure. Posterior maxillipeds, however, distinguished by the substitution of a short joint carrying 4 subequal spines, for the dactylus. 1st pair of legs somewhat similar to those in *Pseudotachidius*, the inner ramus being much larger than the outer, and distinctly 3-articulate. The 3 succeeding pairs of legs powerfully developed, with the rami subequal in size. Last pair of legs with the distal joint well defined, proximal joint forming inside a rather prominent setiferous expansion.

Remarks.—This new genus in some respects combines characters of both the 2 preceding genera. The peculiar structure of the posterior maxillipeds is very characteristic of the genus, recalling that in the genus *Bradya* among the *Ectinosomidæ*. I am as yet acquainted with only a single species.

213. Tachidiella minuta, G. O. Sars, n. sp.

(Pl. CCXXI).

Specific Characters.—*Female.* Body comparatively short and stout, with the anterior division regularly oval in form, and sharply marked off from the posterior. Cephalic segment large, exceeding in length the 4 succeeding segments combined; rostral projection rather prominent and narrowly rounded at the tip.

Last pedigerous segment very small. Urosome about $^2/_3$ the length of the anterior division, with the posterior edges of the segments minutely spinulose ventrally and laterally, genital segment rather large and expanded, last segment much shorter than the preceding one, and having the anal opercle very small and smooth. Caudal rami scarcely half as long as they are broad, and transversely truncated at the tip, innermost apical seta twice as long as the outermost, inner medial seta remarkably strong and considerably thickened in its proximal part, being about half the length of the body. Eye apparently present, but very small. Anterior antennæ not nearly half the length of the cephalic segment, and gradually tapering distally, 1st and 2nd joints the largest, terminal part exceeding half the length of the proximal one. Posterior antennæ with the outer ramus scarcely more than half as long as the distal joint, and carrying 5 setæ, 2 on the 1st and 3 on the very small last joint. 1st pair of legs with the outer ramus widening very considerably distally, its last joint being much larger than either of the 2 preceding ones and armed with 4 spines and 2 setæ, the spines being fringed, like those on the 2 preceding joints, with slender spinules along the outer edge; inner ramus nearly twice as long as the outer, and straight, 1st joint much the largest, 2nd joint obliquely produced outside, last joint sub-linear and carrying at the end 2 slender setæ and an intermediate ciliated spine. Inner ramus of the 3 succeeding pairs with the middle joint acutely produced at the outer corner, terminal joint carrying on the tip a long spine and 2 comparatively small setæ, its inner edge being provided in the 2nd pair with one, in the 3rd pair with 3, and in the 4th pair with 2 setæ. Last pair of legs with the distal joint of rounded oval form, and edged with 4 comparatively short setæ; inner expansion of proximal joint extending considerably beyond the distal joint and carrying on the narrowly truncated end 2 unequal setæ and inside them a short spine.

Male unknown.

Colour not yet ascertained.

Length of adult female 0.43 mm.

Remarks.—This small Copepod has at first sight a certain resemblance to the species of the genus *Idyæa*, Philippi, the anterior division being distinctly depressed and sharply marked off from the posterior. The structure of the several appendages, however, is very different, and proves it to belong in reality to the present family.

Occurrence.—Some specimens of this form, all of the female sex, were picked up from a sample taken at Skutesnæs, south-west coast of Norway, from a depth of about 12 fathoms.

Gen. 77. **Robertsonia**, Brady, 1880.

Generic Characters.—Body not depressed, almost cylindric in form, though tapering behind, with no very sharp demarcation of the 2 divisions. Rostrum prominent, well defined behind. Genital segment imperfectly subdivided in female. Caudal rami short. Anterior antennæ comparatively short and stout, with the number of joints somewhat reduced; those in male distinctly hinged. Posterior antennæ with the proximal joint not subdivided, outer ramus well developed, though composed of only 2 joints. Oral parts normal. 1st pair of legs only slightly differing in structure from the 3 succeeding ones, inner ramus 3-articulate and about the length of the outer; inner ramus of 2nd pair of legs in male conspicuously transformed. Last pair of legs of normal appearance, with both joints well defined.

Remarks.—This genus was established in the year 1880 by Prof. Brady, and was referred by that author to his sub-family *Tachidiinæ*. I am also of opinion, that this genus is more properly referable to the present family, although the general form of the body is rather unlike that in the typical genus *Tachidius*. Only one species has as yet been observed.

214. Robertsonia tenuis, Brady.

(Pl. CCXXII).

Robertsonia tenuis, Brady, Monogr. of Brit. Copepoda, Vol. II, p. 25, Pl. XLI, figs. 1—14.

Specific Characters.—Female. Body moderately robust, somewhat dilated in front, and rapidly tapering behind. Cephalic segment large and deep, fully equalling in length the 4 succeeding segments combined; rostrum rather prominent and narrow triangular in form, tip obtusely acuminate. Epimeral plates of the 3 succeeding segments well developed and acutely produced at the posterior corner. Last pedigerous segment almost as broad as the preceding segment. Urosome somewhat exceeding half the length of the anterior division, and gradually tapering distally, posterior edge of the segments coarsely spinulose, genital segment, fully as long, as the remaining segments combined. Caudal rami broader than they are long and obtusely truncated at the end, edges partly spinulose, apical setæ of moderate length and normal structure. Eye distinct though rather small. Anterior antennæ much less than half the length of the cephalic segment, and rather densely clothed with comparatively short, partly ciliated setæ, being composed of 5 joints only, 3 of them belonging to the proximal part, terminal part about half the length of the latter, with the 1st joint very small. Posterior

antennæ short and stout, with the proximal joint scarcely longer than the distal one, and carrying in front a strong ciliated seta; outer ramus about the length of the distal joint, and provided with 4 setæ, 2 apical and 2 lateral. Posterior maxillipeds of moderate size, with a long seta issuing from the basal joint in front, hand finely ciliated inside, dactylus scarcely longer, and clothed inside with slender spinules. 1st pair of legs with the inner ramus projecting a little beyond the outer, both coarsely spinulose outside. The 3 succeeding pairs rather strongly built, with the inner ramus a little shorter than the outer. Last pair of legs with the distal joint comparatively small, cordiform in shape, with 5 marginal setæ; inner expansion of proximal joint well developed, broadly triangular in form, and extending considerably beyond the distal joint, marginal setæ 5 in number, and rather strong, spiniform, the outermost the smallest.

Male with the anterior antennæ moderately strong and composed of 7 well defined joints, the 4th being somewhat dilated. 1st pair of legs with a highly chitinized plug-like prominence inside the 2nd basal joint. Inner ramus of 2nd pair of legs transformed in much the same manner as in the *Thalestridæ*, middle joint carrying at the end outside 2 closely juxtaposed spiniform appendages, the outer of which is very coarse. Last pair of legs smaller than in female, with the inner expansion of the proximal joint much reduced in size, and provided with only 2 spiniform setæ.

Colour more or less reddish.

Length of adult female 0.80 mm.

Remarks.—In its outward appearance the present form somewhat recalls certain species of the genus *Amphiascus*. The structure of the 1st pair of legs, however, is very different, and the female is only provided with a single ovisac. Also the other structural details prove it to be much more nearly allied to the genus *Tachidius*, as was also suggested by Prof. Brady.

Occurrence.—I have taken this form rather abundantly in one place, near Farsund, on a muddy bottom at a depth of about 20 fathoms. It also occurs occasionally in some other localities of the south coast of Norway (Lillesand, Risör), as also in the upper part of the Christiania Fjord.

Distribution.—British Isles (Brady), Arctic Ocean, off Spitsbergen and Franz Josef Land (Scott).

Gen. 78. Danielssenia, Boeck. 1873.

Syn: *Jonesiella*. Brady. 1880.

Generic Characters.—Body more or less fusiform in shape, with no sharp demarcation between the 2 divisions. Rostrum well defined behind, forming a very thin and hyaline plate. Genital segment in female imperfectly subdivided. Caudal rami, as a rule, rather short. Eye well developed. Anterior antennæ very small, with the number of joints much reduced, some of the setæ very strong and coarsely spinulose; those in male strongly hinged, sub-cheliform. Posterior antennæ with the proximal joint not subdivided; outer ramus well developed, 3-articulate. Oral parts on the whole built on the same type as in the other genera of the present family. Natatory legs coarsely spinulose, with the rami comparatively narrow and provided at the tip with coarse spiniform setæ; 1st pair differing from the others in the fact that the inner ramus is composed of only 2 joints. Inner ramus of 2nd pair of legs in male conspicuously transformed. Last pair of legs with the distal joint well defined, inner expansion of proximal joint in female linguiformly produced.

Remarks.—This genus was established by Boeck as early as the year 1873, but was rather imperfectly characterised. The genus *Jonesiella* of Brady is undoubtedly identical with Boeck's genus, and this name ought of course to be replaced by that proposed by Boeck. Prof. Brady placed this genus within his sub-family *Stenheliinæ*: but I think that such an arrangement cannot properly be defended, as its affinity to the 3 other genera included by Brady in that sub-family is in reality a very remote one. On the other hand, the several appendages are built, upon the whole, upon the type characteristic of the present family. In addition to the 2 species described below, a 3rd well-defined species *(D. sibirica)* has been characterised and figured by the present author, and a 4th species *(D. Braueri)* has been recorded by Th. Scott from the coast of Novaja Sembla. The form at first described by Th. Scott as *Jonesiella hyænæ* has, on the other hand, recently been raised by that author to the type of a distinct genus *Thompsonula*.

215. Danielssenia typica, Boeck.

(Pl. CCXXIII).

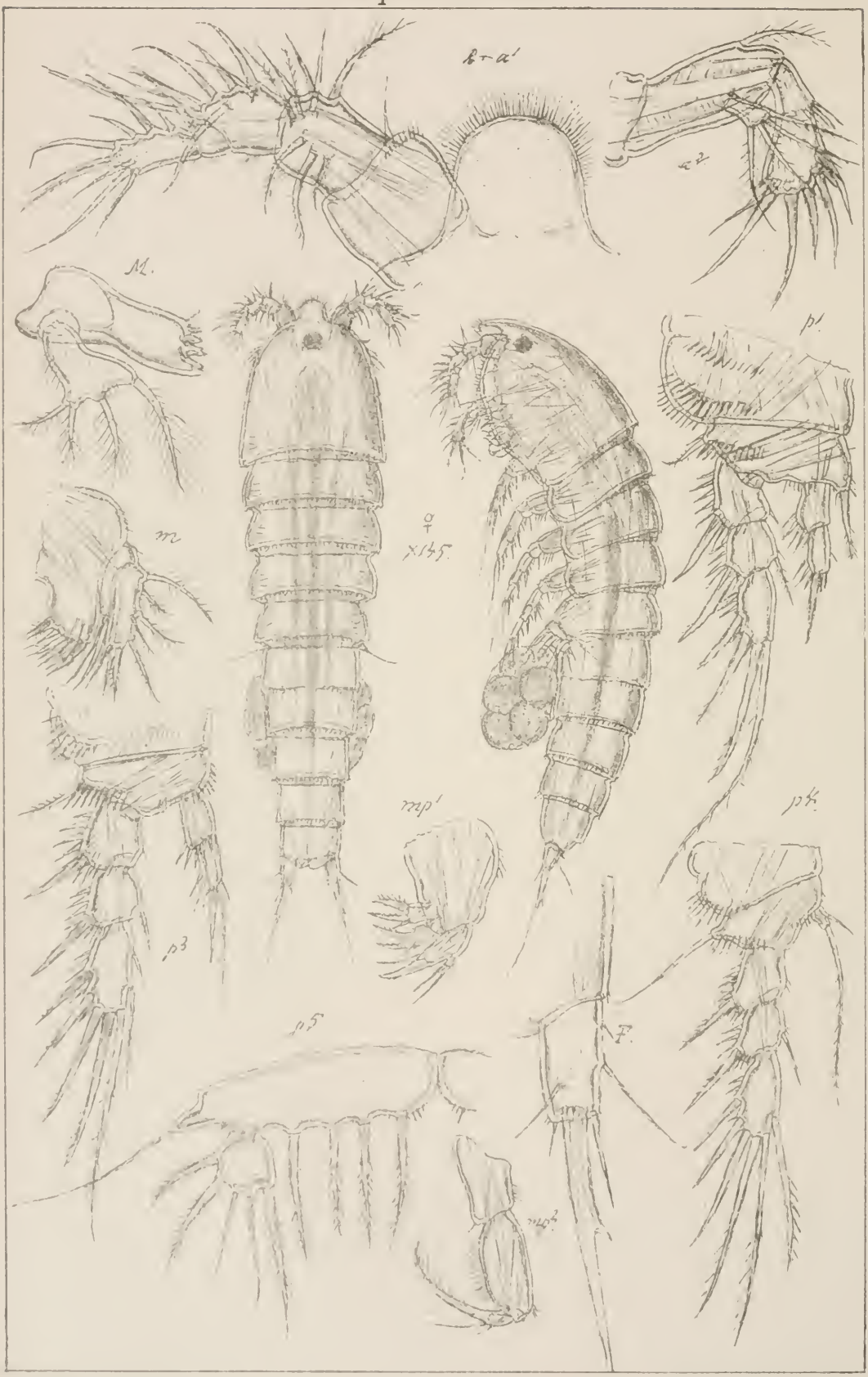
Danielssenia typica, Boeck, Nye slægter og Arter of Saltvandscopepoder. Chr. Vid. Selsk. Forh. f. 1872, p. 55.

Syn: *Jonesiella spinulosa*, Brady.

Specific Characters.—*Female.* Body comparatively short, slightly depressed in its anterior part, and evenly contracted both in front and behind. Cephalic

Copepoda

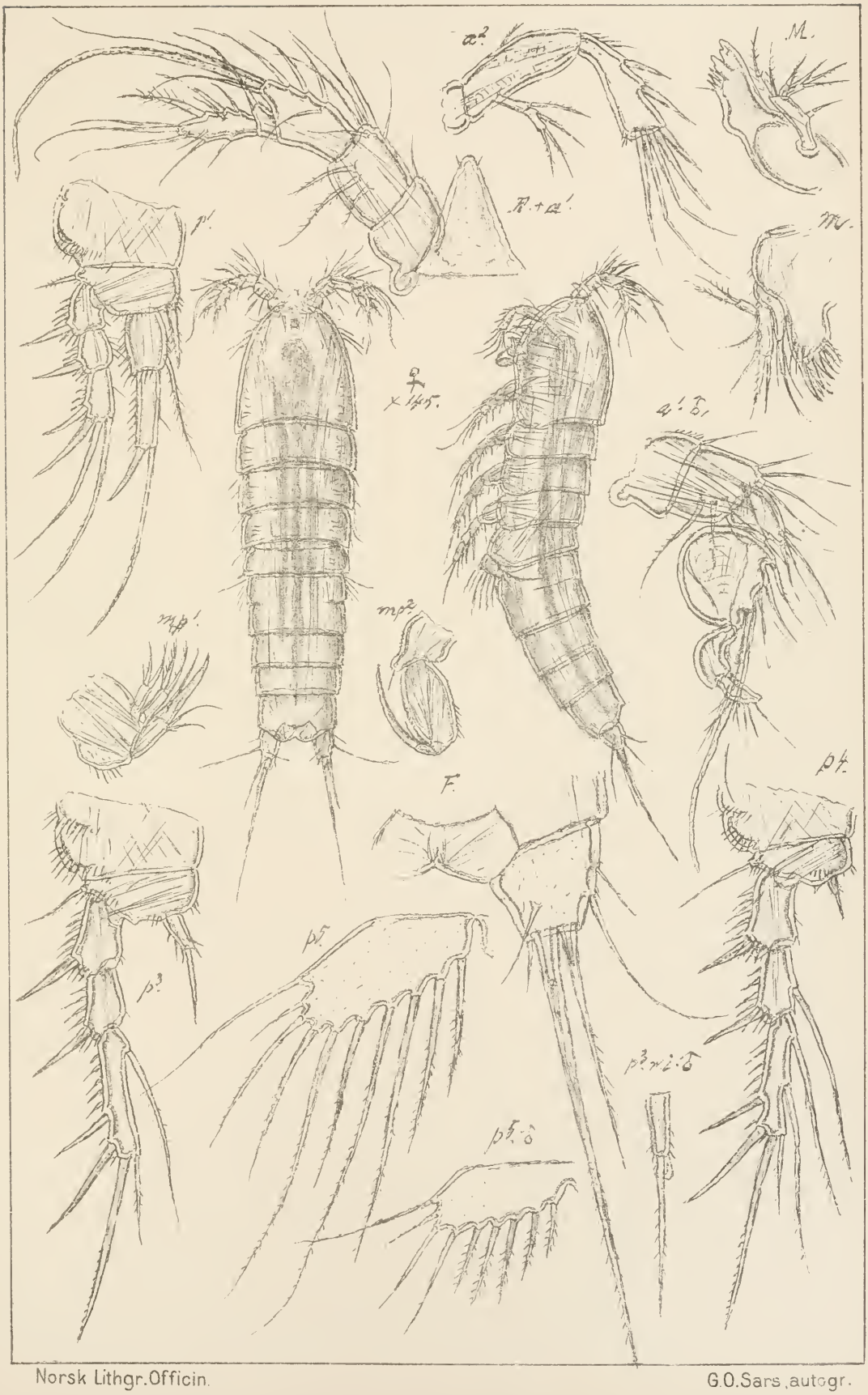
Cletodidæ — Harpacticoida — Pl. CCIX.



G.O.Sars, autogr. — Norsk Lithgr. Officin.

Nannopus palustris, Brady

Copepoda

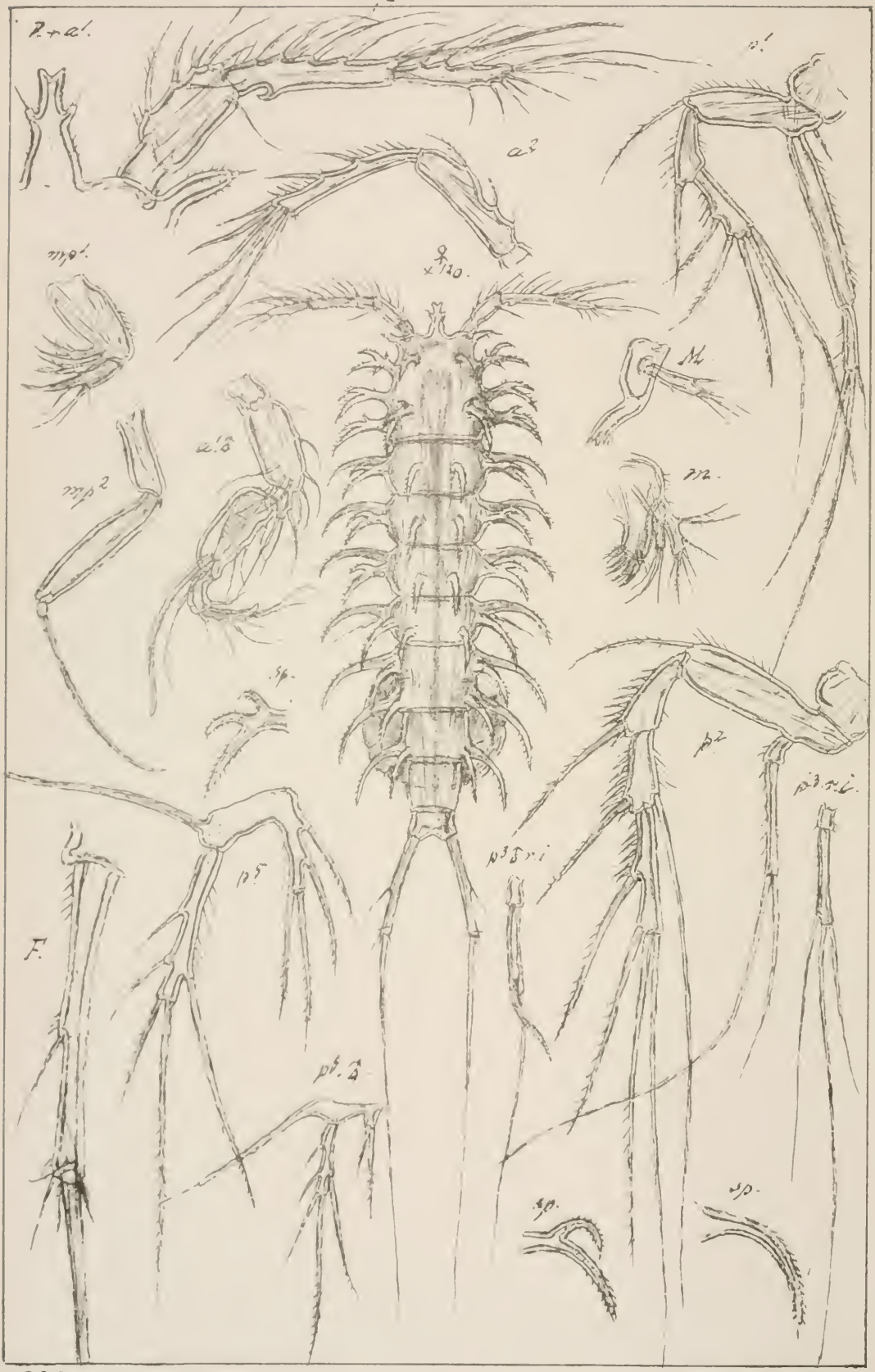


Norsk Lithgr. Officin. G.O. Sars, autogr.

Pontopolites typicus, Scott

Copepoda

Anchorabolidæ — Harpacticoida — Pl. CCXI.



G.O.Sars, autogr. — Norsk Lithgr. Officin.

Anchorabolus mirabilis, Norm.

Copepoda

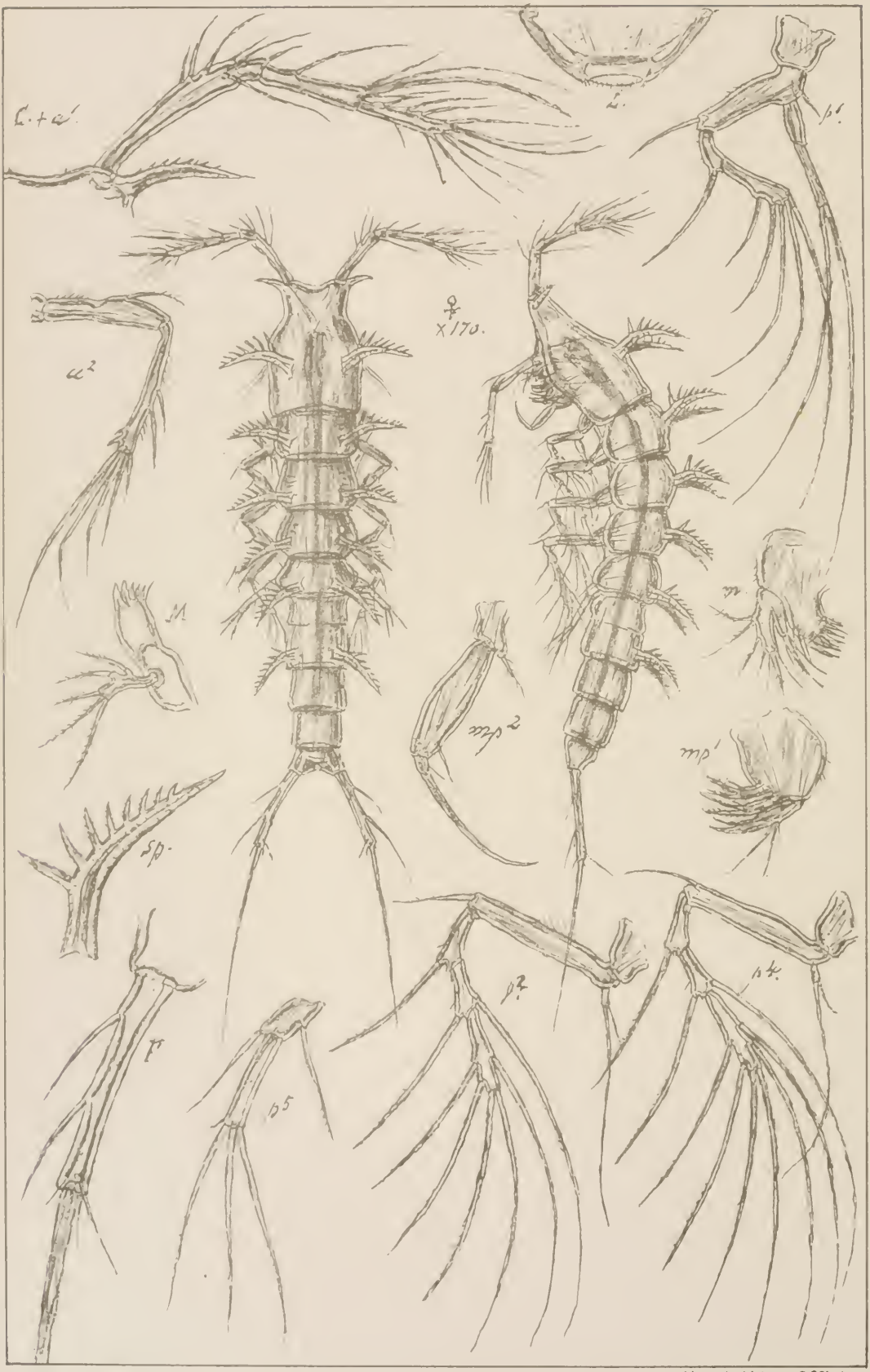
Anchorabolidæ — Harpacticoida — Pl. CCXII.

G.O.Sars, autogr. — Norsk Lithgr. Officin

Echinopsyllus Normani, G.O.Sars

Copepoda

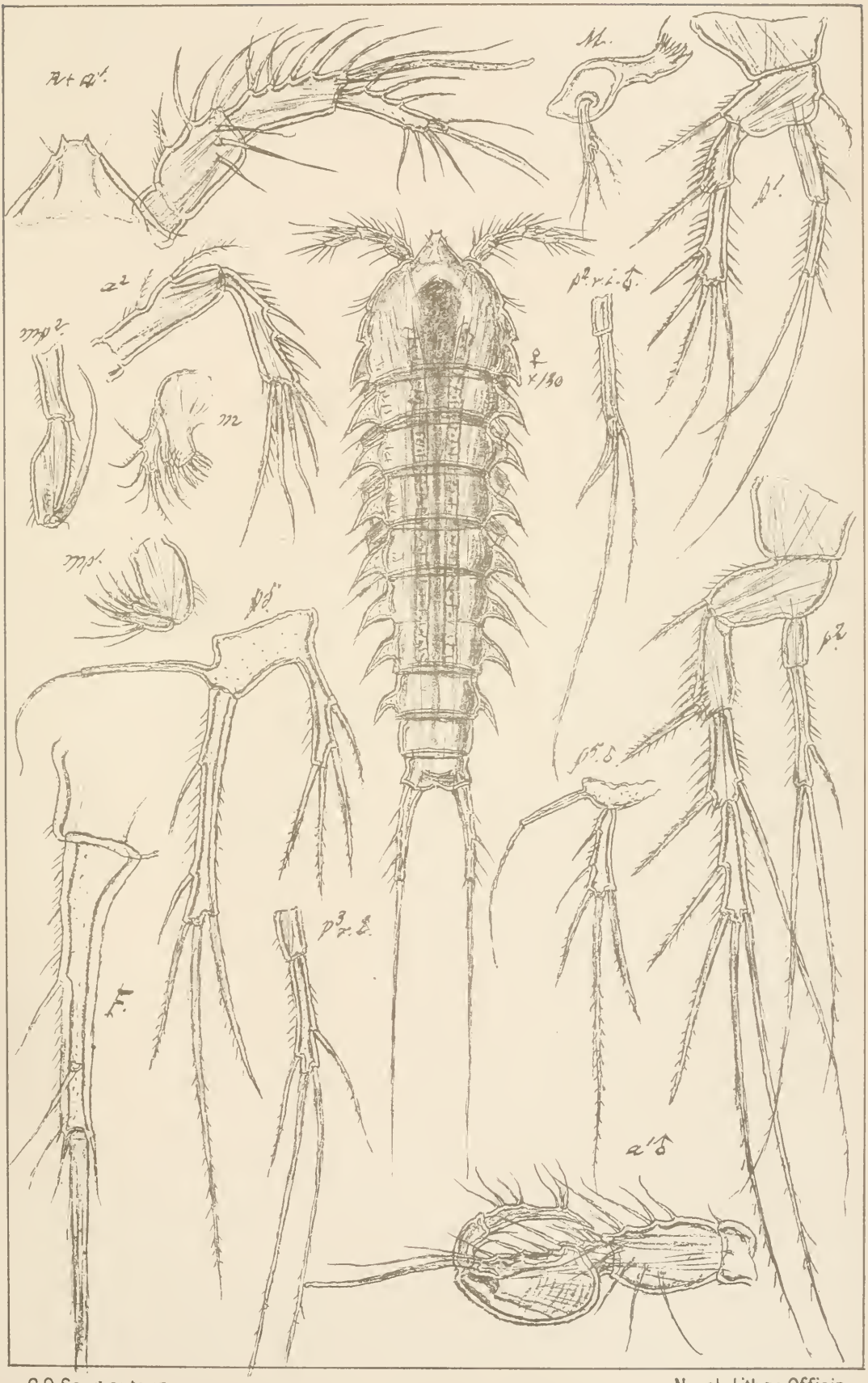
Anchorabolidæ — Harpacticoida — Pl. CCXIII.



G.O.Sars, autogr. — Norsk Lithgr. Officin

Ceratonotus pectinatus, G.O.Sars

Copepoda



G.O.Sars, autogr. Norsk Lithgr. Officin.

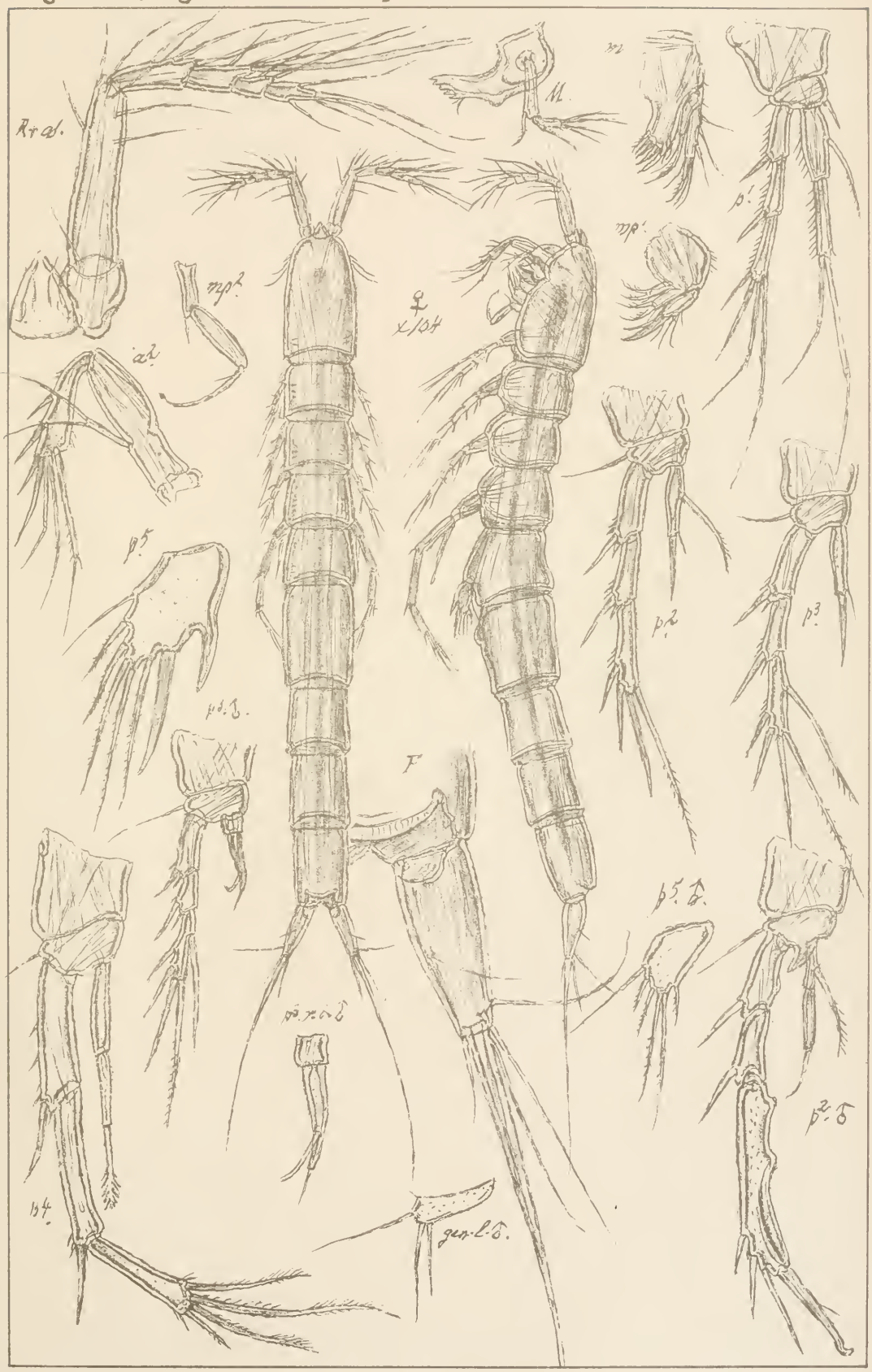
Arthropsyllus serratus, G.O.Sars

Copepoda

G.O.Sars, autogr. Norsk Lithgr. Officin

Cylindropsyllus lævis, Brady

Copepoda

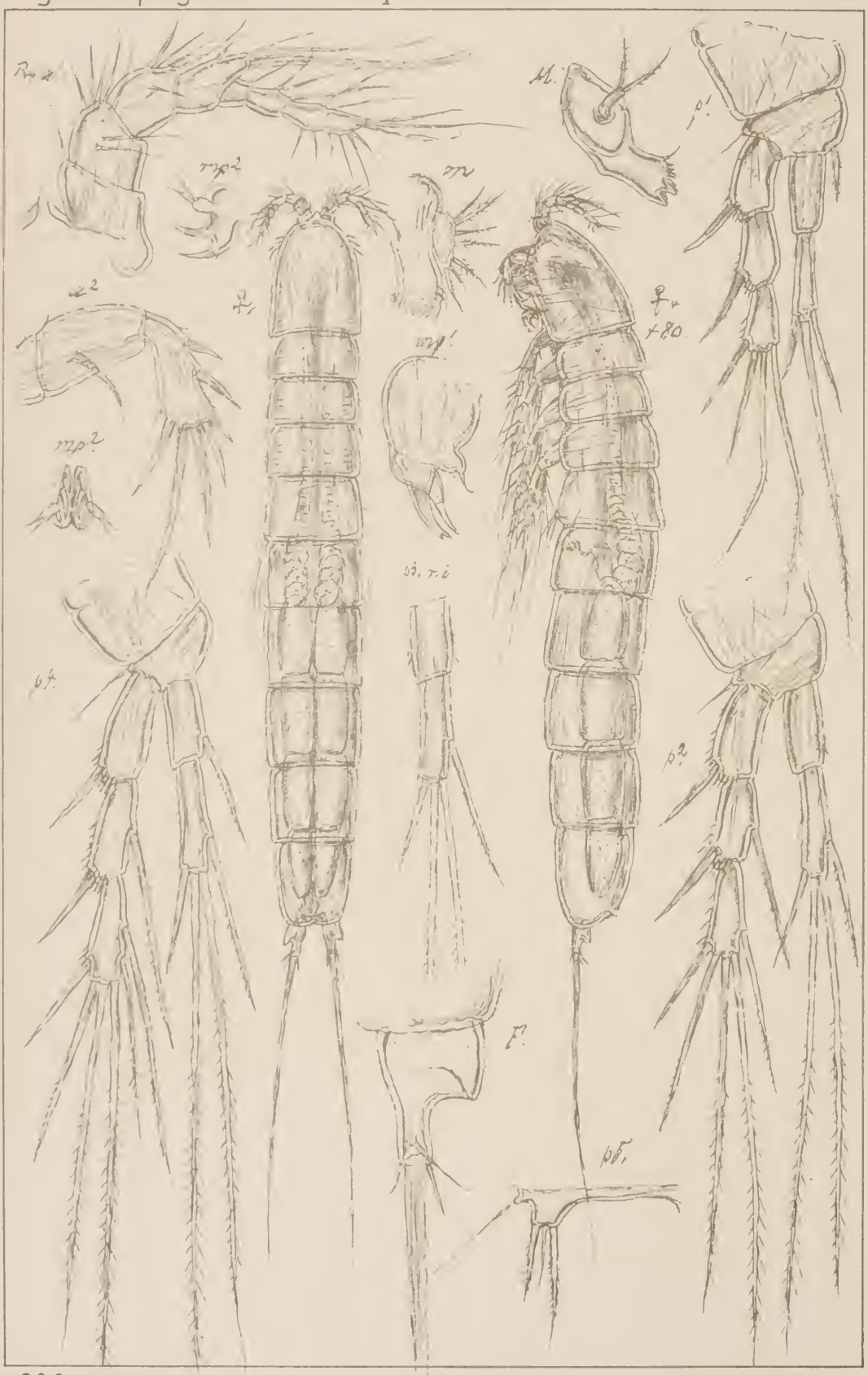


G.O.Sars, autogr. Norsk Lithgr. Officin.

Stenocaris gracilis, G.O.Sars

Copepoda

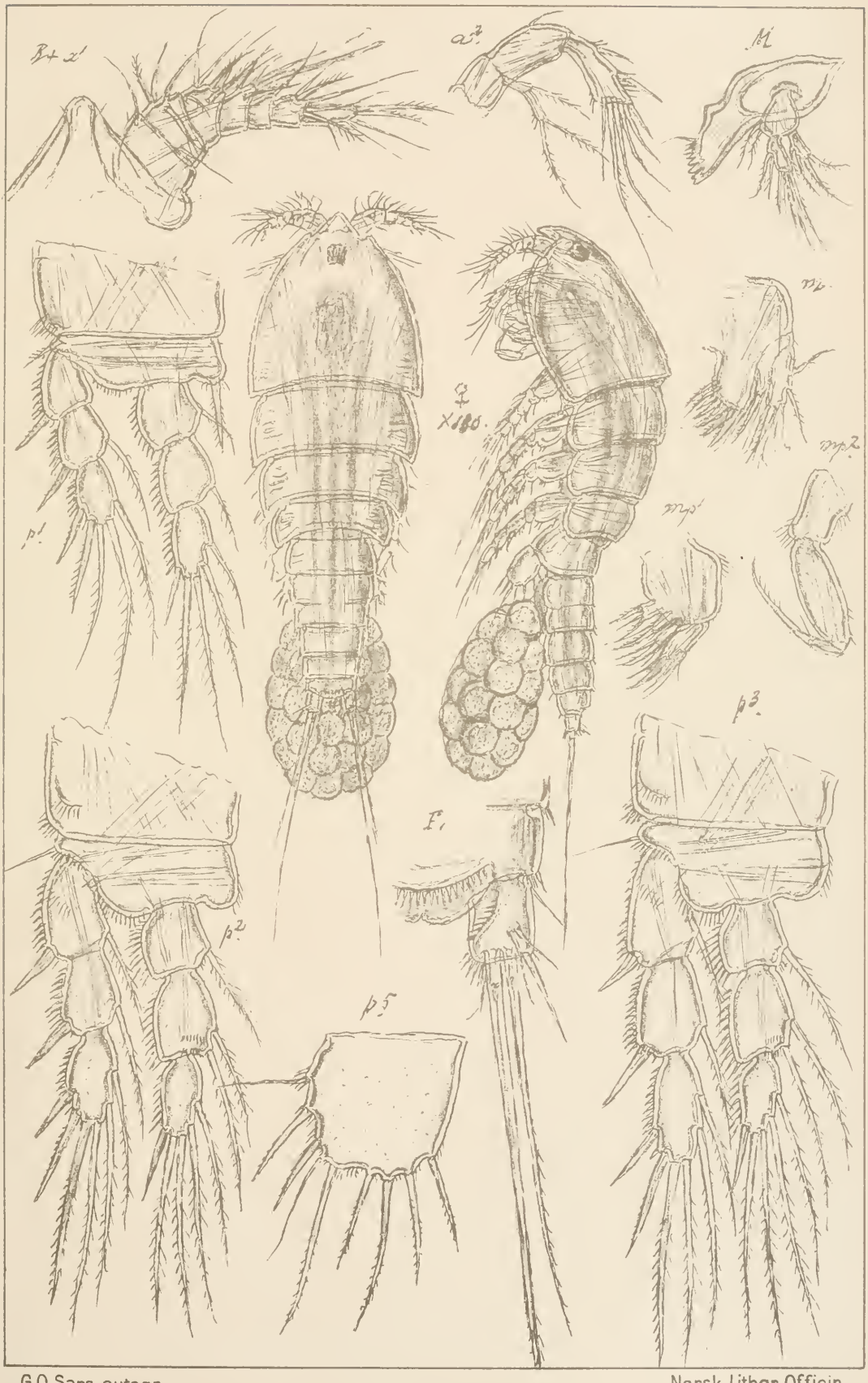
Cylindropsyllidæ Harpacticoida PL. CCXVII



G.O.Sars, autogr. Norsk Lithgr. Officin.

D'Arcythompsonia fairliensis, Scott

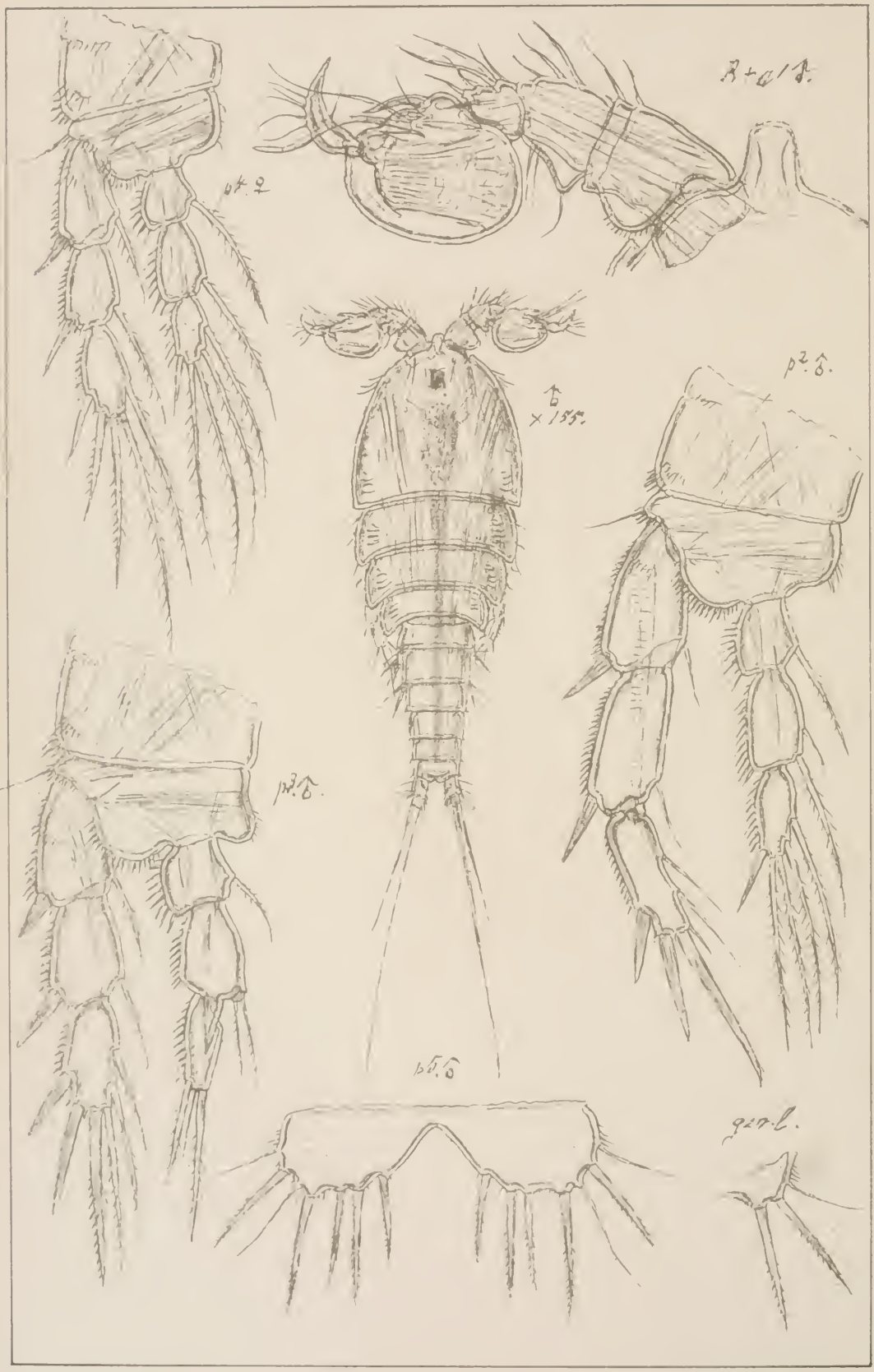
Copepoda



G.O.Sars, autogr. Norsk Lithgr. Officin.

Tachidius brevicornis, Lilljeb.

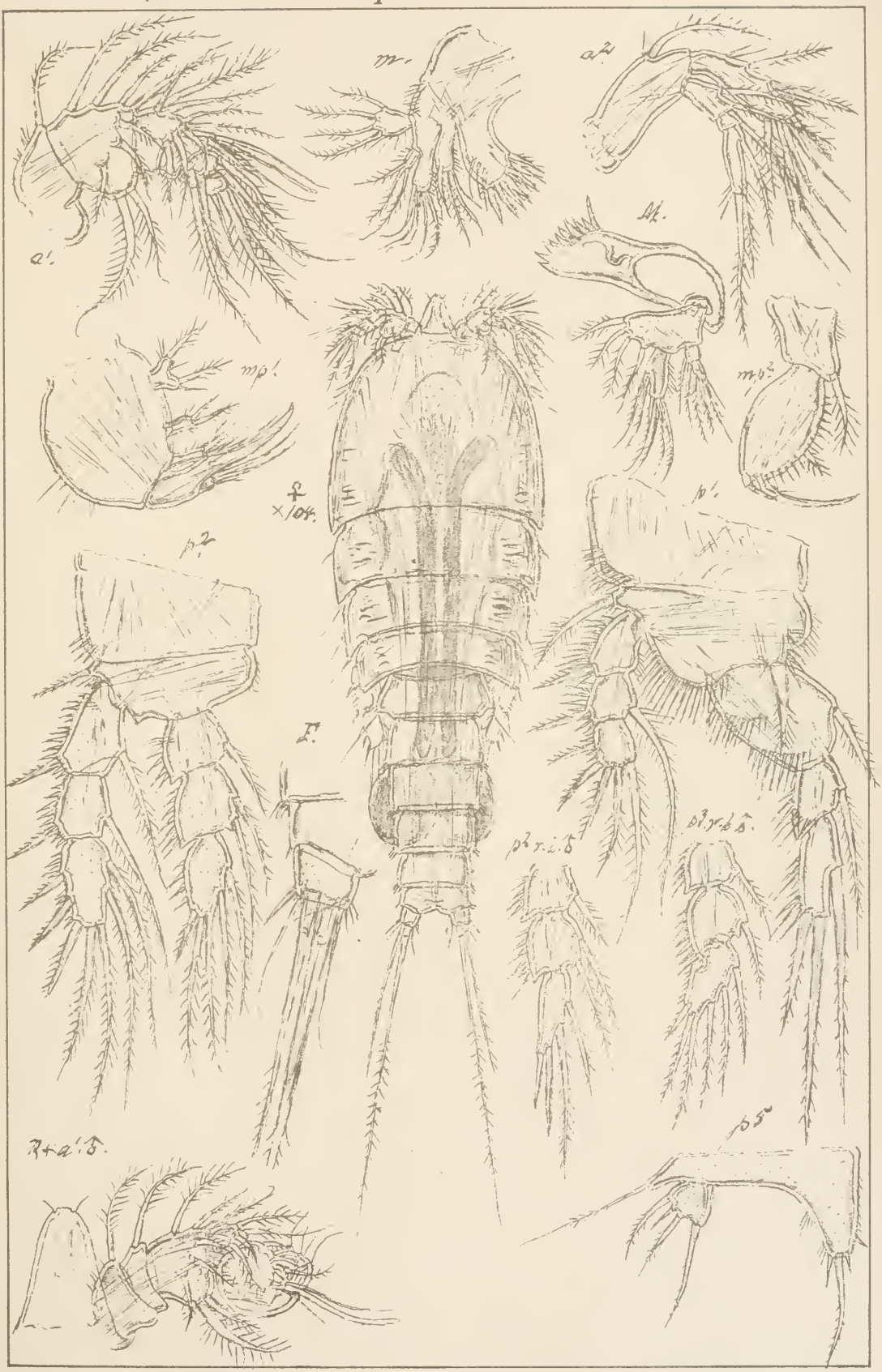
Copepoda



G.O.Sars, autogr. Norsk Lithgr. Officin.

Tachidius brevicornis, Lilljeb. (continued)

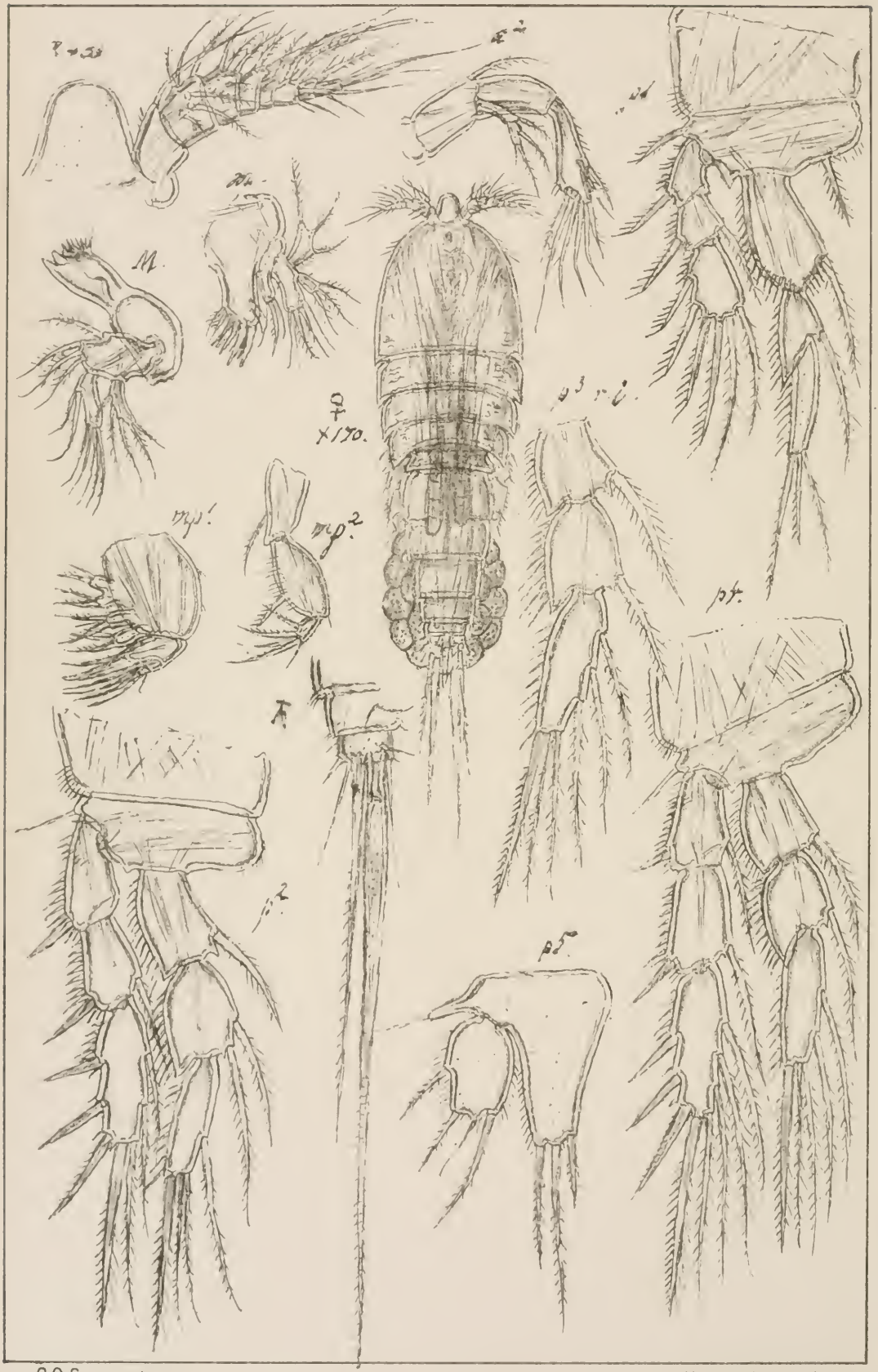
Copepoda



G.O.Sars, autogr. Norsk Lithgr. Officin.

Pseudotachidius coronatus, Scott

Copepoda

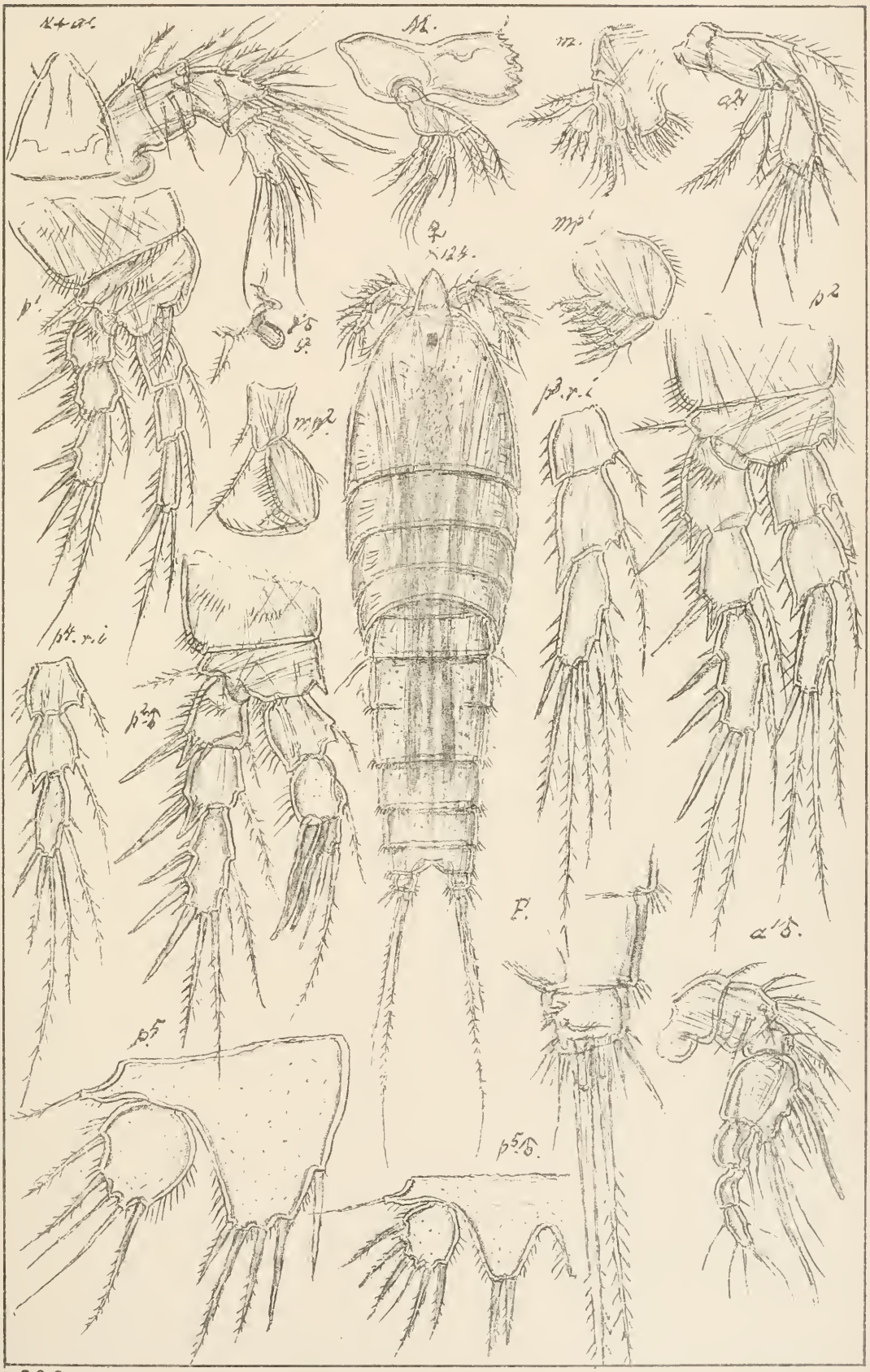


G.O.Sars, autogr. Norsk Lithgr. Officin.

Tachidiella minuta, G.O.Sars

Copepoda

Tachidiidœ — Harpacticoida — Pl. CCXXII.

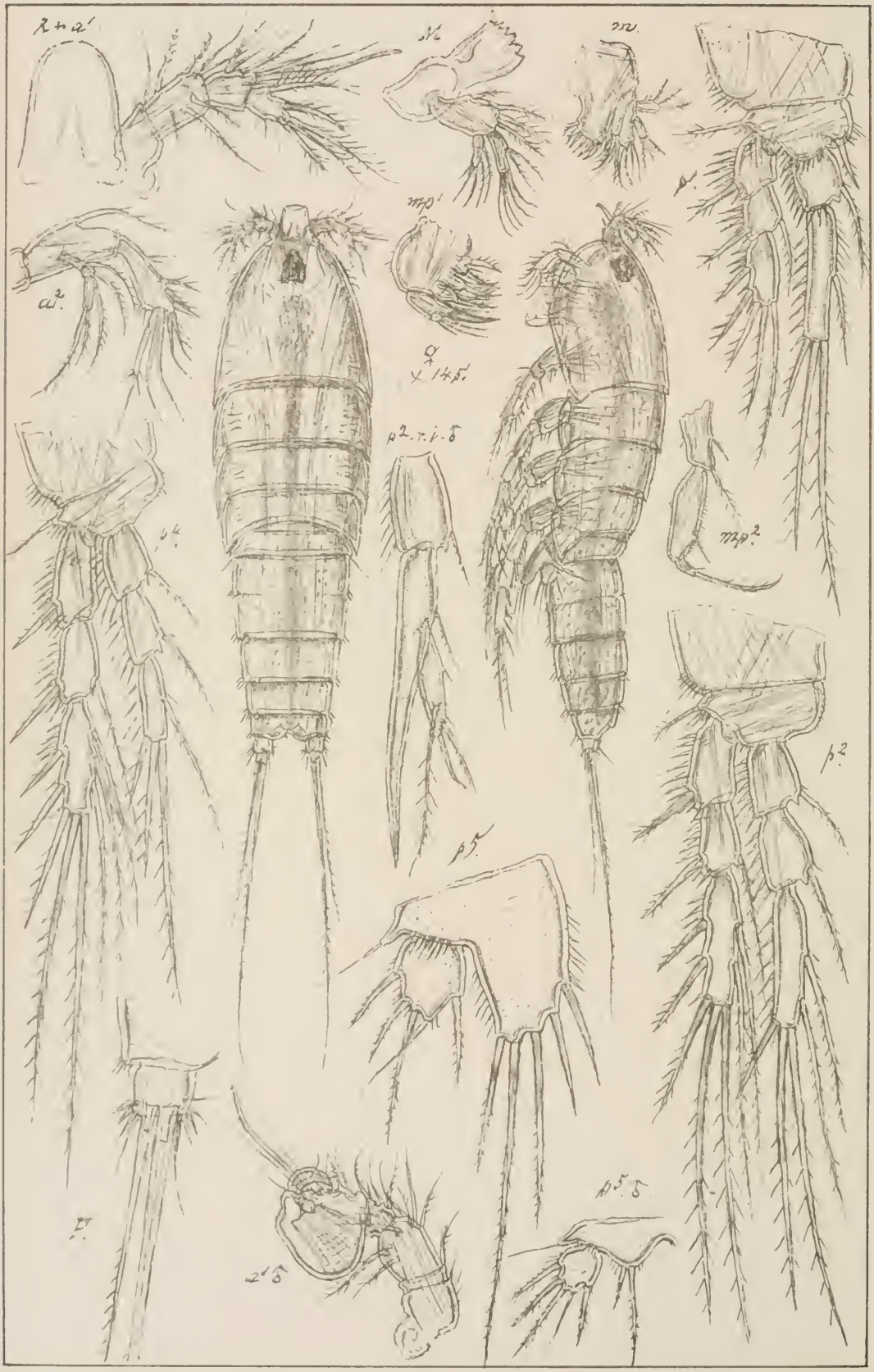


G.O.Sars, autogr. — Norsk Lithgr. Officin.

Robertsonia tenuis, Brady

Copepoda

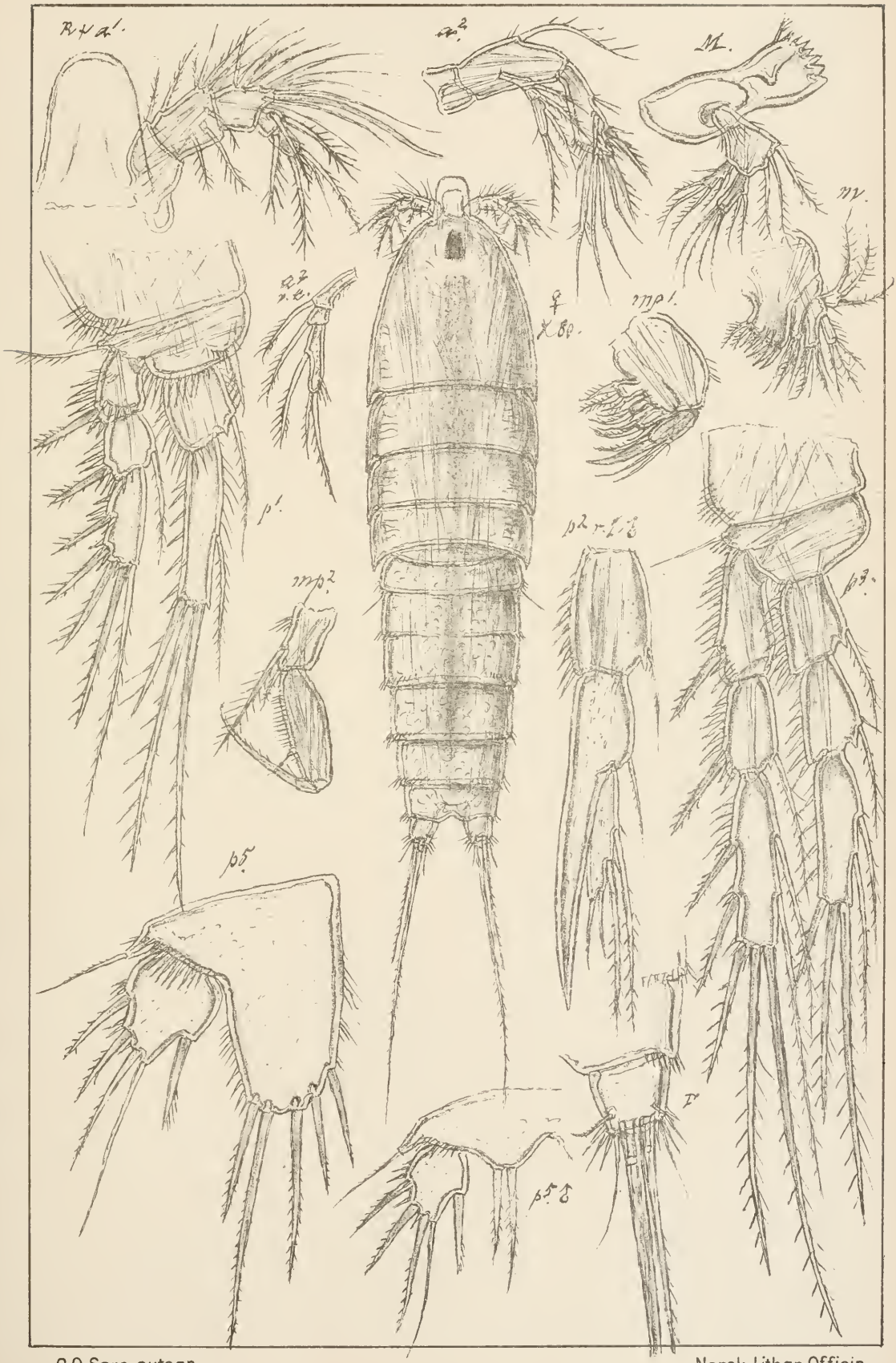
Tachidiidœ — Harpacticoida — Pl. CCVIII



G.O.Sars, autogr. — Norsk Lithgr. Officin.

Danielssenia typica, Boeek

Copepoda



G.O.Sars, autogr. Norsk Lithgr. Officin.

Danielssenia fusiformis (Brady)