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AN ACCOUNT
OF THE
CRUSTACEA
OF
NORWAY

AN ACCOUNT
OF THE
CRUSTACEA
OF
NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

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VOL. II.

ISOPODA



BERGEN

PUBLISHED BY THE BERGEN MUSEUM

SOLD BY

ALB. CAMMERMEYERS FORLAG, CHRISTIANIA

1899



19276

BERGEN. JOHN GRIEG

PREFACE.

I have now the satisfaction of presenting to the scientific world the 2nd Volume of my work on the Crustacea of Norway.

The *Isopoda* have not yet been treated of as a whole by any of the Scandinavian zoologists, although of solitary groups there have recently been published several excellent monographs, especially by Danish zoologists. Thus the *Cymothoidæ* and *Ægidae* have been treated of by Prof. Lütken and Meinert, the *Cirrolanidæ* by Dr. Hansen, and the extensive group *Oniscoida* by Mr. Budde-Lund. In all these monographs, however, both indigenous and foreign forms are combined, and the present Volume is accordingly the first faunistic work on Scandinavian Isopoda. In as much as this is the case, I hope that it will be of practical use to future zoologists, who may enter upon a study of the indigenous Isopod-Fauna.

The plan according to which the work has been carried out, is chiefly that followed in the 1st Volume treating of the nearly-allied order *Amphipoda*. Of course, in so doing, some limits have presented themselves, beyond which the treating of the several forms could not pass, though in some instances, perhaps, a more detailed account would have been desirable.

The difficulties connected with the elaboration of this work have been by no means small. I have especially taken great pains in investigating and critically determining the *Epicarida*, which undoubtedly is the most difficult of the Isopod groups, being at the same time of very prominent interest in biological respects. It is not improbable that some deficiencies and perhaps also errors may be found to exist in my account of this or the other groups; but considering the great difficulties connected with this investigation, I hope that they will be excused, and that they will soon be corrected by other zoologists. I may add, that the account especially of the *Oniscoida* and *Epicarida* would have been still much more defective, if I had not been assisted in a most ready manner by the directors of the

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Copenhagen Museum, who have kindly placed at my disposal the rich collections of these groups procured during recent years by that Museum.

As to the systematic arrangement here adopted, some objections may perhaps be urged against its validity. I must, however, observe, that it is chiefly out of regard to the merely practical side of the question, that I have been induced to retain unaltered this arrangement, proposed by me several years ago, and now sanctioned by several distinguished authors.

In the Appendix to the Volume, some additions, chiefly as regards the geographical distribution of the species, are given, as also descriptions and figures of a few new species.

The plates, as in the 1st Volume, have been prepared by the autographic method, the appropriateness of which has been proved both by the plates of the 1st Volume, and by several other illustrations published by the present author. I am sorry, however, that some of the last plates of the present Volume have been less perfectly executed, owing to some want of care on the part of the lithographer in the transfer of my drawings. Yet I hope that these plates too will be found sufficiently distinct to allow of easily recognising the species illustrated.

In concluding this short preface, I wish in the first place to express my most hearty feeling of gratitude to my friend, the distinguished Danish zoologist, Dr. Hansen, for the kindness with which he has at all times assisted me, both by forwarding to me specimens from the Copenhagen Museum, and by giving me much useful advice and information. I am likewise indebted to Mr. Budde-Land, the well-known author of the work on air-breathing Isopoda, for identifying some difficult forms of *Oniscoida*. There are also several other gentlemen to whom my thanks are due, partly for having sent me specimens, partly for having assisted me in other ways.

Finally, I beg to offer my best thanks to the direction of the Bergen Museum for the readiness with which it has undertaken the continued publication of this great work.

G. O. Sars.

PRINCIPAL WORKS ON ISOPODA.¹⁾

Isopoda in general.

- H. Milne-Edwards.* Histoire naturelle des Crustacés. Tome III. 1840.
- H. Rathke.* Beiträge zur Fauna Norwegens. 1843.
- H. Krøyer.* Crustacées, in Gaimard's Voyage en Scandinavie, etc. Atlas. 1849.
- J. Dana.* Report on the Crustacea of the United States Exploring Expedition. Part II. 1853.
- P. v. Beneden.* Recherches sur la faune littorale de Belgique. Crustacés. 1861.
- Cam. Heller.* Carcinologische Beiträge zur Fauna des adriatischen Meeres. Isopoda. 1866.
- Sp. Bate & Westwood.* A History of British sessile-eyed Crustacea. Vol. II. 1868.
- Fr. Meinert.* Crustacea Isopoda, Amphipoda et Decapoda Danica. 1877.
- Crustacea malacostraca (Det videnskabelige Udbytte af „Hauch's“ Togter). 1890.
- Oscar Harger.* Report on the marine Isopoda of New England and adjacent Waters. 1878.
- P. P. C. Heck.* Die Crustaceen gesammelt während der Fahrten des „Willems Barents“. 1882.
- G. O. Sars.* Oversigt af Norges Crustaceer I. 1882.
- Crustacea of the Norwegian North Atlantic Expedition. 1885.
- Fr. Beddard.* Report on the Isopoda of the Challenger Expedition. 1886.

¹⁾ It is of course not my intention to give here any complete account of the literature referring to the Isopoda, as such an account would fill several sheets; it is only my purpose to record some of the more important works, especially those referring to the northern fauna. The works are, as a rule, enumerated in chronological succession, and besides those treating of the Isopoda in general, some particular works are recorded for each of the chief groups, an arrangement which I hope may be of some practical use in facilitating reference.

- H. J. Hansen.* Oversigt af de paa Dijnphna-Toget indsamlede Krebsdyr. 1886.
 — Oversigt over det vestlige Grønlands Fauna af malacostrake Havkrebsdyr. 1887.
 — Isopoden, Cumaceen und Stomatopoden der Deutschen Plankton Expedition. 1895.
- D. Robertson.* Catalogue of the Amphipoda and Isopoda of the Firth of Clyde. 1888.
- T. R. R. Stebbing.* A History of Crustacea. Recent Malacostraca. 1893.
- Jules Bonnier.* Edriophthalmes (Résultats scientifiques de la campagne du „Candan“ dans le golfe de Gascogne). 1896.

Chelifera.

- H. Kröyer.* Nye Arter af Slægten Tanais. Nat. Tidsskr. Bd. IV. 1842.
- Fritz Müller.* Ueber der Bau der Scheerenassehn. Arch. f. Naturg. Jahrg. XXX, Bd. I. 1864.
- W. Lilljeborg.* Bidrag til kännedomen om de inom Sverige och Norrige förekommande Crustaccer af Isopodernes underordning och Tanaidernes familj. 1865.
- Anton Dohrn.* Zur Kenntniss von Bau und der Entwicklung von Tanais. Jenaische Zeitschrift, Bd. 3. 1870.
- G. O. Sars.* Revision af Gruppen Isopoda chelifera. Arch. f. Mathem. & Naturvid. 1881.
 Middelhavets Saxisopoder. Arch. f. Mathem. & Naturvid. 1886.
- Norman & Stebbing.* On the Crustacea Isopoda of the „Lightning“, „Porcupine“ and „Valorous“ Expeditions. Apseudidæ & Tanaidæ. 1884.
- H. Blanc.* Contribution à l'histoire naturelle des Asellotes hétéropodes. 1884.

Flabellifera.

- Chr. Lütken.* Nogle Bemærkninger om de nordiske Ægaarter. Vid. Meddelelser. 1859.
 — Tillæg til „Nogle Bemærkninger om de nordiske Æga-Arter“. Vid. Meddelelser. 1861.
- E. Hesse.* Mémoire sur les Pranzes et les Ancées. 1864.
- A. Dohrn.* Zur Kenntniss des Baues von Paranthura Costana (Untersuchungen über Bau und Entwicklung der Arthropoden). 1870.

- A. Dohrn.* Entwicklung und Organisation von Präniza (*Anceus*) maxillaris. Ibid.
- J. Schödte & Fr. Meinert.* Symbolæ ad monographiam Cymothoarum. I. *Ægidæ*. 1879.
- O. Harger.* Report on the result of dredging under the supervision of Alex. Agassiz, on the east coast of the United States during the summer of 1880. Isopoda. 1883.
- Norman & Stebbing.* On the Crustacea of the „Lightning“, „Porenpine“ and „Valorous“ Expeditions. Anthuridæ. 1884.
- C. Bovallius.* A new Isopod from the coast of Sweden. Bihang till Vetensk. Akad. Handl. Bd. 10. 1885.
- A new Isopod from the Swedish Arctic Expedition. Ibid.
- New or imperfectly known Isopoda. II. Ibid. Bd. 11. 1886.
- H. J. Hansen.* Cirolanidæ et familiæ nonnullæ propinquæ. 1890.

Valvifera.

- H. Goodsir.* On 2 new species of *Leachia*. Edinb. New. Ph. Journ. Vol. XXX. 1841.
- T. R. R. Stebbing.* On a new species of *Arcturus* (*A. danmoniensis*). Ann. Nat. Hist. 1874.
- E. J. Miers.* Revision of the *Idoteidæ*. 1881.
- Ch. Chilton.* Revision of New Zealand *Idoteidæ*. Trans. N. Z. Inst. 1889.
- A. Dolfuss.* Les *Idoteidæ* des côtes de France. Feuille des jeunes Naturalistes 1898.
- J. E. Benedict.* The *Arcturidæ* in the U. S. National Museum. Proc. of the biol. Soc. of Washington. 1898.

Asellota.

- H. Krøyer.* *Munna*, en ny Krebsdyrslægt. Nat. Tidsskr. Bd. 2. 1839.
- M. Sars.* Beskrivelse af en ny Slægt og Art af Isopoder, *Munnopsis typica* Sars. Chr. Vid. Selsk. Forhandl. 1860.
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- A. Dohrn.* Die embryonale Entwicklung des *Asellus aquaticus*. Zeitschr. f. wiss. Zoologie. 1866.

- C. Bovallius.* Notes on the family Asellidæ. Bihang till Kgl. S. Vetensk. Handl. Bd. II. 1886.
- C. G. Syc.* Beiträge zur Anatomie und Histologie von *Jacra marina* (Inaugural-Dissertation). 1887.

Oniscoida.

- J. E. Brandt.* Conspectus monographiæ Oniscodorum Latreillii. 1833.
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- Max Weber.* Ueber einige neue Isopoden der Niederländischen Fauna. Tydschr. d. nederlandsche Dierk. Vereenigg. 1881.
- Anatomisches über Trichonisciden. Arch. f. mikrosk. Anatomie. Bd. XIX.
- G. Budde-Lund.* Crustacea Isopoda terrestria. 1885.
- R. F. Scharff.* The Irish Wood-lice. 1894.

Bopyrida.

- H. Kröyer.* *Bopyrus abdominalis*. Nat. Tidsskr. Bd. 3. 1840.
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- E. Hesse.* Observations sur des Crustacés rares ou nouvelles des côtes de France. Ann. scienc. nat. 1865, 1867, 1876.
- R. Buchholtz.* Ueber *Hemioniscus*, eine neue Gattung parasitischen Isopoden. Zeitschr. wiss. Zool. Bd. 16. 1866.
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- R. Kossmann.* Studien über Bopyriden. Mittheil. a. d. zool. Station zu Neapel, 1881, and in Zeitschr. f. wiss. Zool. Bd. XXXV.
- Neucres über Cryptonisciden. Sitzungsber. d. Akad. d. Wissensch. zu Berlin. 1884.
- A. Giard & J. Bonnier.* Contribution à l'étude des Bopyriens. 1887.
- Sur les *Épicarides* de la famille des *Dajidæ*. 1889.
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- Sur les *Épicarides* parasites des Arthrostracés. Travaux du Labor. de Wimereux-Ambleteuse. 1895.



General Remarks.

The present order being rather nearly allied to that of the Amphipoda, a similar terminology may on the whole be applied to both. The body, which in most cases exhibits a more or less depressed, not as in the Amphipoda compressed, form, admits of being divided into 3 chief sections, viz., cephalon, mesosome and metasome, the urosome not being, as in the Amphipoda, defined as a particular division. In the group *Chelifera*, as also in the family *Anathidæ* among the *Flabellifera*, the cephalon is coalesced with the 1st segment of the mesosome, for which reason, in the said forms, this section may more properly be termed *cephalosome*. As to the several appendages, those of the cephalon are the same as in the Amphipoda, and are denominated in a similar manner. The 2 pairs of antennæ, it is true, are generally described as inner and outer, not as superior and inferior; but on a closer examination it may be easily proved, that in all forms the outer antennæ in reality issue beneath the inner. The 2 pairs of maxillæ, in the typical Isopoda, differ somewhat from those in the Amphipoda, the anterior ones being generally devoid of palp, whereas the posterior ones carry outside the outer lobe a lamellar appendage which ought to be regarded as a palp. The maxillipeds only exhibit a single pair of masticatory lobes, answering to the basal lobes in the Amphipoda. On the other hand they are provided outside with a more or less distinctly developed epignath, wholly wanting in the Amphipoda. In parasitic forms, as usual, the oral parts become more or less modified in their structure. The appendages of the mesosome, the legs, exhibit only in the terrestrial Isopoda (Oniscoidea) such a uniform appearance as to justify the name given to the order; but in by far the greater part of the Isopoda, the structure of the legs is rather diversified, in some cases (for instance in the Munnopsidæ) even more so than in the Amphipoda. The 1st pair generally differ conspicuously from the next succeeding ones, being prehensile and applied to the oral region,

thus meriting the name of true gnathopoda, but in some instances the 2 succeeding pairs assume a similar prehensile nature (*Ægida*, *Cirolanida*, *Idotheida*). In the group *Chelifera*, the 1st pair of legs attain their greatest development, exhibiting the character of true chelipeds, as in the higher Crustacea. The number of legs is 7 pairs, as in the Amphipoda, with the one exception of the family *Gnathiidae*, in which only 6 pairs are counted, the last pair being wholly absent. This, as is well known, is also the case with the young of all Isopoda, immediately after being hatched. The coxal plates to which the legs are appended, are far from being so distinct in the Isopoda as in the Amphipoda. In a great number of forms not even a trace of these plates is to be seen, and, when present, they are always so firmly connected with the corresponding segments, as scarcely to admit of being detached from them by dissection. In no case are branchial lamellæ found to be appended to these plates. The appendages of the metasome are, as a rule, 6 pairs, as in the Amphipoda. Of these the 5 anterior ones are in some instances natatory in character. But in the greater part of the Isopoda their function has changed to be more or less exclusively respiratory, and in such cases they lie densely crowded beneath the shield-like terminal portion of the metasome. In the group *Asellota* the 1st pair of these appendages are, as a rule, peculiarly modified, being in the female coalesced to a single thin opercular plate, covering the succeeding pairs, whereas in the male they are transformed into complicated copulative organs. Only the last pair can properly be termed uropoda. Their structure is rather variable in different Isopoda, affording excellent systematic characters. The telson is distinctly defined only in the *Anthurida*. In all other Isopoda it is fused with the preceding segment, and in some cases all the segments of the metasome are coalesced to a single shield-like plate, the so-called *urus*.

The systematic arrangement adopted in the present work is that proposed by the present author in 1882 (*Oversigt af Norges Crustaceer I*). I give below a Synopsis of the 6 Tribes into which the Isopoda, according to this arrangement, are divided, each tribe being defined by 3 characters, viz., those of the 1st pair of legs, the uropoda, and the pleopoda:

Legs of 1st pair	cheliform. Uropoda distinctly developed,	terminal. Pleopoda, when exclusively natatory.	1. Chelifera.	
		Uropoda lateral,	forming together with the terminal segment of the metasome a caudal fan. Pleopoda for the most part natatory.	2. Flabellifera.
	valve-like, inflexed, arching over the pleopoda, which to a great extent are branchial.		3. Valvifera.	
	not cheliform.		Pleopoda exclusively branchial, generally covered by a thin opercular plate (the modified 1st pair.)	4. Asellota.
		Uropoda terminal,	Pleopoda fitted for air-breathing.	5. Oniscoidea.
			Pleopoda, when present, exclusively branchial in the adult animal, and not covered by any operculum.	6. Epicarida.

Tribe 1.

CHELIFERA.

Body generally slender, nearly cylindric in form. Cephalon and the 1st segment of mesosome coalesced, forming together a kind of carapace, which on each side contains a small branchial cavity. The 6 other segments of mesosome well defined, with the coxal plates small or inconspicuous. Metasome generally composed of 6 segments, the 5 anterior short, subequal, the last much the largest. Eyes distinct or wanting. Superior antennae generally simple, sometimes, however, provided with a distinct secondary appendage; inferior ones smaller than the superior and issuing immediately beneath them. Mandibles with or without palps. Anterior maxillae provided with a reflexed, setiferous palp; posterior ones very small, often quite rudimentary. Maxillipeds more or less coalesced at the base, and each having outside a membranous epignath projecting within the branchial cavity. 1st pair of legs very strong, curving anteriorly, and each terminating in a cheliform hand; 2nd pair sometimes unlike the succeeding ones, which are simple, ambulatory. Pleopoda, when present, comparatively small, natatory, rami lamelliform. Uropoda terminal, consisting of a short basal part and one or two terminal filaments. Sexual difference often very pronounced.

Remarks. — This is certainly a very anomalous group, differing, as it does, in certain particulars very markedly from the typical Isopoda, and exhibiting some points of resemblance to apparently widely distant crustacean orders, for instance the *Cumacea*. For this reason it has been proposed by some authors to remove this group altogether from the Isopoda, and to regard it as a distinct order. I do not find, however, that such an arrangement affords any real advantage, and as the present forms agree in many other respects with the Isopoda, I prefer to retain them within that order as an anomalous tribe. The most striking external feature is undoubtedly the peculiar modification of the 1st pair

of legs, or the gnathopoda, into strong cheliform organs, a character not found in any other Isopoda, and somewhat recalling the higher Crustacea, crabs and lobsters. It is indeed from this character that the name of the group, chelifera, proposed by the author, has been derived. Another very anomalous feature is the complete fusion of the cephalon and the 1st segment of the mesosome, to form a kind of carapace, and the localisation of the respiration to that part, instead of, as in other Isopoda, to the metasome. In connection therewith is also the more anterior situation of the heart in the present forms. The group contains 2 distinct families, *Apseudidæ* and *Tanuidæ*, both represented in the fauna of Norway.

Fam. 1. Apseudidæ.

Body more or less elongated, tapering behind, and subdepressed in front, with the cephalosome rather broad and carinated laterally. Free segments of mesosome very sharply marked off, and exhibiting at the insertions of the legs, distinct, though small coxal plates. Metasome very narrow, composed of 6 well-defined segments. Eyes well-developed or rudimentary, being placed on distinctly defined lobes at the outer corners of the frontal margin. Superior antennæ issuing far apart, just beneath the ocular lobes, and consisting of a 3articulate peduncle and 2 unequal filiform flagella. Inferior antennæ much smaller than the superior, and sometimes having at the end of the peduncle a small squami-form appendage. Mandibles rather strong, each with a well-developed molar expansion and a triarticulate palp. Anterior maxillæ with 2 masticatory lobes, palp biarticulate and terminating in a number of slender setæ; posterior ones normally developed, though rather small. Epignath of maxillipeds rather large, forming a broad vaulted plate, terminating in a digitiform point. The 2 anterior pairs of legs unlike the others, and provided at the base with a small biarticulate exopodite; 1st pair distinctly cheliform and much restricted at the base, with the ischial joint obsolete; 2nd pair very powerful, fossorial in character, the outer joints being complanated and edged with strong spines. Pleopoda well developed and having the rami tipped with long natatory setæ. Uropoda biramous, rami filiform, multiarticulate, the inner one much the longer. Incubatory pouch normal.

Remarks. — This family is well distinguished from that of the *Tanuidæ* by the gradually tapering, and slightly depressed body, the greater development of the cephalosome, the peculiar structure of the antennæ and of the 2nd pair of legs, and the presence of a rudimentary exopodite at the base of the 2 anterior pairs

of legs. In the structure of the oral parts also, several well-marked differences are to be found. Thus the mandibles are provided with distinct palps, always wanting in the *Tanaidæ*, and the maxillæ are more fully developed, the anterior ones having 2 masticatory lobes, and the posterior ones exhibiting all the parts characteristic of the typical Isopoda. Finally, the epignath of the maxillipeds is of an essentially different shape, and much more fully developed than in the *Tanaidæ*. The family contains as yet 3 genera, viz., *Apseudes* Leach, *Sphyrapus* Norm. & Stebb., *Parapseudes* G. O. Sars, *Typhlopsudes* Beddard, and *Leiqpus* Beddard. Of these the 2 first-named genera are represented in the fauna of Norway.

Gen. 1. *Apseudes*, Leach, 1814.

Syn: *Eupheus*, Risso.

" *Rhoëa*, M. Edw.

Generic Characters. — Body, as a rule, very slender and attenuated, with the segments generally sharply marked off from each other. Cephalosome rather broad, depressed, more or less distinctly sculptured above, and generally terminating in front in a flattened rostral plate. First free segment of mesosome rather firmly connected to the cephalosome, and having the coxal plates spiniform, pointing obliquely in front. Metasome very narrow, more or less hairy, with the terminal segment rather produced. Ocular lobes generally well-defined, with or without distinct eyes. Superior antennæ of similar structure in the two sexes, both flagella rather elongated. Inferior antennæ furnished at the end of the peduncle outside with a scale-like setous appendage. Mandibles rather strong, cutting part divided into 2 superposed dentated lamellæ and having behind a dense bunch of slender spines doubly or trebly forked at the tip, palp well developed and densely setous. Chelipeds in male larger than in female, with the hand more tumid and the thumb tuberculated inside. Fossorial legs rather strongly built and of similar structure in the two sexes. All the pleopoda distinctly developed, rami unarticulate and clothed with long ciliated setæ. Uropoda with the rami very slender, filiform, being composed of numerous short articulations.

Remarks. — This is the first recorded genus, and may therefore be regarded as the type of the family. It is chiefly characterised from the next genus by the slender body, the flattened and distinctly sculptured cephalosome, the presence of a well-defined scale-like appendage to the inferior antennæ, and the less pronounced sexual differences, as regards the superior antennæ and the first 2 pairs of legs. The genus contains several species from different parts of the Oceans,

amounting to about 14 in all. Only a single species is as yet found off the coast of Norway.

Apsedes spinosus, M. Sars.

(Pl. I & II.)

Rhoëa spinosa, M. Sars, Oversigt over de i den Norsk-arktiske Region forekommende Krebsdyr, Christiania Vid. Selsk. Forh. f. 1858, p. 30.

Syn: *Apsedes talpa*, Liljeb. (not Mont.).

Specific Characters. — Body very slender and elongated, gradually tapering behind. Cephalosome distinctly areolated above, with a slight notch on each side in front of the middle, rostral plate cordiform, defined on each side by a distinct notch, and terminating in an acute, somewhat deflexed point. Ocular lobes well-defined, outer part slightly tumefied, and armed anteriorly with a short pointed prominence. Free segments of mesosome defined by deep constrictions, and having the upper face slightly tubercular. 1st pair of coxal plates of moderate size, spiniform, and pointing obliquely outwards, the others rather small and rounded. Antero-lateral corners of the 5 posterior segments produced to triangularly pointed, setiferous projections. Metasome very narrow, with the epimera of the 5 anterior segments produced to spiniform projections densely clothed with long ciliated bristles, terminal segment narrow and elongated, equalling in length the other 5 combined, subcylindrical in form and furnished laterally with numerous small setiferous nodules. Eyes imperfectly developed, with opaque whitish pigment and devoid of any distinct visual elements. Superior antennæ rather elongated, 1st joint of the peduncle attenuated distally and finely serrated in the proximal half of the inner edge, flagellum fully as long as the peduncle and 16—20-articulate, accessory appendage about half as long, and 8—9-articulate. Inferior antennæ with the flagellum longer than the peduncle. Chelipeds in female rather robust, scarcely smaller than the fossorial legs, basal joint fusiform, with a strong dentiform projection on the posterior edge beyond the middle, hand much larger than the carpus, oblong ovate in form, thumb with a distinct tubercle in the middle of the inner edge; those in male with the hand very large and tumid, both the thumb and the dactylus strongly tubercular inside. Uropoda very much elongated, attaining almost half the length of the body, inner ramus composed of about 30 articulations, outer ramus scarcely $\frac{1}{2}$ as long and 12-articulate. Colour whitish. Length reaching to 13 mm.

Remarks. — The present species was briefly described by my late father in the year 1858 as *Rhoëa spinosa*, but was subsequently, by most authors, identi-

fied with *Apseudes talpa* of Montagu. Having, however, been enabled to examine the latter species from Mediterranean specimens, I have convinced myself of its distinctness from the Norwegian form. The latter grows to a much larger size than the typical species, and has the body more strongly spinous, differing moreover very conspicuously in the rudimentary condition of the eyes, which in *A. talpa*, on the other hand is well developed, with dark pigment and distinctly defined visual elements.

Occurrence. — The species occurs along the whole coast of Norway, from the Christiania Fjord to Vadsö on a bottom consisting of loose muddy clay with gravel or stones intermingled, the depth ranging from 30 to 150 fathoms. It is a rather sluggish animal, concealing itself in the loose mud, so that at first it is not easily caught sight of. In many cases, moreover, it is found to be so thickly covered with mud adhering to the several spiniform projections of the body, and to the setæ issuing from them, that it is rather difficult to recognise. I have never seen it make any attempt to swim, though the structure of the pleopoda would seem to allow it, at least in a younger state, to move at times freely through the water.

Distribution. — Bohuslän (Lälljeborg); SSW of Ireland (Porcupine Expedition) in a depth of 725 fathoms (Norman & Stebbing).

Gen. 2. *Sphyrapus*, Norm. & Stebb., 1884.

Generic characters. — Body less elongated than in *Apseudes*, though somewhat more slender in male than in female. Cephalosome broadest behind and gradually narrowed in front, upper face vaulted and less distinctly areolated, frontal plate imperfectly defined at the base. Ocular lobes very small. First free segment of mesosome rather broad, and firmly connected with the cephalosome, but not coalesced with the same. Coxal plates very small, not produced in the form of spines. Metasome not very much elongated, terminal segment comparatively short. Eyes wholly absent. Superior antennæ with the 1st joint of the peduncle rather large and flattened, accessory appendage small; flagellum in male with dense bunches of sensory filaments. Inferior antennæ very slender and without any scale-like appendage. Mandibles comparatively less strong than in *Apseudes*, palp very slender and only thinly setous. Chelipeds with the hand very large, submalleolate, being set on at right angles to the carpus, the latter, as also the meral joint, much more elongated in male than in female. Fossorial legs in male

of extraordinary length. Pleopoda well-developed, with both rami biarticulate. Uropoda of moderate length, and of a similar structure to that in *Apsceudes*.

Remarks. -- This genus has been established by Messrs. Norman & Stebbing, to include some forms differing from *Apsceudes*, among other things, in the absence of the scale-like appendage to the inferior antennae. As another distinctive character, is mentioned the supposed fusion of the first 2 segments of the mesosome with the cephalon; but this, I believe, is not quite correct. For in the Norwegian species, at any rate, the 2nd segment is well defined from the cephalosome, though apparently rather firmly connected with it. As a third characteristic feature may be mentioned the very pronounced sexual difference occurring in this genus, both as to the general form of the body, and to the structure of the superior antennae and the first 2 pairs of legs. The generic name refers to the peculiar malleolate appearance of the chelipeds, which, especially in the male, is very conspicuous. We know as yet of 4 species, 2 of which, *S. malleolus* and *S. tudes*, were procured during the Porcupine Expedition from very considerable depths, the greatest being 1460 fathoms, the 3rd, *S. serratus* G. O. Sars, likewise from great depths in the Arctic Ocean, the 4th a Norwegian form, to be described below.

Sphyrapus anomalus, G. O. Sars.

(Pl. III & IV.)

Apsceudes anomalus, G. O. Sars, Undersøgelser over Christianiafjordens Dybvandsfauna, N. Mag. f. Naturvid. f. 1899, p. 45.

Specific Characters. -- Body in female scarcely 5 times as long as it is broad, in male considerably more slender. Cephalosome with the upper face evenly vaulted and perfectly smooth. Frontal plate broad, rounded, exerted at the end to a short, finely denticulated point. First free segment of mesosome somewhat broader than the cephalosome; the succeeding ones much narrower and defined by deep constrictions; last segment shorter than the others. Metasome perfectly smooth, with the epimera not at all produced, terminal segment occupying about $\frac{1}{3}$ of the length of the metasome and obtusely rounded at the tip. Superior antennae in female about the length of the cephalosome, 1st joint of the peduncle gradually widening distally, with 4 strong setae on the outer edge, last joint very small; flagellum scarcely half the length of the peduncle, and 5-articulate, accessory appendage about half its length, and 3-articulate; those in male rather larger, flagellum more fully developed, 7-articulate, and carrying dense fascicles of sensory filaments. Inferior antennae fully as long as the superior, but much narrower, flagellum much shorter than the peduncle, and 4-articulate. Chelipeds

in female rather strong, hand very large oblong oval, malleolate, exceeding in length the 2 preceding joints combined, fingers about the length of the palm and densely serrated inside. Chelipeds of male much more elongated, with the basal joint exceedingly large, and the meral joint greatly elongated and narrow. Fossorial legs in female longer than the chelipeds, and in male almost attaining the length of the whole body, the carpus being greatly elongated. Ambulatory legs narrow, and but scantily setiferous. Uropoda scarcely exceeding in length the metasome, inner ramus 10-articulate, outer rather small and 3-articulate. Colour a pure white. Length of female 4 mm., of male 5 mm.

Remarks. — The present form was first recorded by the author under the name of *Apsceules anomalus*. It certainly belongs, however, to the genus *Sphyraxus* subsequently established by Messrs. Norman and Stebbing. It is very nearly allied to the arctic species, *S. serratus*, described by the present author from the Norwegian North Atlantic Expedition, but may be at once distinguished by the fact that the epimera of the metasome are not, as in that species, acutely produced, but are simple and rounded.

Occurrence. — I have met with this form along the whole Norwegian coast from the Christiania Fjord to Vadsö. In the great fjords especially, it is often found in rather large numbers on a bottom consisting of muddy clay, the depth ranging from 100 to 400 fathoms. It is accordingly, like the other species of the genus, a true deep-water form, and resembles in habits the species of the genus *Apsceudes*.

Distribution. — The Kara Sea (Hansen).

Fam. 2. Tanaidæ.

Body sublinear, cylindric, scarcely attenuated behind. Cephalosome not very broad, scarcely depressed, and having the front, as a rule, narrowly truncated; ocular lobes sometimes well defined, sometimes obsolete. Free segments of mesosome perfectly smooth, the middle ones being generally the longer; coxal plates inconspicuous. Metasome comparatively short, but scarcely narrower than the mesosome. Eyes present or wanting. Superior antennæ issuing close together from the frontal part, simple, in female comparatively short, conical and composed of only 3 or 4 articulations, in male, as a rule, much more fully developed, with a well-defined, multiarticulate flagellum. Inferior antennæ generally smaller

than the superior, flagellum short, and, as a rule, only biarticulate. Mandibles of various structure in the several genera, but always without palps. Anterior maxillæ with only a single slender masticatory lobe; posterior ones quite rudimentary, forming simple rounded lobes. Maxillipeds coalesced at the base, epignath generally narrow, falciform. Chelipeds, as a rule, strongly built and closely applied to the oral area, issuing from the posterior part of the cephalosome with a broad base, carpus generally broad and compressed, hand sometimes rather dissimilar in the two sexes. Second pair of legs not very different from the succeeding ones, being rather small and ambulatory in character. Pleopoda, as a rule, very small, with the rami lamelliform and incurved, sometimes in female rudimentary or quite wanting. Uropoda not much elongated, simple or biramous.

Remarks. — This family may be easily distinguished from the preceding one, both as regards the outward appearance of the body, and the structure of the several appendages. It comprises rather a large number of genera, amounting to about 15 in all. These genera are chiefly characterised by the structure of the mandibles, partly also by that of the superior antennæ, the legs and the several appendages of the metasome. As to habits, the greater part of the species—perhaps all—seem to be tubicular in character, constructing for themselves abodes of mud, into which they may wholly withdraw their bodies. They all, moreover, exhibit this peculiarity, namely, that on reaching the surface of the water, they remain floating, without being able to reimmerge their bodies, whereby the discovery of the generally very small and inconspicuous specimens is essentially facilitated. On placing some muddy clay taken from greater depths, in a shallow vessel, and stirring up the mud, they will very soon appear floating on the surface like small white pins, and may easily be taken up for a closer examination. To the Norwegian fauna belong 11 different genera, to be described below.

Gen. 1. **Tanais**, M.-Edw., 1829.

Syn. *Crossurus* Rathke.

Generic Characters. — Body not much elongated, but with the cephalosome rather tumid and provided with distinctly defined ocular lobes. Metasome only composed of 5 segments. Eyes well developed. Superior antennæ of similar structure in the two sexes, 3-articulate, with a very small knob-like terminal

flagellum. Inferior antennæ a little smaller than the superior, with the flagellum 3—4-articulate. Mandibles rather strong, with the molar expansion well-developed. Palp of the anterior maxillæ biarticulate and provided at the tip with several slender setæ. Epignath of the maxillipeds more fully developed than in most other Tanaidæ, forming a semilunar, ciliated plate terminating in a digitiform lappet. Chelipeds very robust, especially in the male, hand in the latter much larger than in female, and having the fingers subforcipate. Second pair of legs slightly differing from the succeeding ones, the dactylus being very much elongated and setiform; dactyli of the other pairs strongly hooked, and in the 3 posterior pairs armed with comb-like teeth. Only 3 pairs of pleopoda present, all of them rather fully developed, with densely setiferous lamelliform rami. Uropoda simple, not much elongated, and composed of a limited number of articulations. Incubatory pouch formed by 2 lamellæ only, issuing from the base of the 5th pair of legs.

Remarks.—This is the first recorded genus, and from it, therefore, the whole family has been named. It is well distinguished from all the other genera, especially by the structure of the metasome and the limited number of pleopoda. The genus contains as yet 4 species, viz., *T. tomentosus* Kröyer, *T. Carolini* M-Edw., *T. Dulongi* M-Edw. and *T. novæ-zeelandiæ* Thomson. Only the first-named of these species occurs off the coasts of Norway.

Tanais tomentosus, Kröyer.

(Pl. V.)

Tanais tomentosus, Kröyer, Naturh. Tidskr. Bd. IV, p. 183.

Syn: *Crossurus vittatus*, Rathke.

„ *Tanais vittatus*, Lilljeborg.

„ *Tanais hirticaudatus*, Sp. Bate.

Specific Characters.—Body of female about 5 times as long as it is broad, that of male somewhat shorter and thicker. Cephalosome rather tumid in its posterior part, and gradually narrowed anteriorly, frontal edge slightly angular in the middle. Free segments of mesosome defined by well-marked and rather deep constrictions, the 3 posterior ones being somewhat longer than the 3 anterior, and widening behind. Metasome fully as broad as the mesosome, but considerably narrowed in its posterior part, the 3 anterior segments being much the largest, and densely clothed laterally with stiff bristles, which on the 2 foremost ones are continued across the dorsal face in band-like fringes; 4th segment very small, terminal one scarcely broader, and subquadangular in form. Eyes well developed, with dark pigment and distinct visual elements. Superior antennæ in female

shorter than the cephalosome, and rather densely setiferous at the end of the joints, 1st joint about the length of the remaining joints combined, olfactory filaments 5 in number. Inferior antennæ but little shorter than the superior, though somewhat narrower. Chelipeds very strong, hand in female oblong oval and exceeding in length the carpus, both fingers provided inside with an obtuse tubercle; that in male considerably larger, with the fingers distinctly forcipate. 1st pair of pereopoda longer than the others, dactylus biarticulate and subulate in shape; the succeeding ones with the carpal joint somewhat expanded and armed with several strong denticles, dactylus in the 3 posterior pairs very strong, hooked and armed inside in their outer part with comb-like denticles. Uropoda about the length of the last 2 segments of metasome combined, 3-articulate and rather densely setiferous, middle joint the longest, terminal joint rather short. Body whitish, variegated on the dorsal surface with a dark brownish pigment forming on the cephalosome a close reticulation, on the segments of mesosome, interrupted transversal bands. Length of adult female 5 mm., of male somewhat less.

Remarks. — This form has been recorded by Krøyer, as early as in 1842, under the above name, whereas Rathke's description of his *Crossurus vittatus* dates from the succeeding year. According to the rules of priority therefore, the specific name proposed by Krøyer ought to be preferred to that of Rathke. The *T. Carolini* of M.-Edw. is very closely allied to the present species, and the only, in any way essential difference I have found in examining a single specimen of that species, is that the uropoda are 4-articulate instead of 3-articulate.

Occurrence. — Rathke found this form on oysters at Molde. It has subsequently been observed at Christiansund by v. Düben, and on the south coast by Örsted. My late father found it at Florö and Manger. I have myself observed it rather plentifully in a small bay at Korshavn, south of Bergen, where it occurred in quite shallow water among grass. At Haugesund, farther south, I have found it occasionally in weedy pools left by the tide.

Distribution. — Öresund (Krøyer), British Isles (Sp. Bate), Atlantic coast of North America (Harger).

Gen. 2. *Heterotanais*, G. O. Sars, 1880.

Generic Characters. — Body comparatively short and thick, slightly depressed, and exhibiting a rather different appearance in the two sexes. Metasome normally developed, with all 6 segments well defined. Eyes distinct, placed, as in

Tanaïs, on separate lobes. Superior antennæ in female short, triarticulate, with only a single terminal olfactory filament, in male more elongated, with the flagellum more or less developed. Mandibles rather strong, cutting edge in the left one consisting of 2 superposed dentated lamellæ, in the right mandible simple and finely serrated on the front edge, molar expansion in both mandibles large and thick. Palp of anterior maxillæ uniaarticulate, terminating with 2 setæ only. Epignath of maxillipeds narrow falciform. Oral parts in male quite abortive. Chelipeds in female normal, in male very different, being imperfectly chelate, thumb very short, or transformed to a posteriorly-pointing lappet. 1st pair of pereopoda longer than the others, with the dactylus setiform; the succeeding ones comparatively short and stout, with the dactylus simple. Pleopoda normal. Uropoda biramose, outer ramus very small, inner elongate, 4—5 articulate. Incubatory pouch normal.

Remarks. — This genus was established by the present author in 1880, to include *Tanaïs Örstedii* of Krøyer, which in some points differs rather markedly from the other Tanaidæ, though being most nearly allied to the genus *Leptocheilia* of Dana. From the latter it differs chiefly in the very anomalous structure of the chelipeds in the male. Besides the typical form, another species has been described by the present author from the Mediterranean as *H. anomalus*. Moreover, the north American form *Leptocheilia limicola* Harger, and the New Zealand species *Paratanaïs tenuis* Thomson, are most probably referable to this genus.

Heterotanaïs Örstedii, Krøyer.

(Pl. VI.)

Tanaïs Örstedii, Krøyer, Nat. Tidsskr. Bd. 4, p. 183.

Syn: *Tanaïs carculio* Krøyer ♂.
 " " *balthicus* Fr. Müller ♀.
 " " *rhyachites* Fr. Müller ♂.

Specific Characters. — Body about 5 times as long as it is broad, with the cephalosome in female of normal appearance, equalling in length the 3 succeeding segments combined, in male strongly produced and abruptly narrowed in front to a cylindrical neck, carrying on the tip the antennæ and eyes. Segments of mesosome much more densely crowded in male than in female. Metasome in male about half the length of the mesosome, in female scarcely longer than the last 2 segments combined, terminal segment comparatively short and obtusely rounded at the tip. Eyes of moderate size and same appearance in the two sexes. Superior antennæ in female shorter than the cephalosome, with the basal

joint nearly twice as long as the other 2 combined, in male considerably more elongated, and composed of 5 articulations successively diminishing in size, the outer 2 representing the flagellum. Chelipeds in female of moderate size, hand oval, with the fingers comparatively short, the thumb having, inside, 3 serrations, the dactylus a single tubercle; those in male of enormous size, carpus very large and produced in front, outside the hand, to a lamellar lobe, hand imperfectly chelate, the thumb being transformed into a thin, reflexed lappet instricted at the base, dactylus long and falciform, with 3 small denticles inside. First pair of pereopoda much larger than the others, the 3 posterior pairs more strongly built than the 2 preceding ones, with the basal joint rather tumid. Uropoda about half the length of the metasome, inner ramus 4-articulate, outer very small and biarticulate. Colour whitish. Length of adult female 2 mm., of male about the same.

Remarks. — The very pronounced sexual difference occurring in the present form has caused it to be twice described under 2 different names. Kröyer described the female as *Tanais Örstedii* and the male as *T. curculio*, and some years afterwards Fr. Müller, having apparently not been aware of Kröyer's description, recorded the same form under 2 different names, viz.: *Tanais balthicus* (the female) and *T. rhynchites* (the male). In this manner therefore, no less than 4 different names have been assigned to the same species. As Kröyer was the first to observe the species, one of his 2 specific names ought to be retained for the species, and more properly that by which the female was described. From the Mediterranean species, *H. anomalus*, the present form is easily distinguished by the very different aspect of the male.

Occurrence. — I have taken this form rather plentifully in the Iddefjord at Fredrikshald, where it occurred on a muddy bottom at a depth of 3–6 fathoms. Male specimens were, as usual, far less frequent than female ones, of which numerous specimens, both young and adult, were collected. Some specimens of this form are moreover contained in our University Museum, having been taken by the late Dr. Boeck from piles of the quay at Christiansand.

Distribution. — Öresund (Kröyer), Baltic at Landskrona and Westervik (Lilljeb.), Prussia at Greifswalde (Fr. Müller), Bohuslän (Lilljeb.).

Gen. (2) **Paratanais**, Dana, 1852.

Generic Characters. — Body of female linear, more or less elongated, of male much shorter and stouter. Cephalosome and metasome in both sexes normal. Eyes distinct, being much larger in male than in female, superior antennae in female conical, 3-articulate, in male much more fully developed, consisting of a biarticulate peduncle and a well-defined 4-articulate flagellum densely clothed with sensory filaments. Mandibles well-developed and of a structure similar to that in the preceding genus. Oral parts in male, with the exception of the maxillipeds, abortive, epistome greatly produced. Chelipeds in both sexes normal and not very dissimilar, hand oblong oval, fingers comparatively short. Pereiopoda of moderate size, 1st pair slightly differing from the others, and having the dactylus setiform, the 3 posterior pairs much stronger than the 2 preceding pairs, though having the basal joint not much tumefied. Pleopoda all well developed, being comparatively larger in male than in female. Uropoda small, biramous, rami subequal and biarticulate. Incubatory pouch normal.

Remarks. — This genus was established in the year 1852 by Dana, to include a small Tanaid from the Sooloo Sea, *P. elongatus*. Several species have been subsequently added to this genus, but the greater part of them are in my opinion evidently generically distinct, and at the present time only a single additional species is to be noted, viz., the one described below. The genus is somewhat intermediate in character between the genera *Leptochelia* and *Typhlotanais*, though differing in some points rather markedly from both of them.

Paratanais Batei, G. O. Sars.

(Pl. VII.)

Paratanais Batei, G. O. Sars, Revision of Gruppen Isopoda chelifera, p. 32.Syn: *Paratanais foreipatus*, Sp. Bate (not Lilljeb.)

Specific Characters. — Body of female about 5 times as long as it is broad, slightly tapering in front and behind, that of male much shorter and conspicuously constricted in the middle. Cephalosome in female gradually tapering anteriorly, with the frontal margin slightly angular in the middle; that of male not having the anterior part prolonged; ocular lobes in both sexes imperfectly defined. Metasome in female scarcely as broad as the mesosome and furnished laterally with scattered hairs, terminal segment about the length of the 2 preceding ones combined, and evenly rounded at the tip. Eyes in female comparatively small, though distinct, in male very large, oval, with numerous refracting cornea. Superior antennae in female shorter than the cephalosome, basal joint somewhat

exceeding in length the other 2 combined, terminal joint longer than the penultimate one; those in male attaining almost $\frac{1}{3}$ of the length of the body, 1st joint of the flagellum very short, discoidal and, like the 2 succeeding joints, having a dense bunch of olfactory filaments. Chelipeds in female somewhat tapering distally, hand a little longer than the carpus, and oblong oval in form, with the fingers much shorter than the palm; those in male slightly differing, the hand being conspicuously dilated in the middle. Uropoda about the length of the last 2 segments of metasome combined, outer ramus a little shorter and narrower than the inner, joints of the rami of equal length. Length of adult female 1.60 mm., of male 0.90 mm.

Remarks. — This form was first recorded by Sp. Bate, but was erroneously identified by him with *Tanais foreipatus* Lilljeborg, which belongs to a very different genus. It was therefore necessary to change the specific name, and in 1880 I proposed for the species the name of *P. Batei*. From the type species, *P. elongatus* Dana, it is easily distinguished by its much less slender form, the male especially exhibiting quite an unusually short and thick body.

Occurrence. — I have met with this form in several places on the west coast of Norway, in comparatively shallow water among the roots of Laminaria. The males, as usual, are far less numerous than the females and, on the whole, look so very different, that they may easily be mistaken for quite a different species. As however, they, were found in company with the females, and no other Tanaid occurred in these places, their true relation could with certainty be affirmed.

Distribution. — British Isles (Sp. Bate), Mediterranean at Spezia (the author).

Gen. 3. *Typhlotanais*, G. O. Sars, 1880

Generic Characters. — Body in female more or less elongated, sub-depressed, linear, with the lateral contours almost straight; that of male comparatively shorter and constricted in the middle. Cephalosome of moderate size, narrowly truncated in front, or slightly produced in the middle, with no traces of ocular lobes. 1st free segment of mesosome generally much shorter than the others. Metasome normal. Eyes wholly absent. Superior antennae in female conically attenuated, 3-articulate, with the middle joint small, the terminal one narrow and elongated; those in male much larger and of a similar structure to that in

the genus *Paratanais*. Inferior antennæ, as a rule, rather narrow, with the 2nd joint more or less dilated. Mandibles well-developed, cutting edge obscurely dented and provided on the left mandible with a distinct secondary lamella, molar expansion cylindric, straight, and slightly dilated at the tip, which is transversely truncated, and surrounded with dentiform tubercles. Oral parts in male, excepting the maxillipeds, abortive; epistome prominent, globular. Chelipeds in female less robust, generally attenuated distally, with the hand comparatively narrow, and the fingers simple; those in male but slightly different. 1st pair of pereopoda, as a rule, longer than the second, with the dactylus setiform; the succeeding ones comparatively short, basal joint of the 3 posterior pairs generally strongly tumefied. Pleopoda normally developed and larger in male than in female. Uropoda short, biramosc, both rami biarticulate, or one of them unarticulate. Incubatory pouch normal.

Remarks. — This genus is chiefly distinguished from the preceding ones by the total absence of eyes and ocular lobes, as also by the somewhat different structure of the mandibles. Moreover the subulate form of the superior antennæ in the female, and the narrowness of the band of the chelipeds may serve as recognizing marks. The genus contains rather a large number of species, which all are true deep-water forms, and pronouncedly tubicolar, constructing small cylindric tubes of mud-particles agglutinated together. No less than 9 different species occur off the coast of Norway, and will be described below. Moreover the present author has recorded a Mediterranean species, *T. messinensis*, and 2 additional species, *T. koryculensis* and *T. brachyurus* have been described by Mr. F. Beddard from the Challenger Expedition.

1. *Typhlotanais tenuimanus* (Lilljeb.).

(Pl. VIII, fig 1.)

Tanais tenuimanus, Lilljeborg, Bidrag till Kännedomen om de inom Sverige och Norrige förkommande Crustaceerne af Tanaidernes familj, p. 15.

Specific Characters. — ♀. Body more than 6 times as long as it is broad, with the segments only separated by very narrow constrictions. Cephalosome rather large, much longer than it is broad, and gradually attenuated in front. 1st free segment of mesosome much shorter than the others, the 4 succeeding ones subequal, rectangular, last one somewhat shorter. Metasome slightly dilated in the middle, with the terminal segment about the length of the 2 preceding ones combined. Superior antennæ but little shorter than the cephalosome, subulate, terminal joint much elongated and narrow, almost attaining the length of the

basal one. Inferior antennae with the 2nd joint of the peduncle considerably dilated. Chelipeds much attenuated, hand very narrow, and not nearly attaining the length of the carpus, fingers shorter than the palm. 1st pair of pereopoda longer than the others; the 2 succeeding pairs comparatively robust, with the meral joint dilated distally, triangular in form, and carrying inside a strong spine; the 3 posterior pairs likewise strongly built, with the basal joint much tunnelled, and the 2 outer joints minutely serrulate on the inner edge. Uropoda attaining half the length of the metasome, both rami biarticulate and rather narrow, especially the outer one, which scarcely exceeds in length the basal joint of the inner, and has its terminal joint about twice the length of the basal one. Length reaching to 4.20 mm.

Remarks. — This is the largest and finest species of the genus, and may, moreover, easily be recognized by the strongly attenuated chelipeds and the structure of the uropoda. It may be regarded as the type of the genus.

Occurrence. — I have met with this beautiful form in numerous places on the Norwegian coast, from the Christiania Fjord up to the Lofoten Isles, in depths ranging from 50 to 300 fathoms. In some places, for instance in the Christiania Fjord south of Drøbak, it occurs in considerable numbers on a bottom of loose muddy clay, covered with decaying *Zostera*. The specimens examined by Prof. Lilljeborg were procured at Molde. Out of Norway, it has not yet been recorded.

2. *Typhlotanais microcheles*, G. O. Sars.

(Pl. VIII, fig. 2.)

Typhlotanais microcheles, G. O. Sars, l. c. p. 38.

Specific Characters. — ♀. Body somewhat more slender than in the preceding species, being about 7 times as long as it is broad, and having the segments more sharply marked off from each other. Cephalosome gradually attenuated anteriorly, frontal margin acutely produced in the middle. First free segment of mesosome rather short and somewhat widening in front; the remaining segments subquadrate in outline. Metasome scarcely broader than the mesosome, and having the terminal segment rather short. Superior antennae comparatively short, but little exceeding half the length of the cephalosome, conical in form, basal joint longer than the other 2 combined, terminal joint produced at the tip to a somewhat inward-pointing denticle. Inferior antennae with the 2nd joint of the peduncle less dilated than in the preceding species. Chelipeds rather poorly developed, hand unusually small and narrow, with the fingers about the length of the palm. 1st pair of pereopoda not very different from the 2 succeeding pairs, though with the dactylus more produced. The 3 posterior pairs less

robust than in *T. tenuimanus*, with the basal joint less tumid, and the 3 outer joints each armed inside with a strong denticle. Uropoda about half the length of the metasome, rami very narrow and unequal, the inner biarticulate, the outer unarticulate and scarcely more than half as long. Length 2.70 mm.

Remarks. — This species is nearly allied to *T. tenuimanus*, though easily distinguishable by several well-marked differences, for instance, the acutely produced frontal margin, the comparatively short superior antennae, the unusually poor development of the chelipeds, and the structure of the uropoda.

Occurrence. — Only a few female specimens of this form have hitherto been found by me. These were collected in two widely-distant localities, viz., at Bekkervig, on the west coast of Norway, and at Kvalø on the Nordland coast, the depths being 60—100 fathoms.

3. *Typhlotanais finmarchicus*, G. O. Sars.

(Pl. IX.)

Typhlotanais finmarchicus, G. O. Sars, l. c. p. 36.

Specific Characters. — Body in female sublinear, depressed, about 6 times as long as it is broad, with the segments only separated by narrow constrictions; that of male less elongated, with the segments more sharply marked off from each other. Cephalosome in female almost as broad as it is long, with the side-contours evenly arcuate; that in male considerably more narrowed in front. 1st free segment of mesosome in female about same size as the last one, the 4 middle ones considerably larger and rectangular. Metasome in female of nearly equal breadth throughout, in male much more fully developed, subfusiform and occupying $\frac{1}{3}$ of the length of the body. Superior antennae in female scarcely attaining the length of the cephalosome, basal joint almost twice as long as the other 2 combined; those in male modified in the usual manner, basal joint very large and laminar, slightly widening distally. Chelipeds in female of moderate size, hand slightly dilated in the middle and nearly as long as the carpus, fingers about the length of the palm; those in male somewhat more feeble, with the hand narrower and provided inside the insertion of the dactylus with a transverse row of about 5 setae. 1st pair of pereopoda a little longer than the succeeding pairs, and having the dactylus more produced; the 3 posterior pairs moderately strong, with the basal joint not much tumefied, and the carpal joint forming a smooth, rounded prominence at the end inside. Pereopoda in male comparatively more slender than in female. Uropoda rather short, scarcely exceeding $\frac{1}{3}$ of the length of the metasome, both rami distinctly biarticulate, the outer one shorter and much

narrower than the inner, both articulations equal in size. Body in female whitish, semipellucid, each of the segments of the mesosome having 2 irregular, juxtaposed patches of a light yellowish colour derived from some opaque matter lying inside the skin; that of male slightly variegated with a pale brownish pigment. Length of female 2.00 mm., of male 1.50 mm.

Remarks. — This form, at first sight, looks rather like *T. æquiremis* Lilljeborg, to be described below, but is found, on a closer examination, to differ in the structure of the superior antennæ, the posterior pairs of pereopoda, and the uropoda. It is also rather inferior in size.

Occurrence. — I found this species, many years ago, rather plentifully in the harbour of Vadsø at a depth of 30 fathoms. Male specimens occurred not infrequently together with the females, and could of course with perfect certainty be referred to this species. Otherwise it is a matter of great difficulty to refer male specimens to their respective species, not only because they differ very markedly from the females, but because they exhibit a perplexing mutual similarity.

4. *Typhlotanais æquiremis* (Lilljeborg).

(Pl. X₁ fig. 1).

Tanais æquiremis, Lilljeborg, l. c. p. 21.

Syn: *Tanais depressus*, G. O. Sars (olim).

Specific Characters. — ♀. Body linear, more than 6 times as long as it is broad, and pronouncedly depressed, with the cephalosome rather short, but little longer than it is broad. First free segment of mesosome shorter than the others, which are rectangular in form. Metasome scarcely longer than the last 2 segments of mesosome combined, and of equal breadth throughout, terminal segment comparatively short, and obtusely truncated at the tip. Superior antennæ about the length of the cephalosome, conically tapering, basal joint somewhat longer than the other 2 combined. Chelipeds comparatively strong, hand larger than usual, attaining the length of the carpus, and oblong oval in form, fingers about the length of the palm. 1st pair of pereopoda considerably longer than the 2 succeeding ones, which are rather small; the 3 posterior pairs very robust, with the basal joint exceedingly tumefied, and the carpal joint quite smooth, not produced inside. Uropoda very short, but little longer than the terminal segment of the metasome, rami subequal in length, the outer one distinctly biarticulate and terminating in a rather strong seta, inner rami unarticulate, though sometimes with a very slight indication of a subdivision beyond the middle. Length 3.10 mm.

Remarks. — This form was first recorded by the present author as a new species under the name of *Tanaïs depressus*. I have, however, subsequently convinced myself that in reality it is identical with the form described by Prof. Lilljeborg at an earlier date, as *Tanaïs aqviremis*. The species may be recognized by the pronouncedly depressed form of the body, the comparatively strong chelipeds and the structure of the uropoda. Prof. Lilljeborg states that both rami of the latter are biarticulate, but the inner one does not in fact exhibit any distinct subdivision, and may more properly be said to be unarticulate.

Occurrence. — The species is rather common along the whole south and west coasts of Norway, in depths ranging from 30 to 100 fathoms. It extends northwards to the Lofoten Isles.

Distribution. — Bohuslän (Lilljeb.)

5. *Typhlotanaïs assimilis*, G. O. Sars.

(Pl. X, fig. 2).

Typhlotanaïs assimilis, G. O. Sars, l. c. p. 36.

Specific Characters. — ♀. Body rather slender, linear, subdepressed, about 7 times as long as it is broad, with the cephalosome comparatively large, exceeding in length the 2 anterior segments of the mesosome combined, and but slightly narrowed in front. 1st free segment of mesosome considerably shorter than the others, which are rectangular in shape. Metasome longer than the last 2 segments of mesosome combined, terminal segment about the length of the 2 preceding ones taken together, and obtusely produced at the tip. Superior antennæ rather elongated, conically tapering, with the basal joint but little longer than the other 2 combined, terminal joint long and narrow. Inferior antennæ with the 2nd joint of the peduncle rather expanded and finely serrated on the upper edge. Chelipeds not nearly so strong as in *T. aqviremis*, and attenuated distally, hand about the length of the carpus, but much narrower, fingers shorter than the palm. 1st pair of pereopoda much longer than the 2 succeeding ones, which are very small, with the propodal joint oblong oval in form and somewhat compressed; the 3 posterior pairs resembling in structure those in *T. aqviremis*, though having the basal joint less tumefied. Uropoda somewhat longer than the last segment of the metasome, both rami distinctly biarticulate and rather unequal, the outer one being much shorter than the inner, though scarcely narrower. Length 1.70 mm.

Remarks. — The present species is nearly allied to *T. aqviremis*, but easily distinguishable by the comparatively larger size of both the cephalosome and

the metasome, as also by the much less strong chelipeds, and the somewhat different structure of the uropoda. It is also very inferior in size.

Occurrence. — I have found this form occasionally in several places, both on the south and west coasts of Norway, in depths ranging from 50 to 150 fathoms. The most northern place where I have met with it, is Kvalø on the Nordland coast.

6. *Typhlotanais tenuicornis*, G. O. Sars.

(Pl. X, fig. 3).

Typhlotanais tenuicornis, G. O. Sars, l. c. p. 37.

Specific Characters. — ♀. Body very slender and elongated, more than 8 times as long as it is broad, with the cephalosome shorter than the first 2 segments of mesosome combined, and slightly narrowed in front. 1st free segment of mesosome a little shorter than the last one, the others regularly quadrate, being fully as long as they are broad. Metasome shorter than the last 2 segments of mesosome combined. Superior antennae attaining the length of the cephalosome, unusually narrow, with the basal joint longer than the other 2 combined. Inferior antennae, with the 3rd joint of the peduncle armed below with 2 recurved denticles. Chelipeds of moderate size, hand rather elongated, exceeding in length the carpus, fingers about the length of the palm. The first 3 pairs of pereopods rather slender, and each having a long and slender seta springing off from the ischial joint; the 3 posterior pairs much more strongly built, with the basal joint rather tumefied, and the carpal joint forming inside a rounded expansion. Uropoda very short, both rami uniaarticulate, linear, unequal, the inner one being almost twice as long as the outer. Length 1.75 mm.

Remarks. — This form may be at once recognized by the unusually narrow superior antennae, and the long seta springing off from the ischial joint of the 3 anterior pairs of pereopoda, as also by the structure of the uropoda.

Occurrence. — I have met with this species in 3 different localities of the Norwegian coast, lying rather widely distant from each other, viz., in Eidsfjord west of Listerland, at Bekkervig south of Bergen, and at Kvalø on the Nordland coast, the depth ranging from 60 to 120 fathoms.

7. *Typhlotanais brevicornis* (Lilljeb.)

(Pl. XI, fig. 1).

Tanais brevicornis, Lilljeborg, l. c. p. 15.

Specific Characters. — ♀. Body extremely slender and narrow, about 9 times as long as it is broad, with the cephalosome gradually tapering in front. 1st

free segment of mesosome longer than the last one, and not much shorter than those immediately succeeding it. Metasome about the length of the last 2 segments of mesosome combined, terminal segment evenly rounded at the tip. Superior antennæ rather short, scarcely more than half as long as the cephalosome, basal joint much longer than the other 2 combined. Chelipeds of moderate size, hand oblong in form and somewhat shorter than the carpus, fingers about the length of the palm. 1st pair of pereopoda considerably longer than the others, the 3 posterior pairs rather short, with the basal joint not much tumefied. Uropoda scarcely longer than the terminal segment of metasome, rami very unequal, the outer one extremely small and unarticulate, pointing generally straight outwards, inner ramus more than twice as long, and distinctly biarticulate. Length 1.60 mm.

Remarks. — The present species, established by Prof. Lilljebørg, is easily recognized by the very slender and narrow body, the comparatively short superior antennæ, and the structure of the uropoda.

Occurrence. — I have met with this species not infrequently in several places both on the south and west coasts of Norway, in depths ranging from 60 to 150 fathoms. It extends northwards to Kvalø on the Nordland coast.

Distribution. — Coast of Denmark (Meinert).

8. *Typhlotanais cornutus*, G. O. Sars.

(Pl. XI, fig. 2).

Typhlotanais cornutus, G. O. Sars, *Crustacea & Pycnogonida nova in itinere 2do et 3tio Expeditionis Norvegicæ anno 1877 & 78 collecta*, No. 5.

Specific Characters. — ♀. Body comparatively short and thick, depressed, about $4\frac{1}{2}$ times as long as it is broad, with the cephalosome rather broad in proportion to its length, and evenly convex on each side, frontal margin produced in the middle to an acute rostriform projection. 1st free segment of mesosome very short, the others more than twice as broad as they are long, and separated by narrow constrictions. Metasome considerably longer than the last 2 segments of mesosome combined, and slightly narrowed in its distal part. Superior antennæ about the length of the cephalosome, conically tapering, basal joint somewhat longer than the other 2 combined, terminal joint rather narrow and tipped by slender bristles. Chelipeds of moderate size, and somewhat attenuated distally, hand scarcely attaining the length of the carpus, and oblong oval in form, fingers shorter than the palm. 1st pair of pereopoda, as usual, longer

than the 2 succeeding pairs, basal joint of the 3 posterior pairs rather tumid. Uropoda equalling in length about $\frac{1}{3}$ of the metasome, both rami distinctly bi-articulate and somewhat unequal, the outer one being shorter and narrower than the inner. Length 1.65 mm.

Remarks. — This form was discovered during the Norwegian North Atlantic Expedition, and has been described and figured in detail by the present author in the Report of the Crustacea from that Expedition. It is easily distinguished from any of the previously described species by its comparatively short and thick body, the acutely produced frontal margin, and the comparatively long bristles issuing from the tip of the superior antennae.

Occurrence. — A few female specimens of this form have been taken by me at Kvalø on the Nordland coast, from depths of 60—100 fathoms.

Distribution. — Stat. 290 of the Norwegian North Atlantic Expedition, lying W. of Finmark.

9. *Typhlotanais penicillatus*, G. O. Sars.

(Pl. XI, fig. 3.)

Typhlotanais penicillatus, G. O. Sars, l. c. p. 39.

Specific Characters. — ♀. Body a little more slender than in *T. cornutus*, being almost 5 times as long as it is broad. Cephalosome not nearly so broad as in the said species, and having the frontal edge less strongly produced in the middle. First and last segment of mesosome of about same size and somewhat shorter than the others, which are separated by rather conspicuous constrictions. Metasome of almost uniform breadth throughout. Superior antennae extremely slender and narrow, considerably exceeding in length the cephalosome, terminal joint linear and tipped by slender bristles, one of which is of quite an unusual length. Chelipeds slender and feeble, hand very narrow, sublinear, exceeding in length the carpus, fingers nearly as long as the palm. Pereiopoda resembling in structure those in *T. cornutus*, basal joint of the 3 posterior pairs, however, less tumid. Uropoda with the inner ramus distinctly biarticulate, the outer one uni-articulate and somewhat shorter. Length 1.40 mm.

Remarks. — This species is nearly allied to *T. cornutus*, but is of somewhat more slender form, and moreover easily distinguished by the much feebler structure of the chelipeds, and by the extremely slender superior antenna, with their long terminal pencils of bristles. Also the uropoda differ essentially in the fact of the outer ramus being uniarticulate.

Occurrence. — Only 2 female specimens of this form have hitherto been taken by me. They were collected at Sauesund, west coast of Norway, from depths of 50 to 100 fathoms.

Gen. 4. *Leptognathia*, G. O. Sars, 1880.

Generic Characters. — Body in female, as a rule, narrow and elongated, subcylindrical, with the segments marked off by marked constrictions; that of male much shorter and stouter. Cephalosome generally narrowed only in its most anterior part, and having the front narrowly truncated. Metasome with all its segments well defined, being much more fully developed in male than in female. Eyes wholly absent. Superior antennæ in female distinctly 4-articulate, 1st joint the largest, in male much more fully developed, composed of a 3-articulate pedicel and a well-defined, 4-articulate flagellum densely clothed with sensory filaments. Mandibles very small and feeble in structure, cutting part narrow, molar expansion forming a thin acuminate lappet armed at the tip with a few small denticles. Oral parts in male, excepting the maxillipeds, abortive, epistome forming a rounded projecting lobe. Chelipeds in female of normal appearance, with the hand more or less expanded, thumb generally serrated inside; those in male feebler in structure, with the hand narrower, and the fingers quite simple. 1st pair of pereopoda not very different from the 2 succeeding pairs, the 3 posterior pairs generally more strongly built, and having the outer joints armed with spines. Pleopoda in female rather small, sometimes wanting; those in male well-developed. Uropoda, as a rule, biramous, sometimes, however, apparently simple, the outer ramus not being distinctly defined from the basal part, rami always very unequal, the inner one much the larger and biarticulate, the outer with either one or two articulations. Incubatory pouch normal.

Remarks. — This genus is chiefly characterised by the feeble structure of the mandibles. From the preceding genera it may moreover be at once distinguished by the superior antennæ in the female being distinctly 4-articulate, not as in the former 3-articulate. The genus comprises numerous species, which on the whole are true deep-water forms and tubicular in habits. Besides the 6 Norwegian species described below, the arctic form *Tanis gracilis* Krøyer, as also *Tanis graciloides* Lilljeborg, belongs to this genus. Moreover, the *Paratanais rigidus* Sp. Bate and *Leptochelia coeca* Harger, ought to be referred to the same genus. Finally, Mr. E. Beldard has recorded a species, *L. australis*, from the Challenger Expedition.

1. *Leptognathia longiremis* (Liljeb.)

(Pl. XII).

Tanaïs longiremis Liljeborg, l. c. p. 19.Syn: *Tanaïs islandicus*, G. O. Sars.

Specific Characters. — Body of female rather slender and elongated, more than 7 times as long as it is broad; cephalosome about the length of the first 2 segments of mesosome combined, with the proximal half of uniform breadth, the distal one abruptly attenuated; first free segment of mesosome about same size as the last one, both being shorter than the others; metasome well developed, exceeding in length the last 2 segments of mesosome combined, terminal segment nearly occupying $\frac{1}{3}$ of the length of metasome, and armed on each side with a minute deflexed denticle. Body of male much shorter than in female, being scarcely more than 5 times as long as it is broad; cephalosome rather broad in proportion to its length; all free segments both of mesosome and metasome of about equal length, the terminal one narrowly produced at the tip. Superior antennae in female gradually tapering distally, basal joint about equalling in length the other 3 combined, 2nd joint shorter than the outer 2 taken together; those in male attaining in length $\frac{1}{4}$ of the body, the first 2 joints of the peduncle large and expanded, flagellum about the length of the peduncle, and having the 2 outer joints much longer than the other 2. Chelipeds in female rather strong, with the hand considerably dilated, oval triangular in form, and scarcely smaller than the carpus, with a slight dentated crest in front at the insertion of the dactylus, the latter crested along the middle, thumb distinctly serrated at the end inside; those in male with the hand much narrower than in female, and furnished inside with a transverse row of about 10 flattened spines increasing in length behind, fingers quite simple, pointed, the immovable one rather short. Uropoda in female attaining half the length of the metasome, both rami biarticulate, the inner one more than 3 times as long as the outer, and tipped by rather long setae; inner ramus in male distinctly triarticulate. Length of female 3.75 mm., of male 2.55 mm.

Remarks. — This is the largest and finest of the Norwegian species, and may, moreover, easily be recognized by the structure of the chelipeds and uropoda, as also by the dentiform projection occurring on each side of the terminal segment of the metasome. The form at first recorded by the present author from the Norwegian North Atlantic Expedition as *Tanaïs islandicus* is undoubtedly identical with Liljeborg's species.

Occurrence. The species occurs along the whole Norwegian coast, from Christianiafjord to Vadsö in depths ranging from 30 to 100 fathoms.

Distribution. — Off Reykjavik, Iceland, and at Stat. 290 of the Norwegian North Atlantic Expedition (the present author); coast of Denmark (Meinert).

2. *Leptognathia breviremis* (Lilljeb.)

(Pl. XIII, fig. 1)

Tanaïs breviremis, Lilljeborg, l. c. p. 21.

Specific Characters. — ♀. Body much shorter and thicker than in the preceding species, being scarcely 6 times as long as it is broad, with the cephalosome longer than the first 2 segments of mesosome combined, and rather narrowed in front. Segments of mesosome separated by rather deep, though narrow constrictions, the 1st one not being much shorter than the 2nd. Metasome somewhat fusiform in outline, being slightly dilated in the middle, with the side-convexities regularly convex, and the terminal segment evenly rounded at the tip. Superior antennae with the basal joint not attaining the length of the other 3 combined, 2nd joint fully as long as the outer 2 taken together. Chelipeds of moderate size, with the hand about the size of the carpus, and somewhat dilated beyond the middle, fingers much shorter than the palm. Pereiopoda resembling in structure those in the preceding species, except that the basal joint of the 3 posterior pairs is less tumefied. Uropoda very short, scarcely longer than the terminal segment of metasome, inner ramus biarticulate and tipped by long divergent setae, outer one extremely small, unarticulate. Length 1.45 mm.

Remarks. — The present species, established by Prof. Lilljeborg, is easily distinguished from the other species belonging to this genus by its comparatively short and thick body, and by the comparatively short uropoda, which latter character has given rise to the specific name proposed by its discoverer. It is a rather small species.

Occurrence. — I have met with this form rather frequently in the Christiania Fjord at depths ranging from 20 to 60 fathoms, and also in several other places on the south and west coasts of Norway. It extends northwards as far as Kvalø on the Nordland coast.

Distribution. — Bohuslän (Lilljeborg); Kattegat (Meinert).

3. *Leptognathia filiformis* (Lilljeb.)

(Pl. XIII, fig. 2).

Tanaïs filiformis, Lilljeborg, l. c. p. 23.

Specific Characters. — ♀. Body extremely slender, almost filiform, 11 times as long as it is broad, with the cephalosome rather narrow, and the 1st

and last segments of mesosome scarcely more than half as long as the others. Metasome slightly dilated, and scarcely longer than the last 2 segments of mesosome combined, terminal segment of medium size, and obtusely rounded at the tip. Superior antennæ with the basal joint much shorter than the other 3 combined, 2nd joint comparatively large, equalling in length the outer 2 taken together. Chelipeds not very strong, with the hand subtriangular and about the length of the carpus. Pereiopoda comparatively small, basal joint of the 3 posterior pairs considerably tumefied. Uropoda attaining half the length of the metasome, inner ramus slender, biarticulate, outer one represented only by a small knob-like projection of the basal part, carrying 2 slender setæ. Length 2.70 mm.

Remarks. — This form, likewise first described by Prof. Lilljeborg, is easily recognized by its extremely slender, almost filiform body, and by the apparently single-branched uropoda.

Occurrence. — I have met with this species occasionally in several places on the south and west coasts of Norway, from the Christiania Fjord up to Kvalø on the Nordland coast, in depths ranging from 30 to 100 fathoms.

Distribution. — Bohuslän (Lilljeborg), Öresund (Meinert).

4. *Leptognathia brevimana* (Lilljeborg).

(Pl. XIII, fig. 3).

Tanaïs brevimanus, Lilljeborg, l. c. p. 22.

Specific Characters. ♀ Body slender and elongated, about 10 times as long as it is broad, with the cephalosome only narrowed in its most anterior part. First and last segment of mesosome about same size and shorter than the others, which are fully as long as they are broad. Metasome rather large, considerably longer than the last 2 segments of mesosome combined, and also somewhat broader, terminal segment well developed, occupying more than $\frac{1}{3}$ of the metasome and obtusely rounded at the tip. Superior antennæ of the usual structure, 2nd joint not quite as long as the outer 2 combined. Chelipeds not very large, hand shorter than the carpus, subtriangular, fingers not attaining the length of the palm. Pereiopoda comparatively small, basal joint of the 3 posterior pairs less tumefied than in *L. filiformis*. Uropoda about the length of the terminal segment of metasome, inner ramus well developed, biarticulate, with the last joint rather short, outer ramus represented by a rather strong, mucroniform

projection not defined from the basal part, and carrying outside 2 or 3 unequal setae. Length 2.80 mm.

Remarks. — This species was likewise established by Prof. Lilljeborg, and may easily be recognized by the comparatively short hand of the chelipeds, but more especially by the peculiar structure of the uropoda.

Occurrence. — The species occurs along the whole Norwegian coast, from the Christiania Fjord to Vadsö, in depths ranging from 30 to 100 fathoms.

Distribution. — Bohuslän (Lilljeborg); Mediterranean at Messina (the present author); coast of Denmark (Meinert).

5. *Leptognathia dentifera*, G. O. Sars, n. sp.

(Pl. XIV, fig. 2)

Specific Characters. — ♀. Body moderately slender, being not quite 8 times as long as it is broad, cephalosome rather narrowed in front. First free segment of mesosome somewhat longer than the last one, but considerably shorter than the other 4. Metasome rather poorly developed, scarcely as long as the last 2 segments of mesosome combined, and not any broader, terminal segment comparatively short and obtusely rounded at the tip. Superior antennae with the 2nd joint exceeding in length the outer 2 combined. Chelipeds not very strong, hand comparatively short, scarcely attaining the length of the carpus, triangular in form, with an obtuse projection in front of the insertion of the dactylus. Pleopoda extremely small, though of normal structure, natatory setae very short. Uropoda exceeding half the length of the metasome, basal part produced at the end inside to an inflexed hook-shaped process, both rami well defined and biarticulate, the outer one scarcely half as long as the inner and much narrower. Length 1.60 mm.

Remarks. — This new species may be at once distinguished from any of the forms previously described, by the poor development of the pleopoda, but more especially by the peculiar hook-like projection issuing from the basal part of the uropoda inside, which latter character has given rise to the specific name here proposed.

Occurrence. I have only seen a few female specimens of this form, some of which were ovigerous. They were taken in the Christiania Fjord at Hankö and Soon from depths of 60—100 fathoms.

6. *Leptognathia manca*, G. O. Sars.

(Pl. XIV, fig. 3).

Leptognathia (?) *manca*, G. O. Sars, l. c. p. 34.

Specific Characters. — ♀ Body slender and elongated, more than 8 times as long as it is broad, with the segments marked off by conspicuous constrictions, posterior half slightly attenuated. Cephalosome of moderate size, with the side edges regularly curved. First free segment of mesosome much larger than the last one, and somewhat dilated in front. Metasome equalling in length the last 2 segments of mesosome combined, and rather narrow, subcylindric in form, with the terminal segment short and obtuse. Superior antennae with the 2nd joint much shorter than the outer 2 combined. Chelipeds of moderate size, with the hand scarcely dilated, oblong oval in form, and somewhat longer than the carpus, fingers shorter than the palm. The 3 anterior pairs of pericopoda exactly alike both in size and structure, with the dactylus slender, setiform; the 3 posterior pairs having the basal joint but slightly tumefied. Pleopoda wholly absent. Uropoda about half the length of the metasome, inner ramus biarticulate, outer one unarticulate and scarcely half as long. Length 2.00 mm.

Remarks. — The total absence (in the female) of pleopoda is a very striking feature, which at first put me in some doubt as to the true generic relation of this form. Having, however, on a closer examination, found it to agree fairly well in all other essential characters with the species of the present genus, I prefer to retain it in the genus *Leptognathia*, as a somewhat anomalous species.

Occurrence. — I have found this form in two widely separated places on the Norwegian coast, viz., in Eidsfjord, west of Listerland, and at Apelvær, Nandal. In both places it occurred in rather small numbers at depths of 100–150 fathoms.

Gen. 5. *Tanaopsis*, G. O. Sars, n.

Generic Characters. — Body comparatively robust, with the metasome unusually large and composed of 6 well-defined segments. Eyes wanting. Superior antennae in female distinctly 4-articulate. Oral parts very poorly developed. Mandibles extremely small, and rudimentary, unarmed, and without a trace of molar expansion. 1st pair of maxillae with the masticatory lobe much curved. Maxillipeds with the masticatory lobe very short, transverse, palp slender and

but slightly setous. Chelipeds strongly built, with the basal joint very large and prominent below, carpus comparatively short and thick, hand somewhat curved and scarcely expanded in the middle. 1st pair of pereopoda much larger than the others. Pleopoda rather fully developed. Uropoda short, biramous, both rami biarticulate and very unequal in size. Incubatory pouch normal.

Remarks. — The present new genus is founded upon the form recorded by the present author at an earlier date, as *Leptognathia laticaudata*, which, on a closer examination, has proved to differ very materially, especially in the structure of the oral parts, from the species of that genus, and therefore ought more properly to be regarded as the type of a distinct genus. The unusually large and broad metasome together with the strongly-built chelipeds and the comparatively robust form of the body, somewhat recall the genus *Tanais*; but the oral parts are very different, and the metasome is composed of the normal number of segments. The genus contains as yet but a single species.

Tanaopsis laticaudata, G. O. Sars.

(Pl. XIV, fig. 1)

Leptognathia laticaudata, G. O. Sars, l. c. p. 43.

Specific Characters. — ♀. Body linear, somewhat depressed, not much more than 6 times as long as it is broad, with the segments marked off by very narrow constrictions. Cephalosome scarcely longer than it is broad, and considerably narrowed anteriorly, frontal margin subangular in the middle. The first 2 segments of mesosome much shorter than the others, which are rectangular in shape. Metasome about half the length of mesosome, but considerably broader, being rather dilated in the middle, terminal segment well developed, pentagonal in form, tip obtusely angular. Superior antennae about the length of the cephalosome, terminal joint rather slender equalling in length the 2 preceding ones combined. Inferior antennae with the penultimate and antepenultimate joints of the peduncle somewhat expanded and each having above a strong bristle. Chelipeds very strong, with the hand considerably longer than the carpus, and having inside a transverse row of small bristles, fingers about the length of the palm, the movable one serrated along the outer edge, the immovable one terminating in 3 strong denticles. 1st pair of pereopoda considerably longer than the others, with the propodal joint conically produced, and the dactylus very slender, setiform; the 3 posterior pairs rather strongly built, with the basal joint moderately tumefied, and the meral and carpal joints each provided inside with a single very small denticle. Uropoda not nearly attaining the length of the terminal

segment of metasome, inner ramus rather thick, outer scarcely half as long, and much narrower. Length 2.60 mm.

Remarks. — As stated above, this form was first described by the present author as a species of the genus *Leptognathia*. Having, however, subsequently had an opportunity of examining the oral parts more closely, I have found it necessary to separate it generically. It is easily distinguished from the other Norwegian Tanaisids by the strongly dilated metasome and the peculiarly rigid appearance of the chelipeds.

Occurrence. — I have met with this form in a few places on the south coast of Norway (Fredriksvaern, Nevlunghavn, Marilö) in comparatively shallow water, the depth ranging from 6 to 20 fathoms.

Distribution. — Mediterranean at Naples and Messina (the present author).

Gen. 6. *Cryptocope*, G. O. Sars, 1880.

Generic Characters. - Body more or less robust, with the cephalosome considerably narrowed anteriorly, front truncated. Metasome scarcely broader than the mesosome, and composed of 6 well-defined segments. Eyes wanting. Superior antennæ in female short, 4-articulate, in male much larger and of a structure similar to that in the genus *Leptognathia*. Mandibles well developed, with the cutting edge coarsely dentated, and having on the right mandible a rather large secondary lamella, uolar expansion well defined, conic or lamellar. Chelipeds rather strong and of a similar structure in the two sexes. Pereiopoda slender, especially the 3 anterior pairs. Pleopoda in female very small and rudimentary, with the rami extremely small, lobular; those in male well developed, natatory. Uropoda in female short, biramous, rami very unequal; those in male much more fully developed. Incubatory pouch formed only by 2 lamellæ issuing from the bases of the 4th pair of pereiopoda.

Remarks. — This genus is chiefly characterized by the rudimentary condition of the pleopoda in the female. In the structure of the other appendages it exhibits a close affinity to the genus *Leptognathia*; but the structure of the mandibles is slightly different, and the incubatory pouch is constructed as in the genus *Tanais*. Besides the Norwegian species described below, the form at first recorded by the present author as *Tanais Vöringii* belongs to this genus. Moreover, Dr. Hansen has described a third species from the Kara Sea as *C. arctica*.

Cryptocope abbreviata, G. O. Sars.

(Pl. XV, fig. 1).

Tanaïs abbreviatus, G. O. Sars, Beretning om en i Sommeren 1865 foretagen zool. Reise, p. 41.

Specific Characters. — ♀ Body extremely short and stout, sub-depressed, scarcely more than 3 times as long as it is broad. Cephalosome scarcely as long as it is broad posteriorly, and considerably narrowed in front, frontal margin slightly bisinate, with the lateral corners somewhat produced. Fifth and 6th segments of mesosome somewhat larger than the other 4, which are very short. Metasome but little longer than the last 2 segments of mesosome combined, and gradually narrowed in its posterior part, terminal segment comparatively short and obtusely produced at the tip. Superior antennæ somewhat shorter than the cephalosome, basal joint about the length of the other 3 combined. Chelipeds rather strong, carpus comparatively short and thick, hand longer than the former, and slightly narrowed distally, fingers about the length of the palm. The 3 anterior pairs of pereopoda rather slender, with the dactylus long and setiform; the 3 posterior pairs somewhat stronger, but with the basal joint not much tumefied. Pleopoda with the rami quite smooth, the inner one extremely minute, nodiform. Uropoda scarcely attaining the length of the terminal segment of metasome, inner ramus distinctly biarticulate, and tipped with long diverging setæ, outer one extremely minute and unarticulate. Length 1.40 mm.

Remarks. — This form may be easily recognized from the other Norwegian Tanaids by its extremely short and thick body, and by the rudimentary condition of the pleopoda. It differs from *Cryptocope arctica* Hansen, which it somewhat resembles in the form of the body, in the rami of the pleopoda being quite smooth, whereas in the last-named species, according to Dr. Hansen, they are tipped with small bristles.

Occurrence. — I first discovered this form in the Christiania Fjord at a depth of about 30 fathoms, and have subsequently found it occasionally in other places also, both on the south and west coasts of Norway. It has not been recorded by any other author.

Gen. 7. **Haplocope**, G. O. Sars, 1880.

Generic Characters. — ♀. Body slender and elongated, resembling, as regards its outward appearance, some species of the genus *Leptognathia*. Metasome rather

narrow, sublinear, with all the segments well defined. Eyes wanting. Superior antennæ (in female) distinctly 4-articulate. Mandibles well developed, and resembling in structure those in the genus *Typhlotanus*, the molar expansion being rather strong, cylindric, and armed at the tip with dentiform tubercles. Chelipeds comparatively small, with the hand scarcely dilated. The first 3 pairs of pereopoda of similar structure, and more slender than the 3 posterior. Pleopoda (in female) imperfectly developed, forming simple oval lamellæ, without a trace of setæ. Uropoda rather slender, biramous, rami unequal, biarticulate. Incubatory pouch normal.

Remarks. — The most prominent character of this genus is the simple structure of the pleopoda in the female, and it is indeed from this character, that the generic name has been derived. In outward appearance, as also in the structure of the several appendages, it exhibits a close resemblance to the genus *Leptognathia*; but the structure of the mandibles is very different, and agrees much more closely with that found in the genus *Typhlotanus*. The genus contains as yet but a single species.

Haplocope angusta, G. O. Sars.

(Pl. XV. fig. 2).

Haplocope angusta, G. O. Sars, l. c. p. 51.

Specific Characters. — ♀. Body extremely slender and narrow, being fully 10 times as long as it is broad. Cephalosome rather small, slightly narrowed anteriorly, front truncated. 1st free segment of mesosome but little smaller than the next succeeding ones and somewhat dilated in front, last segment the smallest. Metasome about the length of the last 2 segments of mesosome combined, and nearly of uniform breadth throughout, terminal segment of medium size, and angularly produced in the middle. Superior antennæ somewhat shorter than the cephalosome, basal joint only attaining the length of the 2 succeeding joints combined, last joint narrow, conic. Chelipeds rather small, hand about the length of the carpus, fingers shorter than the palm. 1st pair of pereopoda scarcely longer than the 2 succeeding pairs; the 3 posterior pairs a little stronger, and having the outer joints spinous. Uropoda about half the length of the metasome, inner ramus rather elongated, outer scarcely more than half as long and much narrower. Length 1.70 mm.

Remarks. — As stated above, this is the only species as yet known of the genus, and may easily be recognized by its slender, narrow body, and the simple, lamelliform pleopoda.

Occurrence. — I have met with this form occasionally in 3 widely remote localities, viz., in Kidsfjord, west of Listerland, at Bekkervig, on the west coast of Norway, and at Apelvær in Namdal. In all 3 places it occurred in rather small numbers together with other Tanaisids, in depths ranging from 100 to 150 fathoms.

Gen. 8. *Strongylura*, G. O. Sars.

Generic Characters. — Body more or less elongated, subcylindric in form, with rather hard integuments. Cephalosome comparatively large, narrowly truncated in front. Metasome of quite an unusual size, cylindric, slightly widening behind, and composed of 6 well-defined segments, the last of which is very large, cupuliform. Eyes wanting. Superior antennæ in female rather strong, 4-articulate. Mandibles well developed, cutting part strongly incurved, and divided into a few short teeth, molar expansion large, laminar, minutely dentated at the tip. Chelipeds strongly built, with the hand rather large. Pereiopoda comparatively slender and elongated, with the dactylus narrow, setiform. Pleopoda in female wholly absent. Uropoda very small, though distinctly biramous.

Remarks. — The present genus is prominently distinguished by the peculiar appearance, in the female, of the metasome, which is of quite an unusual size, and has the segments perfectly cylindric, without a trace of epimera. Nor is the slightest rudiment of pleopoda to be detected in the female, whereas in the male they seem to occur in the normal condition. In addition to the type species described below, Messrs. Norman & Stebbing have recorded another species, *S. arctophylax*, from the Porcupine Expedition.

Strongylura cylindrata, G. O. Sars.

(Pl. XVI, fig. 1).

Strongylura cylindrata, G. O. Sars, l. c. p. 53.

Specific Characters. — ♀. Body rather slender and narrow, about 9 times as long as it is broad, and slightly narrowed in the middle, with the segments marked off by conspicuous constrictions. Cephalosome comparatively large, almost equalling in length the first 3 segments of mesosome combined, oblong oval in form, and slightly narrowed in front. 1st free segment of mesosome much shorter than the others. Metasome occupying rather more than $\frac{1}{3}$ of the length of the

body, or equalling about the first 5 segments of mesosome combined, slightly widening behind, terminal segment large, oblong oval and very smooth, tip obtusely rounded. Superior antennæ almost attaining the length of the cephalosome, basal joint about the length of the other 3 combined, terminal joint comparatively short and obtusely blunted at the tip. Chelipeds rather strong, hand oblong oval and longer than the carpus, fingers shorter than the palm, the immovable one minutely serrulate inside. The 3 posterior pairs of pereopoda considerably more strongly built than the 3 anterior ones, and having the outer joints armed with ciliated spines, basal joint remarkably constricted at the base. Uropoda very short, inner ramus conical, biarticulate, and tipped by long diverging setæ, outer ramus extremely minute, tuberculiform, though well defined from the basal part. Length 2.85 mm.

Remarks. — From *S. arcophylax* of Norman & Stebbing, the Norwegian species may be at once distinguished by its much more elongated body and the comparatively larger size of the metasome. A few specimens, however, are of considerably shorter form, but as in all of these there are distinct traces of pleopoda, they are, I believe, of the male sex, though probably not yet sexually mature.

Occurrence. — I have found this peculiar Tanaid in several places, both on the south and west coasts of Norway, in depths ranging from 50 to 200 fathoms. It extends northwards to Selsövig, situated just within the polar circle.

Gen. 9. *Anarthrura*, G. O. Sars, 1880.

Generic Characters. — Body elongated, subdepressed, with rather thin, semipellucid integuments. Cephalosome comparatively short and obtusely truncated in front. Metasome in female very poorly developed, narrower than the mesosome, and without a trace of segmentation; that in male, however, of quite normal appearance, being divided into 6 well-defined segments. Eyes wanting. Superior antennæ in female 4-articulate, in male but slightly different, though composed of 5 articulations. Mandibles extremely small and rudimentary, cutting edge simple, molar expansion wanting. Chelipeds comparatively small, with the basal part of a somewhat unusual structure, being oval, tumid, and divided into 2 distinct segments, hand rather small, with the palm unusually short. The 3 anterior pairs of pereopoda rather slender and nearly equal, the 3 posterior pairs rather different, and considerably more strongly built. Pleopoda in female

wholly absent, in male normally developed. Uropoda imperfectly biramous, the outer ramus not being defined from the basal part.

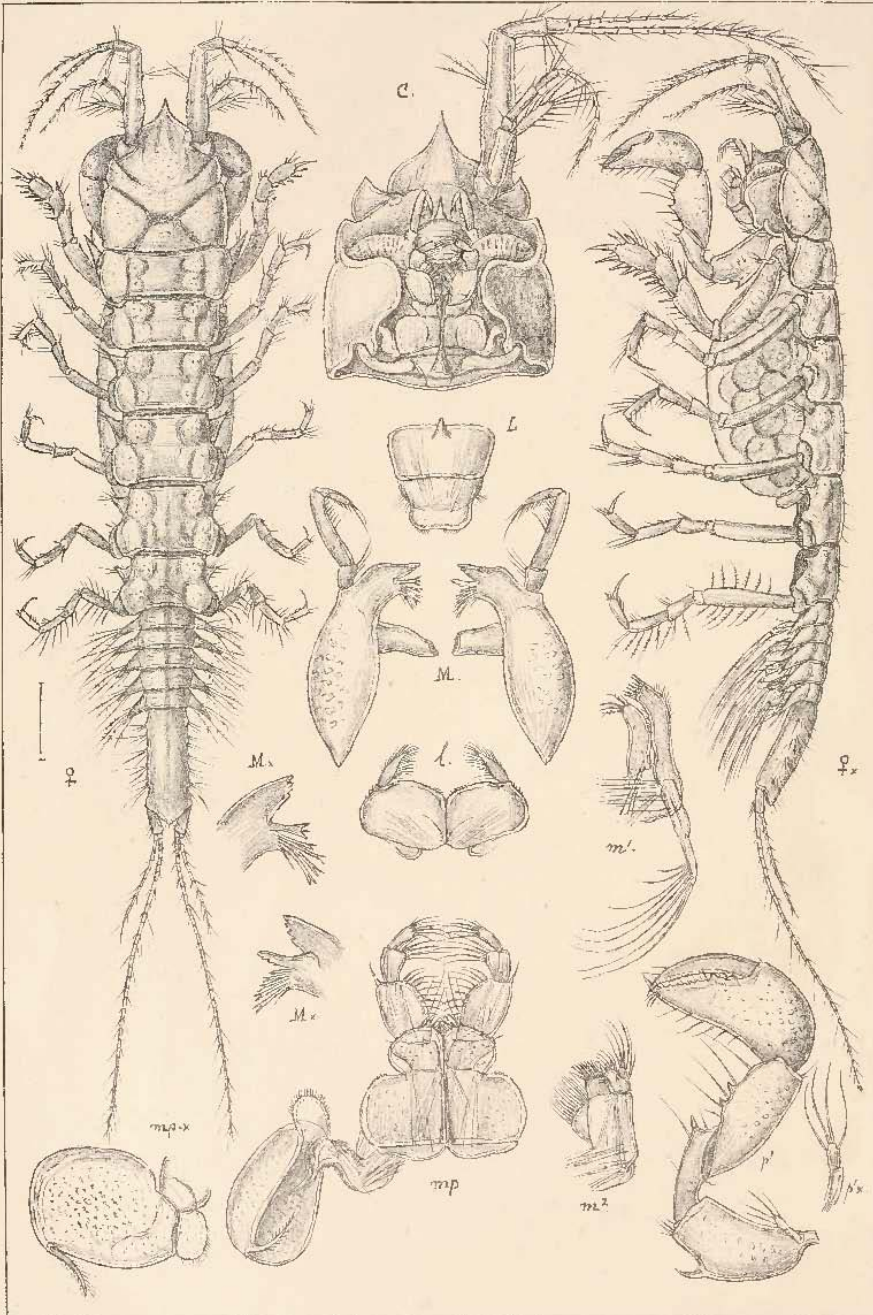
Remarks. -- In this genus also, the structure of the metasome in the female yields the most conspicuous distinctive character; but whereas in the genus *Strongylura* this division is of quite an unusual size, it is in the present genus more reduced in size than in any hitherto known Tanaid. In the male, however, this part exhibits quite a normal appearance. The structure of the chelipeds is likewise somewhat peculiar and differs, among other things, from that of all other Tanaids in the form of the basal part. The oral parts, and especially the mandibles, exhibit a similar rudimentary condition to that found in the genus *Tanaopsis*. Besides the typical species described below, the Australian form *Paratanais linearis* Haswell, according to the opinion of the Rev. Mr. Stebbing, should more properly be referred to this genus.

Anarthrura simplex, G. O. Sars.

(Pl. XVI, fig. 2).

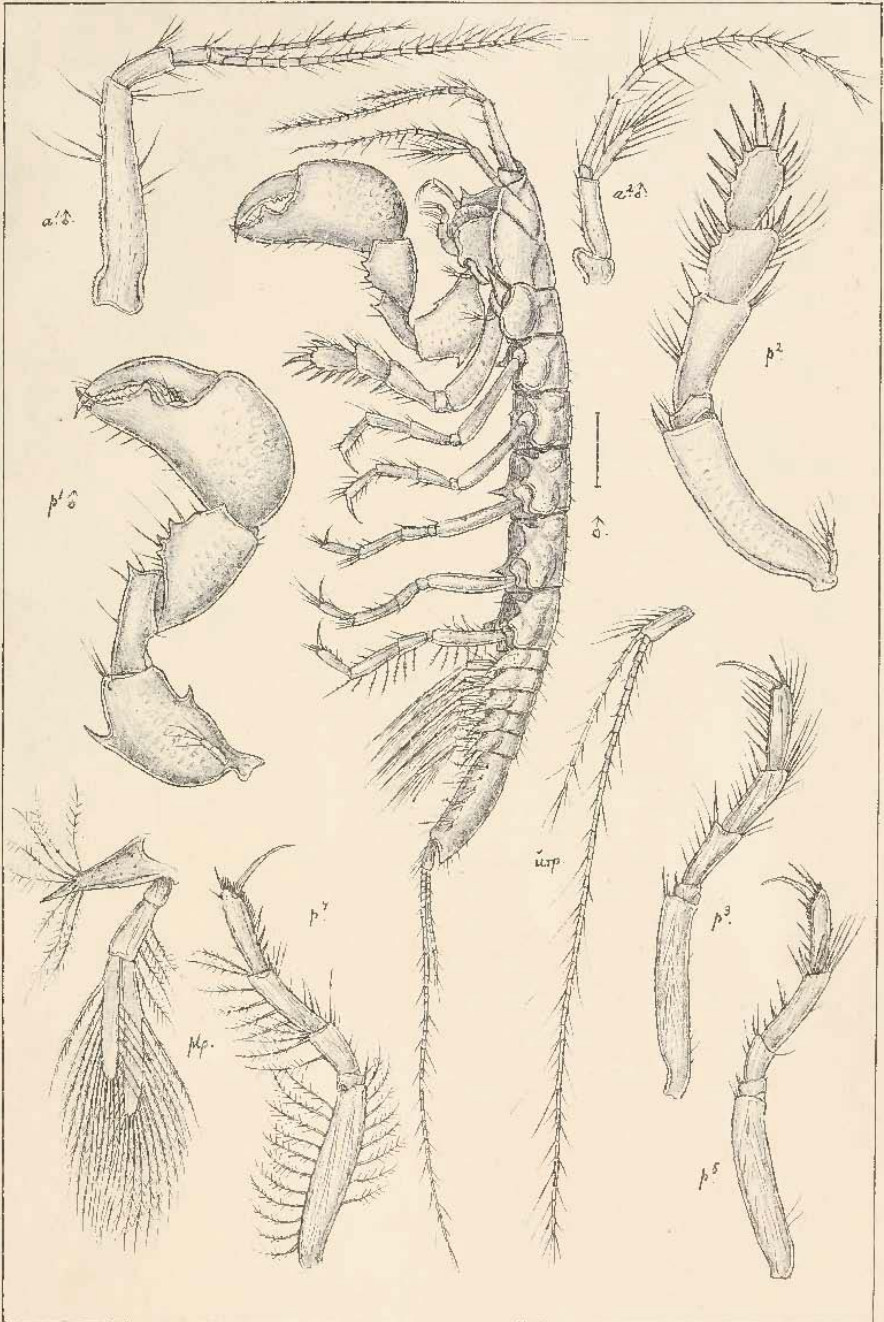
Anarthrura simplex, G. O. Sars, l. c. p. 51.

Specific Characters. --- Body in female about 8 times as long as it is broad, in male somewhat shorter, segments marked off by rather deep constrictions. Cephalosome distinctly depressed, scarcely longer than it is broad, and obtusely truncated in front. 1st and last segments of mesosome shorter than the others, and almost quadrate in outline. Metasome in female scarcely longer than the penultimate segment of mesosome, narrow cylindrical, or very slightly depressed, and somewhat constricted in the middle, tip obtusely angular; that in male nearly twice as large, and of altogether normal appearance. Superior antennae in female about the length of the cephalosome, basal joint but little longer than the 2 succeeding ones combined, terminal joint narrow, conical in form. Chelipeds with the basal part occupying half their length, and having its first segment much larger than the 2nd, hand longer than the carpus, but rather feeble, with the palm unusually short, fingers narrow and not perfectly contiguous when shut, the movable one slightly serrated outside, the immovable one nearly straight and terminating in a lanceolate point. The 3 anterior pairs of pereopoda exactly alike, having the propodal joint tapering conically, and the dactylus long and setiform; the 3 posterior pairs more strongly built, with the basal joint rather tumefied, and the dactylus quite short. Uropoda generally turned obliquely outwards, inner ramus well defined, biarticulate, outer represented by a conical, setiferous projection of the basal part. Length of female 2.35 mm.



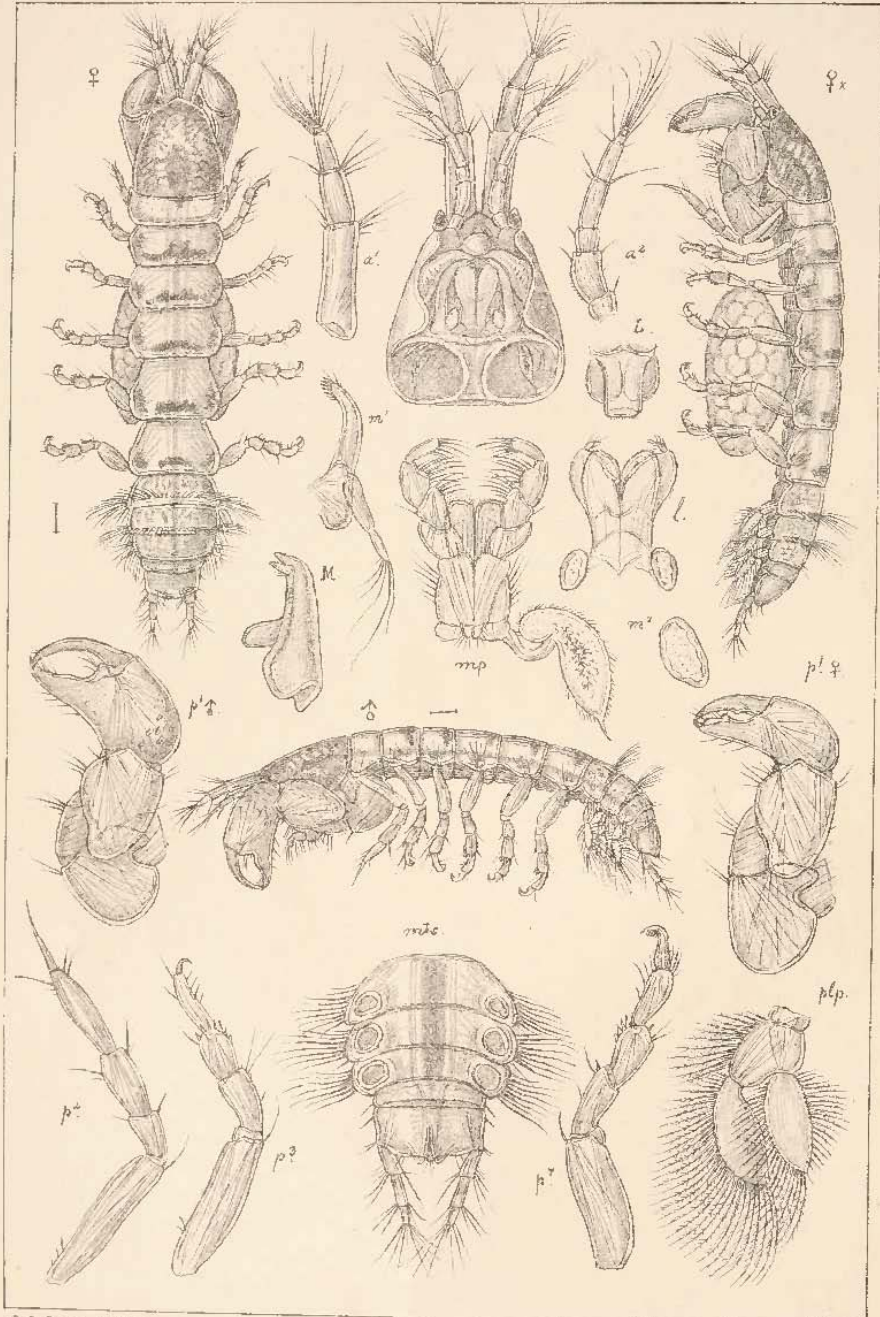
G.O. Sars, autogr.

Aapseudes spinosus (M. Sars).



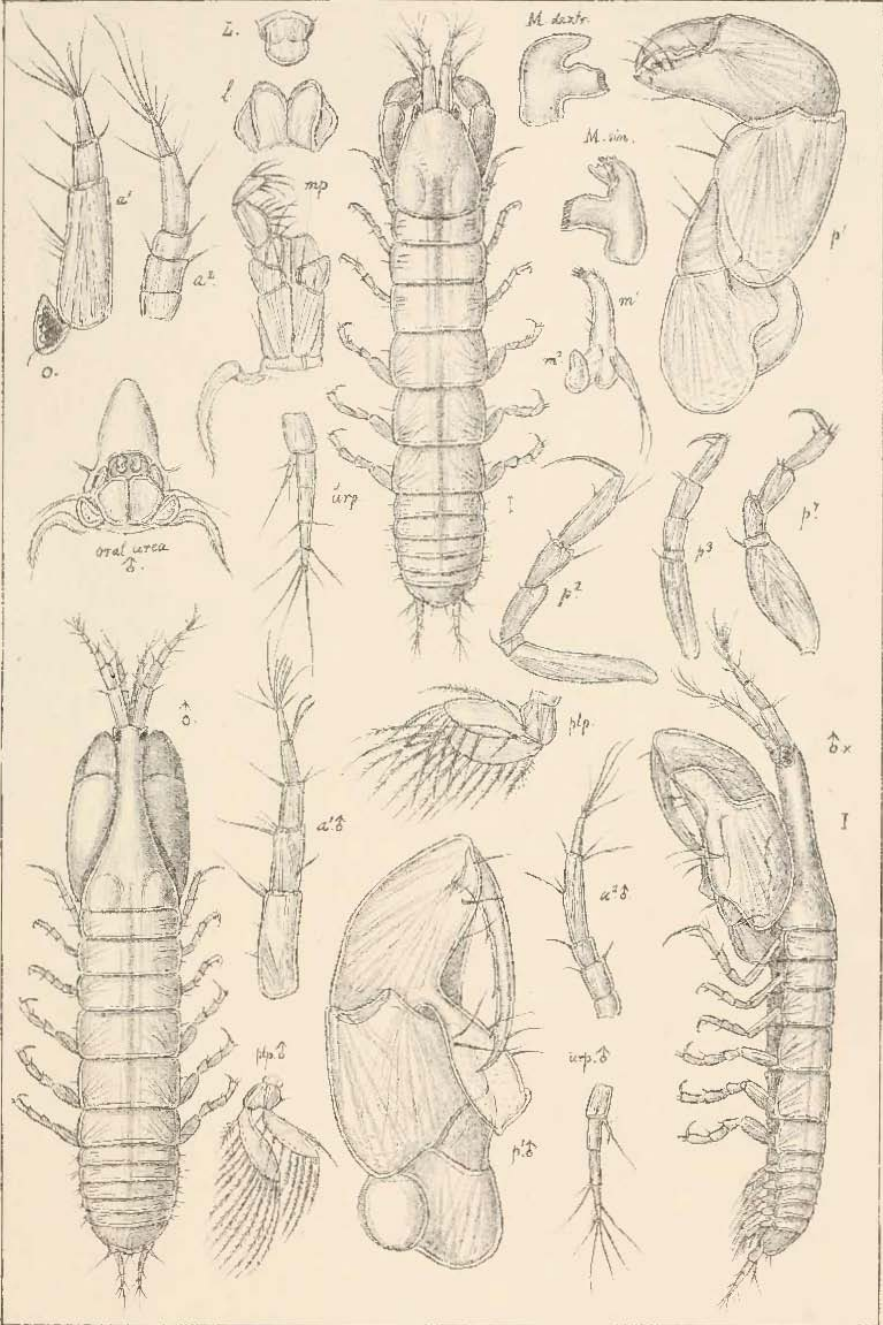
G.O. Sars, autogr.

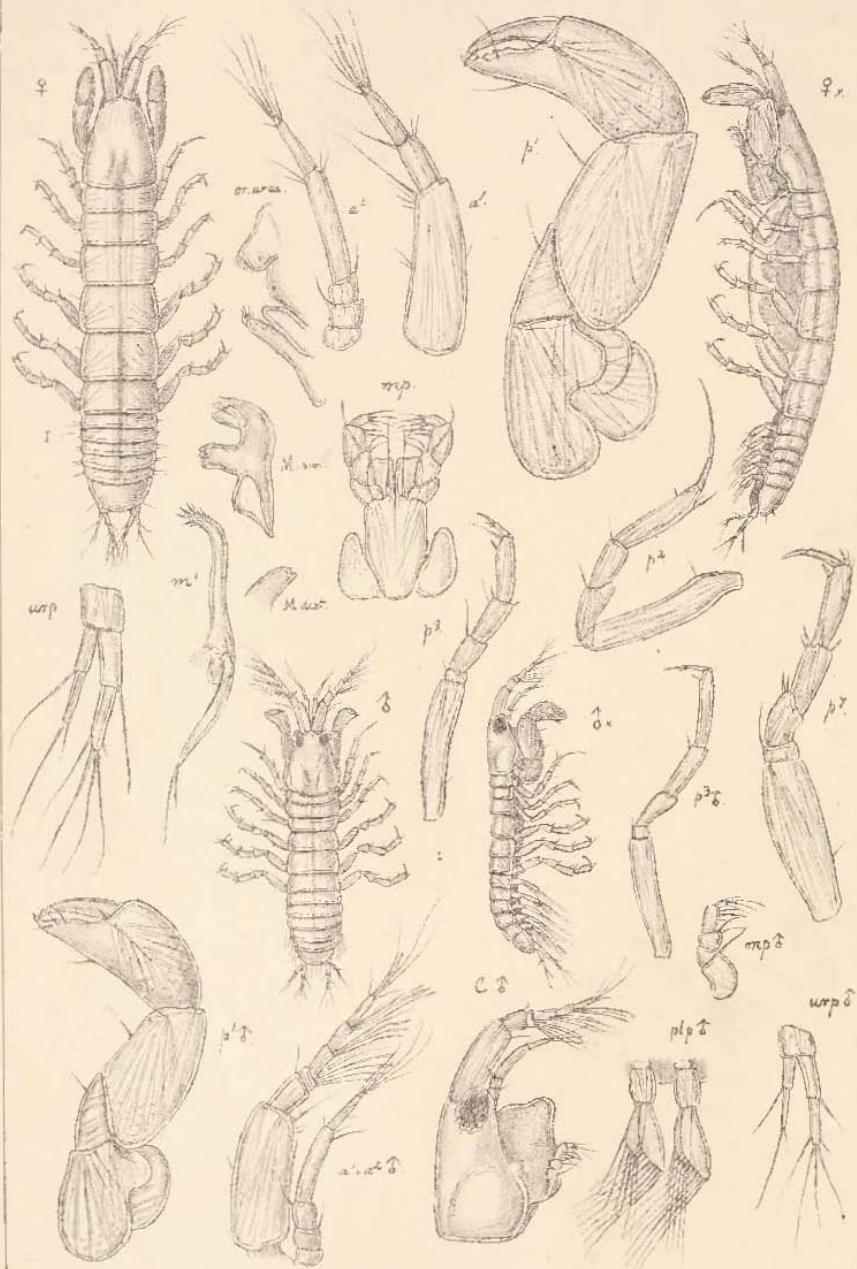
Apsudes spinosus. (M. Sars),
(continued)

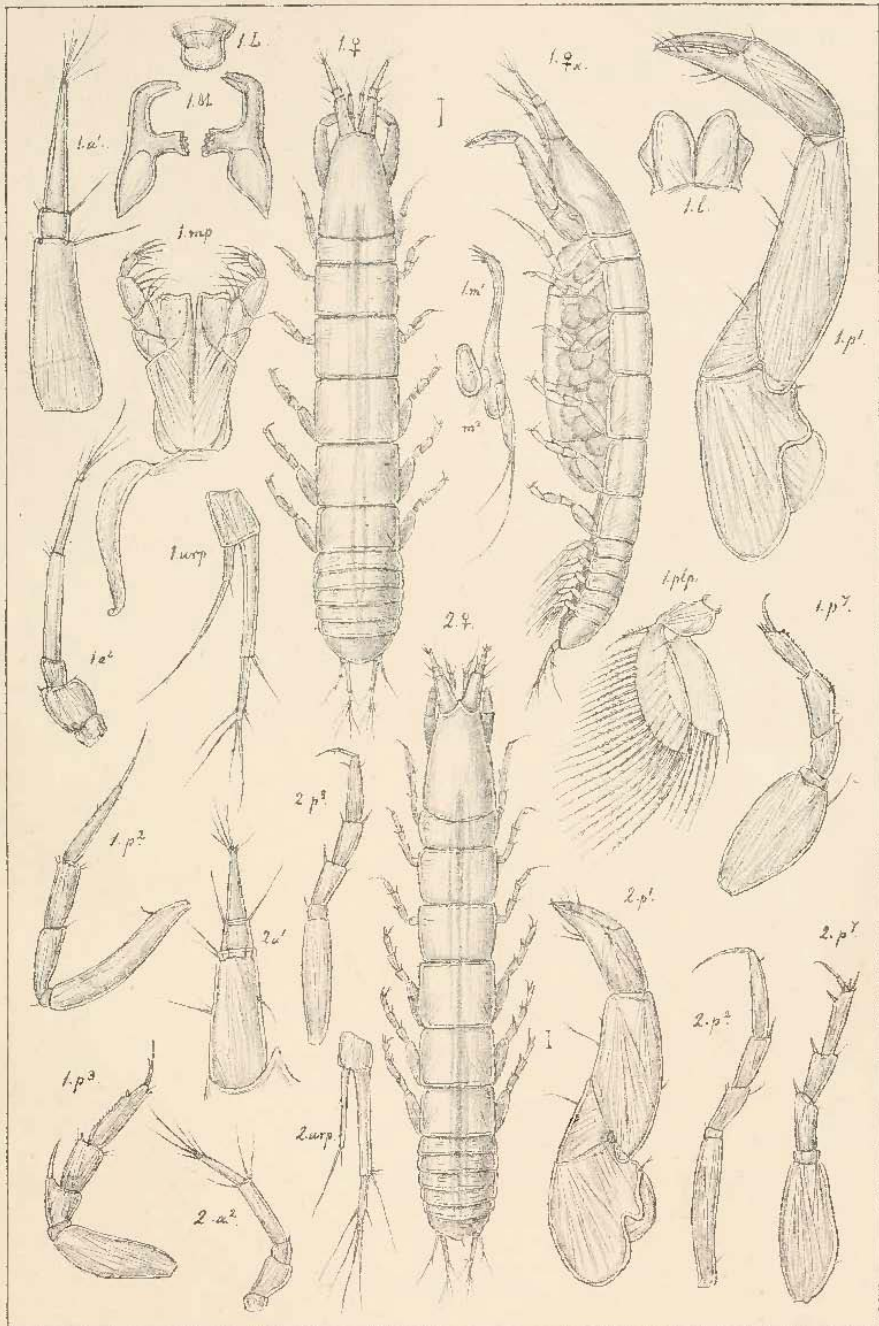


G.O. Sars, autogr.

Tanaidæ tomentosus, Kröyer.





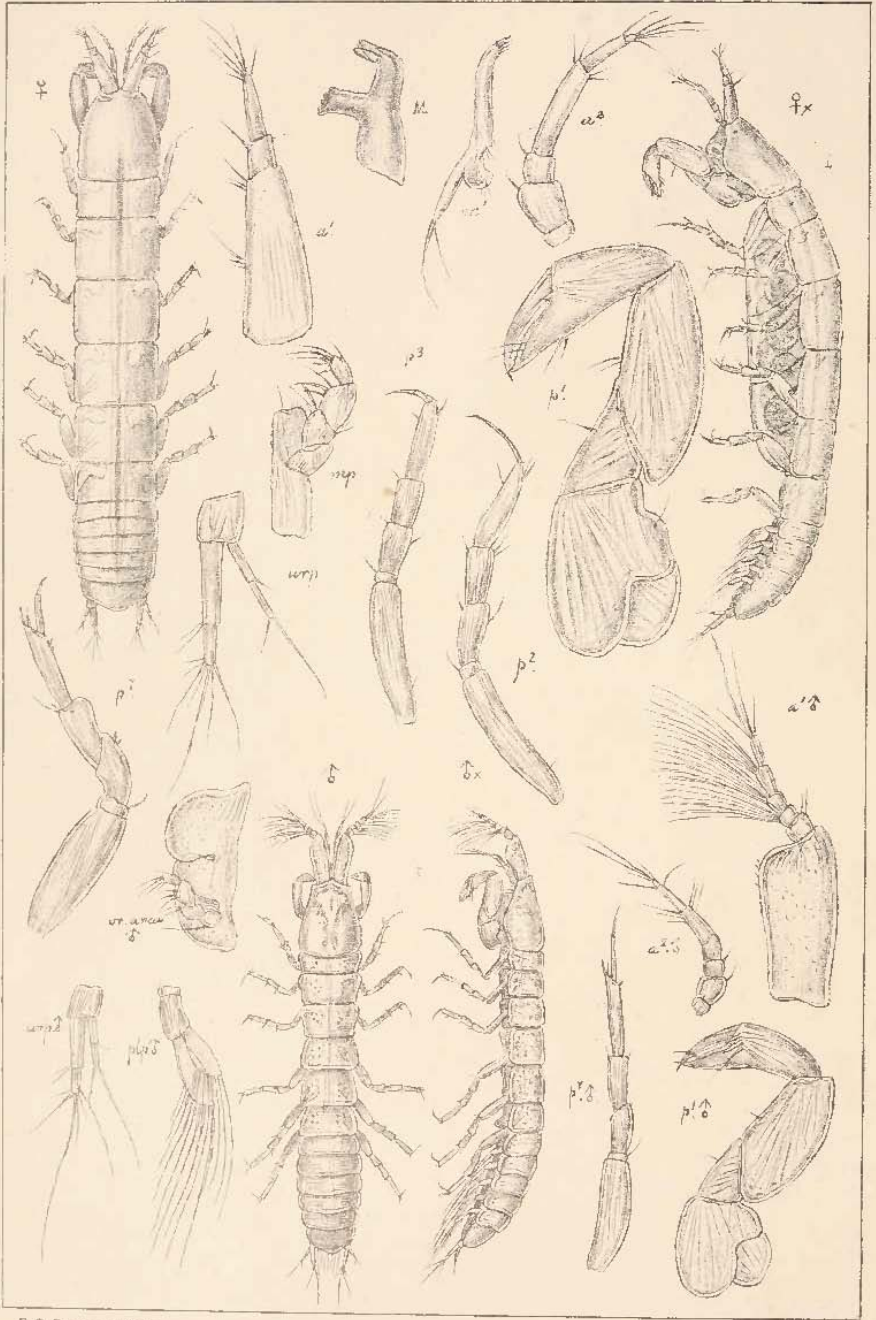


G. O. Sars, autogr.

1. *Typhlotanais tenuimanus*. (Lilljeb.)
 2. *Typhlotanais microcheles*. G. O. Sars.

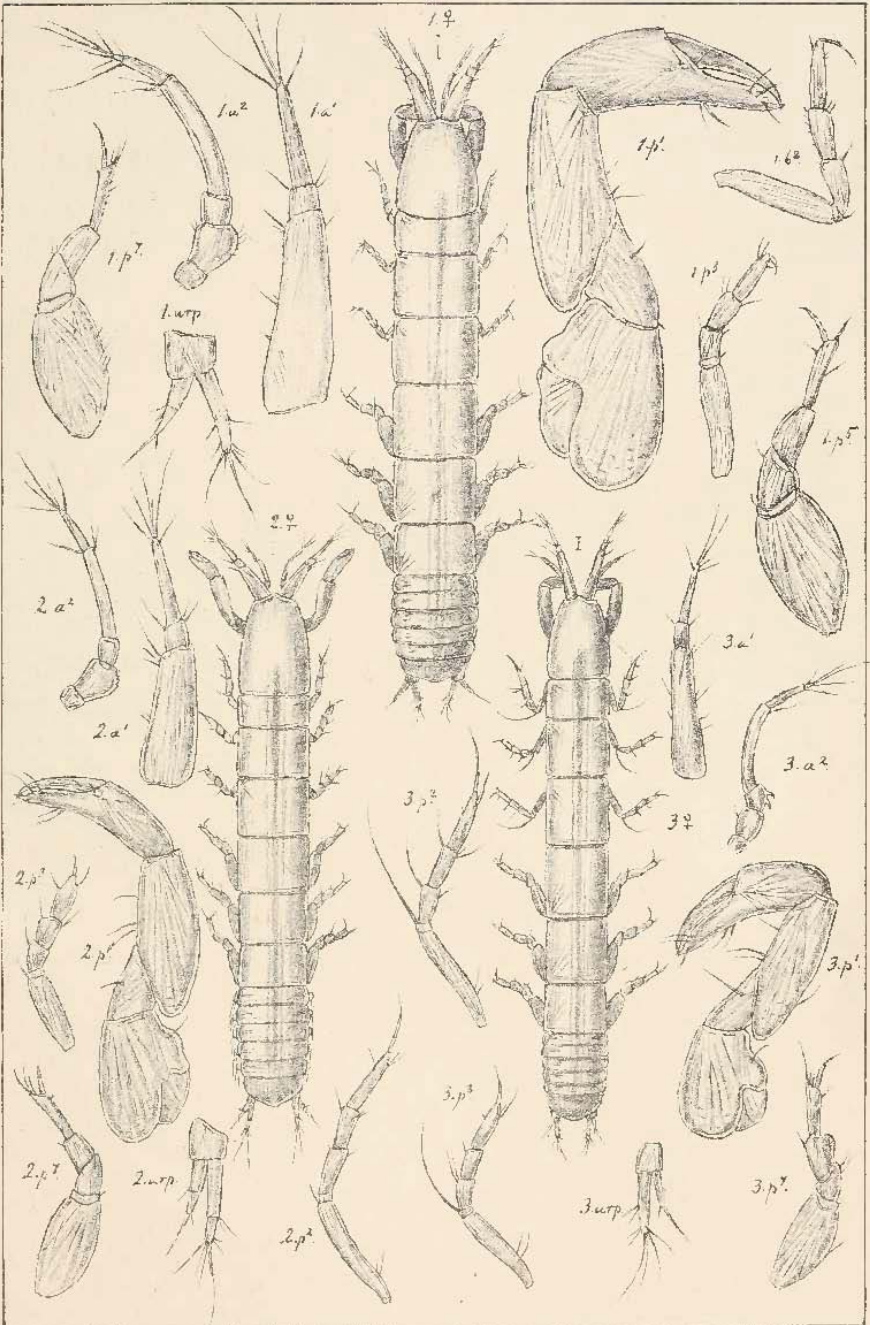






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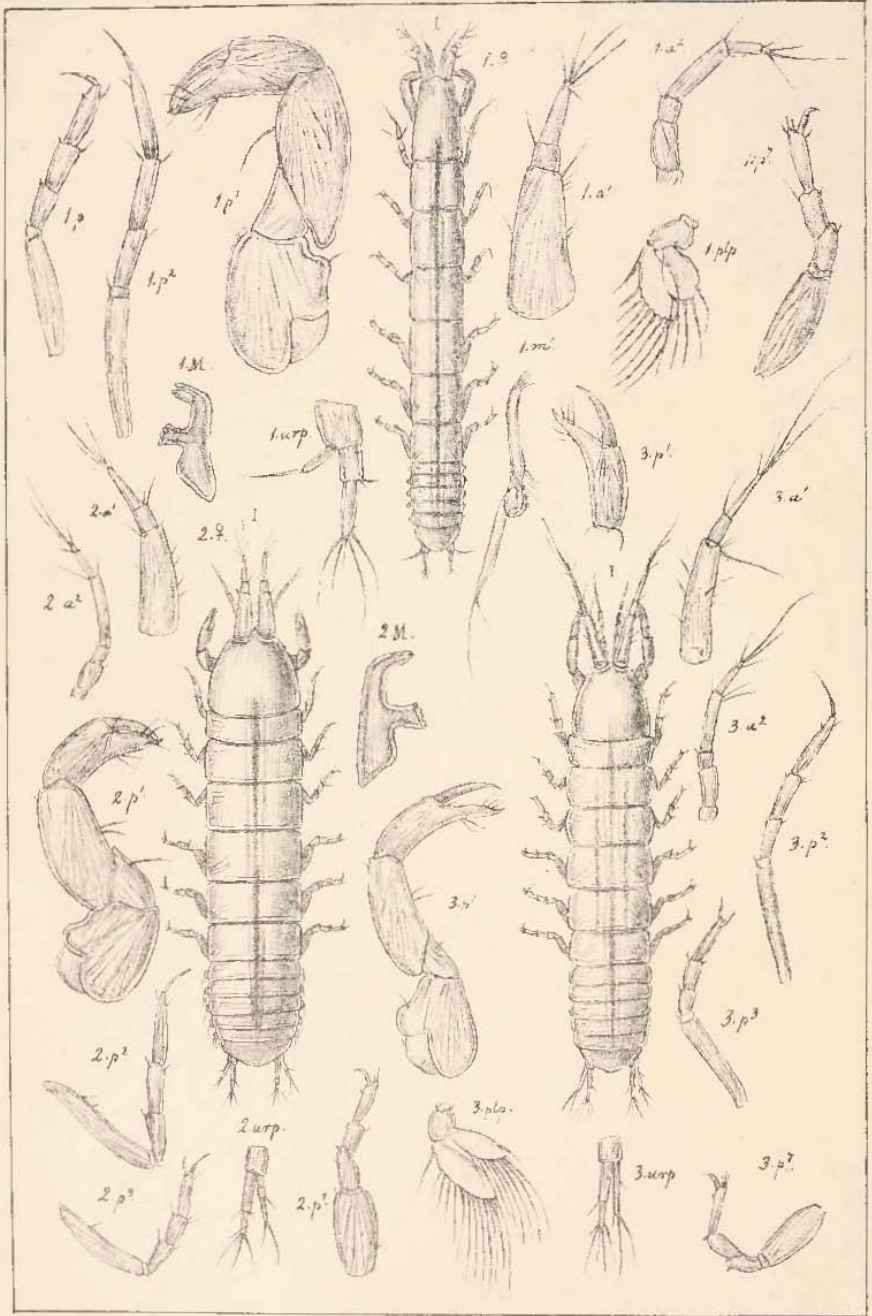
Typhlotanis finmarchicus, G. O. Sars.



G.O. Sars, autogr.

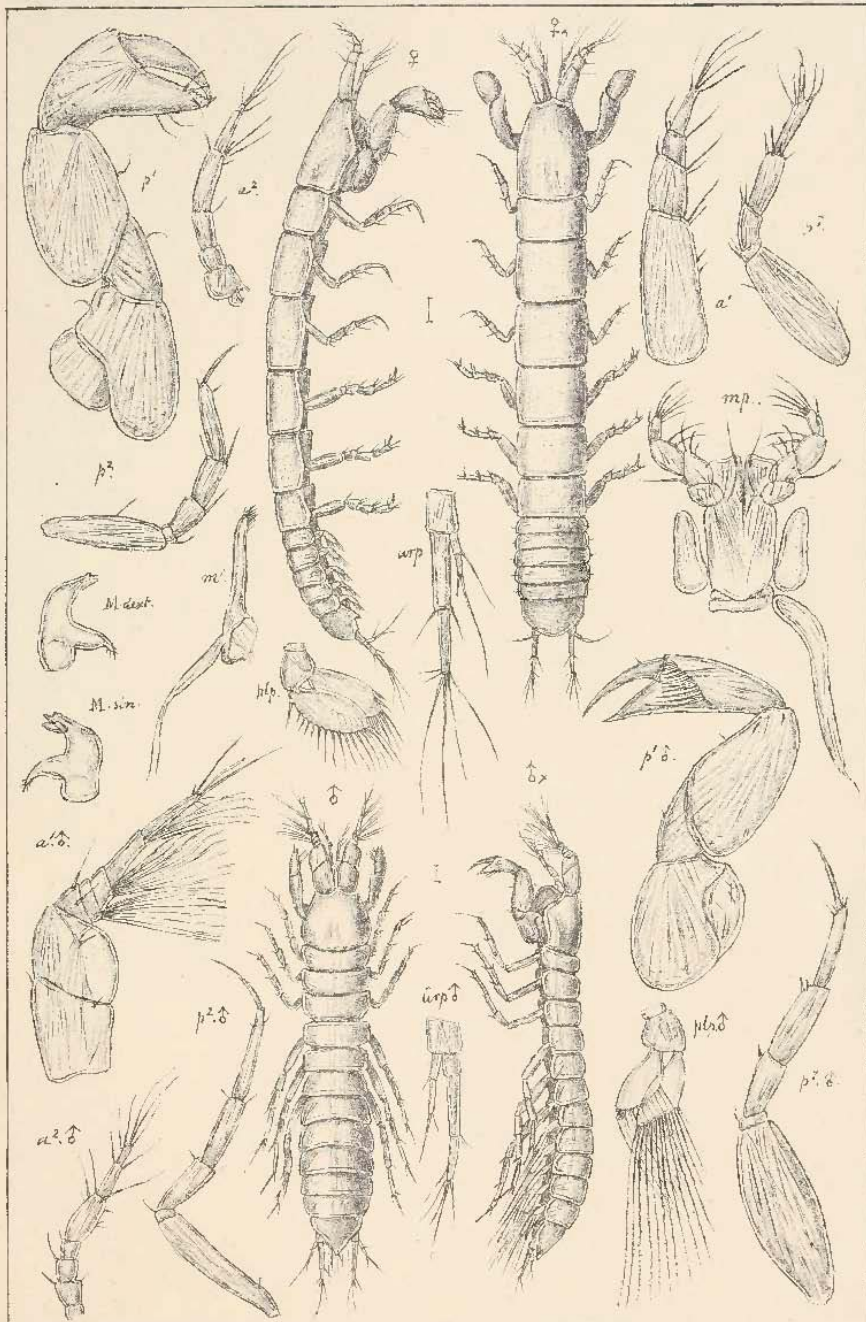
- 1. *Typhlotanis* æqviremis, (Lilljeb).
- 2. " assimilis, G.O. Sars.
- 3. " tenuicornis, G.O. Sars.





G. O. Sars, autogr.

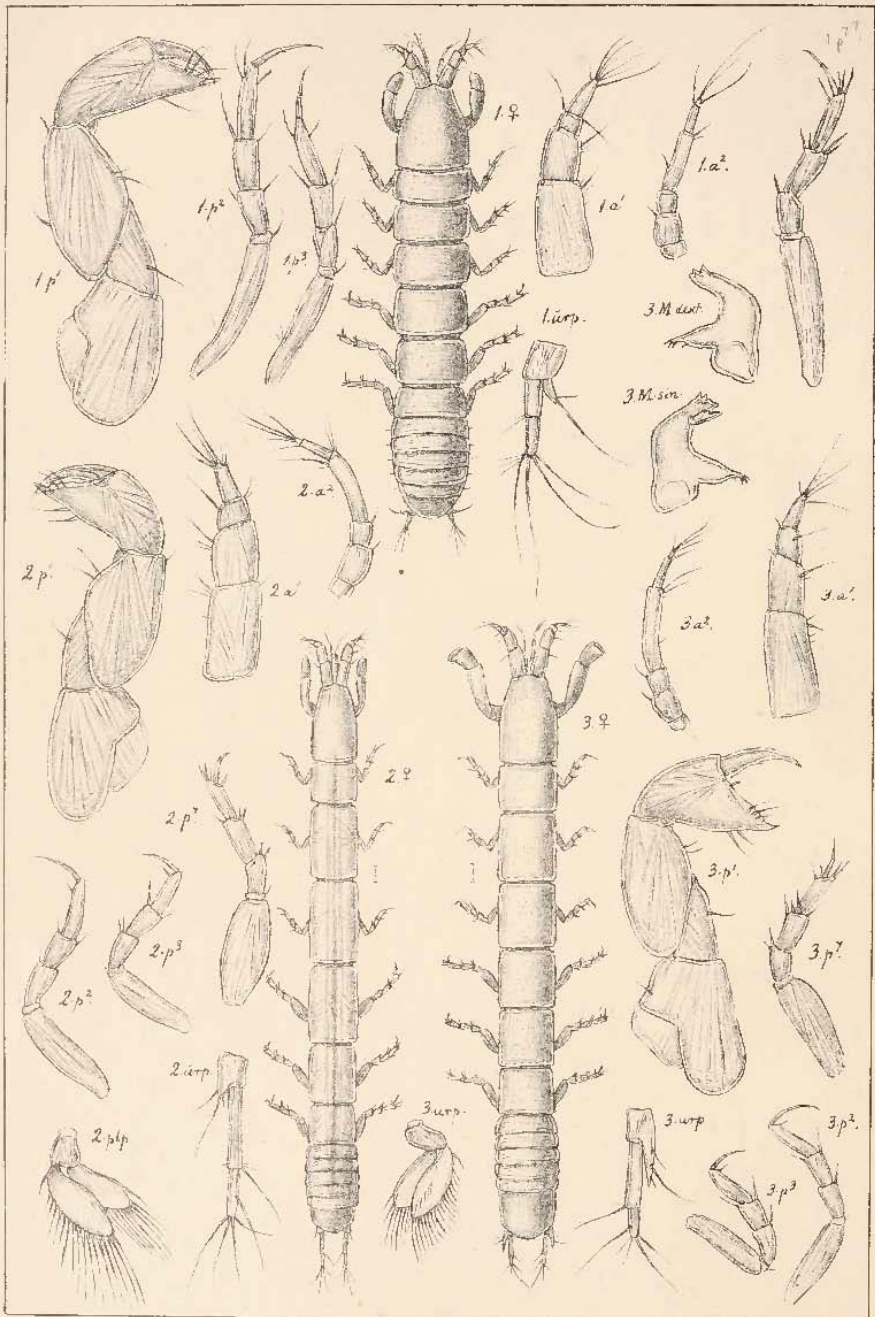
- 1. *Typhlotanis brevicornis*, (Lilljeb).
- 2. " *cornutus*, G. O. Sars.
- 3. " *penicillatus*, G. O. Sars.



G. O. Sars, autogr.

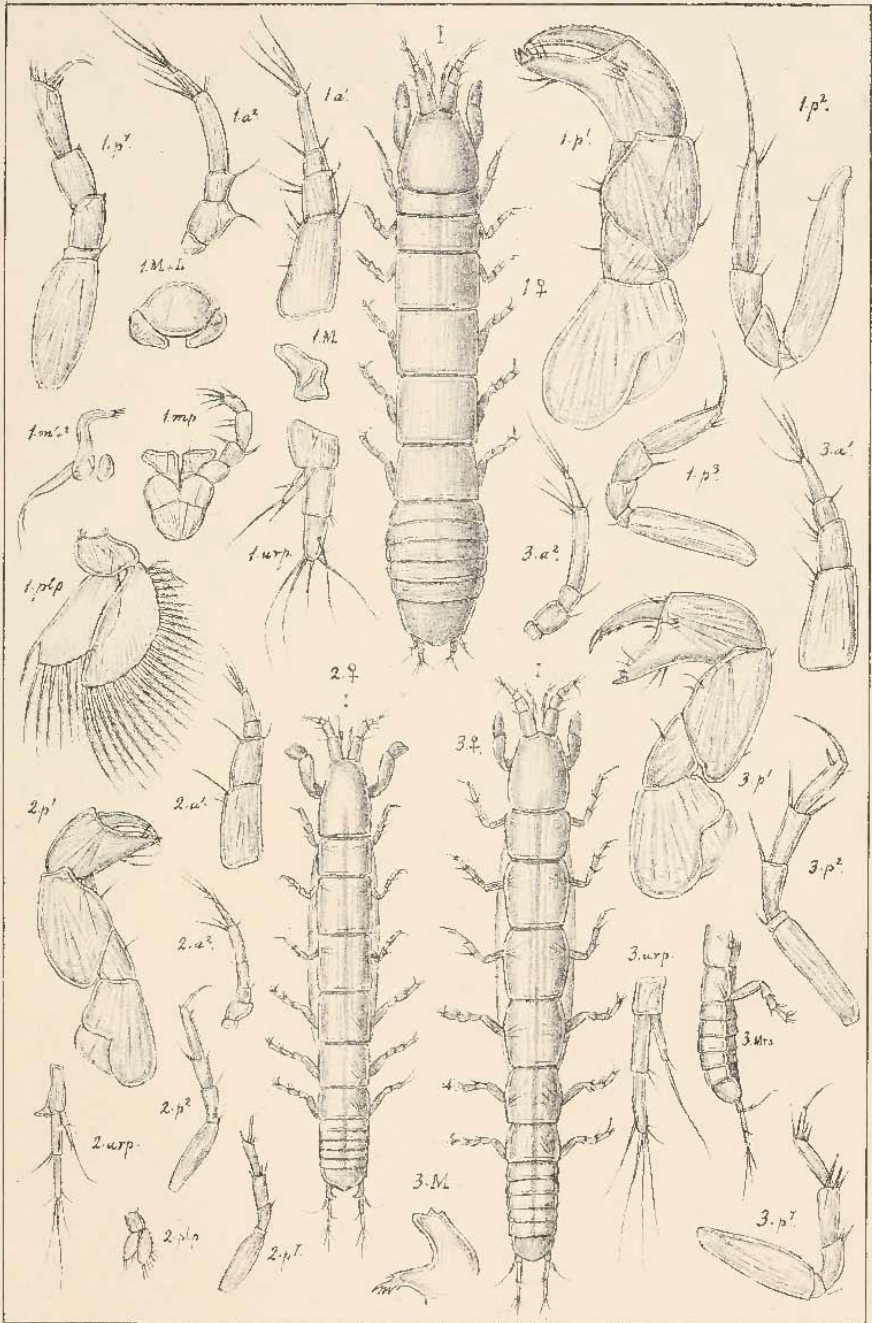
Leptognathia longiremis (Lilljeb.).

Akanthopeltis



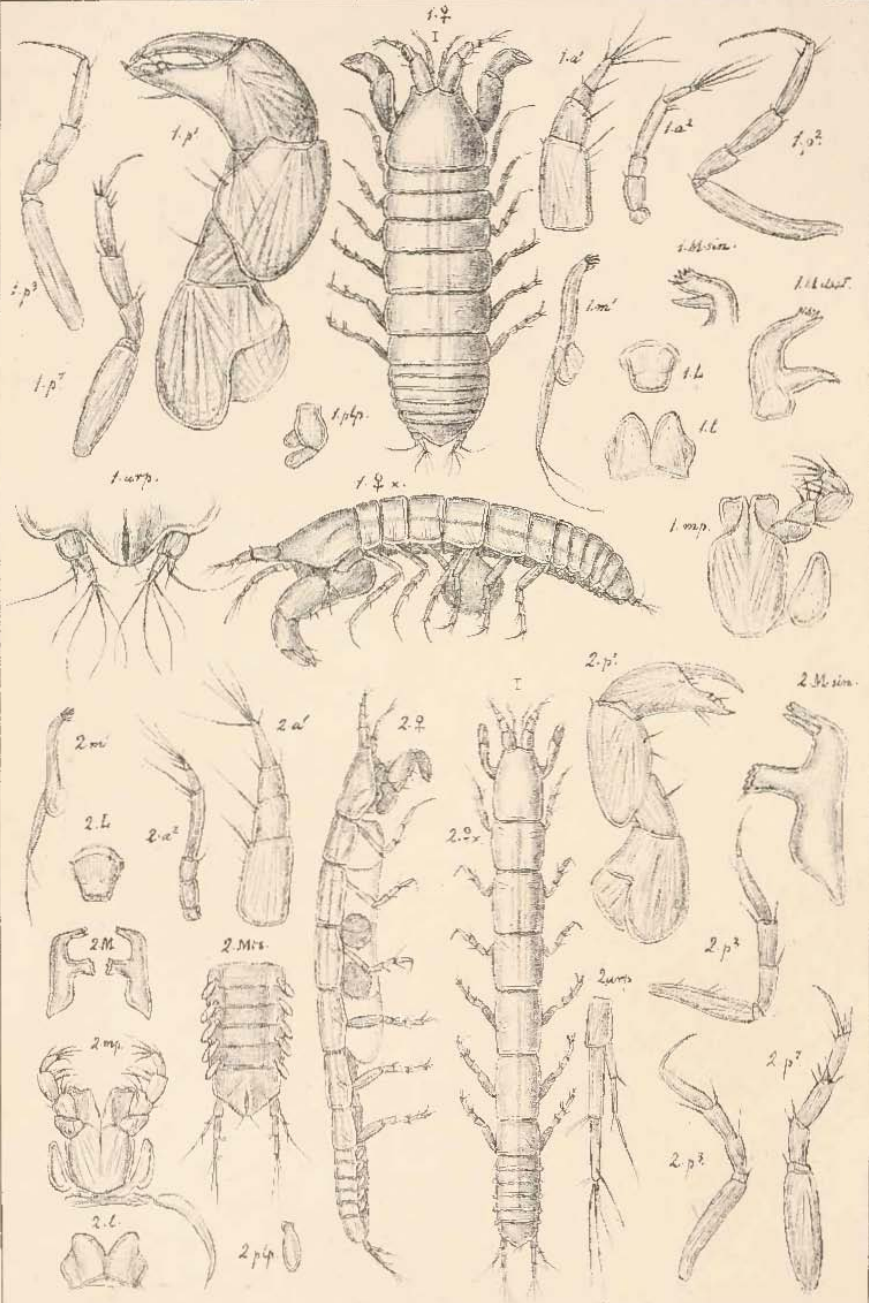
G.O. Sars, autogr.

- 1. *Leptognathia breviremis*, (Lilljeb).
- 2. " *filiformis*, (Lilljeb).
- 3. " *brevimana*, (Lilljeb).



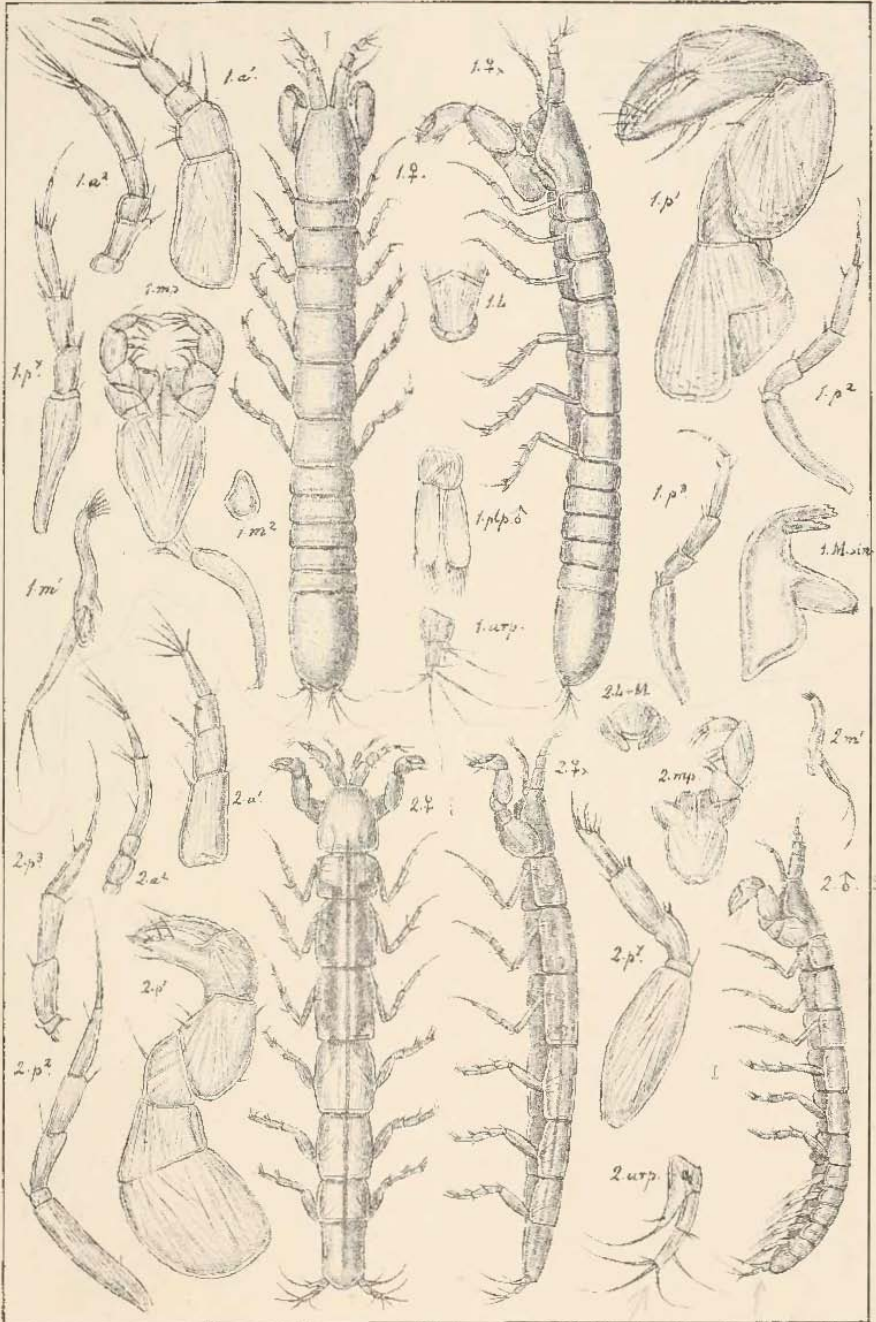
G.O. Sars, autogr.

1. *Tanaopsis laticaudata*, G.O. Sars.
2. *Leptognathia dentifera*, G.O. Sars.
3. " *manca*, G.O. Sars.



G.O. Sars, autogr.

1. *Cryptocoep abbreviata*, G.O. Sars.
2. *Haplocoep angusta*, G.O. Sars.



Remarks. — This peculiar form may at once be distinguished from our other Tanaisids, at least in the female sex, by the rudimentary condition of the metasome. In both sexes, moreover the structure of the chelipeds and uropoda may serve for recognizing the species.

Occurrence. — I have met with this form occasionally together with other Tanaisids in several places, both on the south and west coasts of Norway, as far north as Kvalø, in depths ranging from 50 to 150 fathoms.

Gen. **Pseudotanaïs**, G. O. Sars, 1880.

Generic Characters.—Body short and stout, not very different in the 2 sexes, with the cephalosome more or less contracted in front, and having no distinct ocular lobes. The 3 anterior segments of mesosome much shorter than the 2 succeeding ones. Metasome not broader than the mesosome, and composed of 6 well-defined segments. Eyes imperfectly developed, or altogether wanting. Superior antennae of same structure in the 2 sexes, very narrow, 3-articulate; inferior antennae almost of same size as the superior. Mandibles comparatively small, cutting part in the right mandible simple, minutely serrulate, in the left one provided with a rather large secondary lamella, molar expansion in both mandibles very narrow, styliform. Maxillipeds with the masticatory lobes coalesced. Chelipeds large, of a similar structure in the 2 sexes, hand very much elongated, fingers narrow and acuminate. Pereiopoda slender and elongated; 1st pair somewhat differing from the others, which are subsimilar in structure, each having a remarkably strong, cultriform spine at the end of the carpal joint inside. Pleopoda sometimes wanting in female. Uropoda biramose, both rami well-defined and bi-articulate. Incubatory pouch formed by only 2 lamellae, issuing from the bases of the 4th pair of pereiopoda.

Remarks.—This genus agrees with the genus *Tanaïs* in the less conspicuous sexual difference, and in the structure of the incubatory pouch, but otherwise differs very materially, both as to its outward appearance, and to the structure of the several appendages. It comprises as yet 7 species, 3 of which belong to the Norwegian fauna, and will be described below. Of the other 4, the one, *P. Willemoesi* (Studer), has been taken off the Kerguelen Islands, the second, *P. mediterranea* G. O. Sars, at Spezia, and the other 2, *P. affinis* and *P. crassicornis* Hansen, in the Kara Sea.

1. *Pseudotanaïs forcipatus* (Lilljeborg).

(Pl. XVII, fig. 1.)

Tanaïs forcipatus, Lilljeborg, l. c. p. 16.

Specific Characters.—Body of female scarcely more than 4 times as long as it is broad, in male still shorter and stouter. Cephalosome greatly narrowed anteriorly, with the front transversely truncated. The first 3 segments of mesosome combined not exceeding the length of the 4th segment, which about equals in size the 5th, both being quadrangular in shape; last segment much shorter. Metasome in female about the length of the last 2 segments of mesosome combined, and slightly narrowed distally, terminal segment obtusely rounded at the tip; that in male much more fully developed, equalling about $\frac{1}{3}$ of the length of the body. Eyes in both sexes wholly wanting. Superior antennæ about the length of the cephalosome, basal joint not quite attaining the length of the other 2 combined, last joint longer than the middle one. Chelipeds very large, attaining almost half the length of the body, hand twice as long as the carpus, fingers very narrow, equalling the palm in length, and nearly straight, but distinctly forcipate, the thumb being deeply sinuated at the base inside. First pair of pereopoda with the propodal joint conically tapered, dactylus very slender, setiform; carpal spine of the succeeding pairs not very large. Pleopoda in female wholly wanting. Uropoda but little longer than the terminal segment of the metasome, outer ramus much shorter and narrower than the inner. Length of female 1.40 mm., of male 1.00 mm.

Remarks.—This is the first recorded species, and may therefore be regarded as the type of the genus. It is easily recognized by the forcipate character of the chelipeds, not found in any of the other species, and equally distinct in both sexes.

Occurrence.—The species occurs along the whole Norwegian coast, as far north as Kvalø, but nowhere in any abundance.

Distribution. Bohuslän (Lilljeborg), Öresund (Meinert)

2. *Pseudotanaïs Lilljeborgi*, G. O. Sars.

(Pl. XVII, fig. 2.)

Pseudotanaïs Lilljeborgi, G. O. Sars, l. c. p. 48.

Specific Characters.—♀. Body somewhat more robust than in the preceding species, being scarcely 4 times as long as it is broad, and conspicuously depressed. Cephalosome rather large, and less abruptly narrowed anteriorly, front

obtusely rounded. The first 3 segments of mesosome combined somewhat exceeding in length the 4th segment, which is about the same size as the 5th, both being almost twice as broad as they are long; last segment, as usual, considerably smaller. Metasome about the length of the last 2 segments of the mesosome combined, and distinctly narrowed distally. Eyes present, but very small, punctiform, occurring on the sides of the cephalosome, at some distance from the frontal margin. Superior antennæ with the last 2 joints of about equal length, and combined, not quite attaining the length of the basal one. Chelipeds very strong, hand oblong oval, not attaining twice the length of the carpus, fingers shorter than the palm, and not forcipate. Pereiopoda resembling in structure those in the preceding species, though perhaps somewhat less slender; carpal spine of the 5 posterior pairs comparatively larger, and more conspicuously cultriform. Pleopoda (in female) wholly wanting. Uropoda of about same appearance as in *P. forcipatus*. Length of female 1.55 mm.

Remarks.—Though rather nearly allied to the preceding species, the present form may be easily distinguished by the somewhat different form of the cephalosome, the presence of distinct, though very small eyes, and by the chelipeds not being forcipate.

Occurrence.—The only place where I have observed this form, is in the Varanger Fjord at Vadsö. It occurred here rather sparingly in a depth of 100—120 fathoms. Out of Norway, it has not yet been recorded.

3. *Pseudotanaïs macrocheles*, G. O. Sars.

(Pl. XVIII.)

Pseudotanaïs macrocheles, G. O. Sars, l. c. p. 47.

Specific Characters.—♀. Body very short and compact, scarcely more than 3 times as long as it is broad. Cephalosome scarcely exceeding in length the 3 anterior segments of mesosome combined, and strongly contracted in front, tip narrowly truncated. Free segments of mesosome about as in the 2 preceding species. Metasome gradually narrowed distally, with the terminal segment evenly rounded at the tip. Eyes wholly absent. Superior antennæ very slender, considerably exceeding the cephalosome in length, last joint longer than the 2nd, and both combined, about the length of the basal one. Chelipeds exceedingly large, attaining nearly half the length of the body, hand very much elongated, with the fingers slender and narrow, considerably exceeding the palm in length, but not forcipate. Pereiopoda rather slender, 1st pair with the propodal joint longer than the 2 preceding joints combined, and conically tapered, dactylus long and seti-

form; carpal spine of the succeeding pairs very large and conspicuously cultriform. Pleopoda well developed, both rami tipped by long natatory setae. Uropoda of a similar structure to that in the 2 preceding species, though somewhat longer. Length of female 1.45 mm.

Remarks.—As to its general outward appearance, this species resembles, on the whole, the 2 preceding ones, though the body is of a still shorter and stouter form. It is, moreover, easily distinguished by the long and slender antennae, the structure of the chelipeds, and the presence of well-developed pleopoda, wholly wanting in the female of the other known species. The carpal spine of the 5 posterior pairs of pereopoda is also considerably larger than in the other 2 Norwegian species.

Occurrence.—I have met with this form occasionally in 3 widely-distant places on the Norwegian coast, viz., in the Christiania Fjord, at Bekkervig, south of Bergen, and in the Varanger Fjord at Vadsö. Out of Norway, it has not yet been recorded.

Tribe 2.

FLABELLIFERA.

Remarks.—It is not easy to give any exhaustive diagnosis of this tribe, as it comprises Isopods of extremely different structure. The only essential character common to all the forms, is the relation of the uropoda, which are not, as in the preceding tribe, terminal, but lateral, and arranged in such a manner as to form, with the last segment of the metasome, a caudal fan, similar to that found in some of the higher Crustacea, the shrimps and lobsters. As to the pleopoda, they exhibit more generally the character of true swimming organs, though at the same time they may also serve for respiration, and it is only in exceptional instances that the latter function is exclusively devoted to them. By far the greater number of the forms seem to lead a parasitic, or at least semi-parasitic existence, and for this reason, the oral parts are often found to be peculiarly modified, and, moreover, a number of the legs, in some cases all of them, to assume a more or less pronouncedly prehensile character. The tribe includes 6 very distinct families, viz., *Anthuridæ*, *Gnathiidæ*, *Cymothoidæ*, *Scrotidæ*, *Sphaeromidæ* and *Limnoriidæ*; but of these, the 3rd has generally been again subdivided into 6 families, viz., *Aegidæ*, *Ciclanidæ*, *Corallanidæ*, *Alcioronidæ*, *Barybrotidæ* and *Cymothoidæ*, thereby increasing the number of families to no less than 11 in all. Five of these families are represented in the fauna of Norway, and will be here treated of.

Fam. 1. Anthuridæ.

Characters.—Body long and slender, subcylindric in form, and rather flexible. Head comparatively small. Segments of mesosome all well defined, and

without distinct coxal plates. Metasome comparatively short, with the anterior segments sometimes coalesced, telson generally well defined, linguiform. Both pairs of antennæ, at least in female, short and subequal in length, originating close together, the one pair beneath the other. Oral parts modified for perforation and suction. Legs composed of the normal number of joints, the basal and ischial ones being rather slender, and forming together a genicular bend; 1st pair, as a rule, much stronger than the others and subcheliform; the 2 succeeding pairs likewise subcheliform, but much feebler; the 4 posterior pairs ambulatory. Pleopoda chiefly branchial in character, 1st pair large, more or less covering the others. Uropoda with the outer ramus extending upwards, so as generally to arch over the base of the telson. Incubatory pouch apparently not formed by distinctly defined lamellæ.

Remarks.—In their general outward appearance, the forms belonging to this family somewhat recall the *Tunaide*, having a similar long and narrow body, and in some cases, there is even to be found a slight attempt at a cheliform structure of the 1st pair of legs. But otherwise, the two families are widely different. The structure of the oral parts would seem to point to a parasitic habit, but in none of the forms has the mode of parasitism as yet been stated. The manner in which the metasome terminates is very peculiar, and unlike that found in other Isopoda; for the telson is well defined from the last segment, and more or less strongly deflexed, whereas the outer ramus of the uropoda extends upwards so as to arch over the base of the telson, thereby giving the caudal fan a somewhat cup-shaped appearance. It is indeed from this character that the name *Anthura*, given to the typical genus, has been derived. In some of the exotic forms, however, this peculiar formation would appear to be less pronounced than in the northern forms. Several genera have been established in recent times, amounting to about 10 in all. Of these, only 2 are represented in the fauna of Norway.

Gen. 1. *Calathura*, Norm. & Stebb., 1886.

Generic Characters.—Body moderately slender, with the 2nd segment of mesosome very movably connected, both with the preceding and succeeding segments, dorso-lateral carinæ in all the segments well marked. Metasome comparatively short, with the segments not very distinctly defined, though apparently present in the normal number. Eyes imperfectly developed, or quite wanting. Antennæ subequal in length, both pairs having the flagella multi-articulate; the superior

ones scarcely different in the two sexes. Buccal mass projecting in front as a sharply-pointed cone. Mandibles terminating in a lancet-like point, and having inside, a flexuous lamella, by which a channel-like groove is formed, leading from the tip to the base of the mandible, palp well developed, 3-articulate. Anterior lip narrow, terminating in an obtusely conical point; posterior lip tapering distally, and slightly bifid at the tip. Anterior maxillæ simple, spear-like, terminal part armed with recurved teeth. Posterior maxillæ wanting. Maxilliped: with the basal part narrow oblong, projecting at the end, inside, to a triangular, pointed masticatory lobe, palp distinctly 3-articulate, with the terminal joint rather large, lamelliform, epignath very small, rounded. 1st pair of legs powerfully developed, meral joint transversely expanded, propodos large and tumefied, with the palmar edge concaved, and defined behind by a small, thumb-like projection; the 2 succeeding pairs with the propodos much smaller, and not having the palmar edge defined. 1st pair of pleopoda very large, completely covering the other pairs below. Uropoda with the inner ramus rather broad, lamellar, biarticulate, outer ramus much smaller, uni-articulate, cordiform, edged with strong, ciliated setæ.

Remarks.—This genus has been recently established by Messrs. Norman and Stebbing, to include the arctic form, *Anthura brachiata* of Stimpson. It is very nearly allied to the genus *Paranthura* Bate & Westwood, chiefly differing in the facts that the flagella of both pairs of antennæ are multiarticulate, and that the superior ones are of the same structure in the two sexes; moreover, the uropoda exhibit a somewhat different shape. It may be noted, that in examining the oral parts, I have failed to detect any traces of the posterior maxillæ, either in this or the following genus, whereas in other genera belonging to this family (for instance *Anthura*), these maxillæ are stated to exist in a rudimentary condition. — The present genus contains as yet only 2 species, to be described below.)

1. *Calathura norvegica*, G. O. Sars.

(Pl. XIX, fig. 1.)

Paranthura norvegica, G. O. Sars, Bidrag til Kundskaaben om Dyrelivet paa vore Havbanker, Chr. Vid. Selsk. Forh. 1872, p. 88.

Specific Characters.—Body slender, moniliform, somewhat contracted in front of the middle, with the 1st segment of mesosome rather firmly connected to the cephalon, the 2nd, however, defined from the preceding and succeeding segments by very deep constrictions. Cephalon rather small, and seen from above, rounded oval, with the side-edges evenly convex, frontal edge slightly produced in the middle. The

1) A 3rd species has recently been described by M. Jules Bonnier as *C. affinis*.

first 2 segments of mesosome somewhat widening in front, the 4 succeeding ones nearly twice as long as they are broad; last segment very small. Metasome, including the telson, about the length of the last 2 segments of mesosome combined, and slightly widening behind. Eyes wholly absent. Superior antennæ with the flagellum about the length of the peduncle, and 8-articulate; inferior antennæ a little longer than the superior, with the flagellum not attaining half the length of the peduncle, and composed of about 10 articulations rapidly decreasing in size distally. 1st pair of legs with the propodos very large, oval triangular, forming a rounded expansion outside, palmar edge occupying the whole inner side, evenly concave, and fringed with short spines, dactylus long and curved, impinging against the posterior, produced corner of the palm. Propodos of the 2 succeeding pairs oval pyriform in shape, and armed on the palmar edge with 4 strong spines. Last pair of legs smaller than the 3 preceding ones. 1st pair of pleopoda with the inner plate strongly dilated in the middle, and tapering distally to an obtuse point. Uropoda with the inner ramus rather broad, lamina, terminal joint not attaining half the length of the proximal one, outer ramus short, obliquely cordiform, with the edge minutely crenulated and densely fringed with ciliated setæ. Telson oblong, linguiform, with the tip narrowly rounded, and clothed with slender bristles. Colour greyish brown, with dark brown ramifications on the sides of the cephalon. Length of adult female 12 mm.

Remarks.—The present species is very nearly allied to the succeeding one, and has, indeed, by Messrs. Norman and Stebbing, been identified with it. On a closer comparison, it is, however, found to differ not only in its much inferior size and less slender form, but also in the absolute want of eyes, and in the far greater indistinctness in the dorsal impressions of the 4th to 6th segments of the mesosome.

Occurrence.—I have only met with this form in 3 places on the Norwegian coast, viz., at the Storeggen bank, at Husö, outside the Sognefjord, and at Hvitingsö. In all 3 places it occurred rather sparingly at a depth of from 150 to 200 fathoms. Out of Norway, it has not yet been recorded.

2. *Calathura brachiata*, Stimpson.

(Pl. XIX, fig. 2.)

Anthura brachiata, Stimpson, Marine Invertebrata of Grand Manan, p. 13.

Syn: *Paranthura brachiata* Harger.

„ *Anthura arctica* Heller.

Specific Character.—Very like the preceding species, but more than twice as large, and somewhat more slender in form. Cephalon very small and, seen

from above, nearly quadrate in form, with the side-contours somewhat flexuous. 2nd and 3rd segments of mesosome each with 2 small juxtaposed dorsal tubercles close to the anterior edge; the 3 succeeding segments having, in the same place, a very conspicuous oval depression; dorso-lateral keels, in these and the preceding segments, very strongly marked. Eyes fairly conspicuous, though rather small, each forming a slight bulging laterally, pigment opaque white, visual elements imperfectly developed. Antennæ resembling those in the preceding species, though having the flagella more fully developed. The other appendages of much the same structure as in *C. norvegica*. Colour uniformly greyish brown, without any pigmentary ramifications. Length reaching to 29 mm.

Remarks.—As stated above, I am of opinion that this form is specifically distinct from the preceding one. The resemblance between the two, it is true, is very close; but yet there are to be found some well-marked differences, which do not allow of their being united in one and the same species. Not to speak of the great difference in size, the present species is well distinguished by the presence of distinct, though rather imperfectly developed eyes, of which no trace is to be found in the other species, and also by the peculiar dorsal markings so conspicuous in the form here under consideration, and scarcely at all visible in *C. norvegica*.

Occurrence.—The only place on the Norwegian coast, where I have met with this form, is in the Varanger Fjord at Vadsø. It here occurred occasionally in a depth of about 120 fathoms.

Distribution.—Atlantic coast of North America (Stimpson, Harger), Franz Josef's Land (Heller), Greenland (Hansen), the Kara Sea (Hansen). Norwegian North Atlantic Expedition in several Stations, as far north as Jan Mayen and Spitsbergen (the present author), Porcupine Expedition in 6 different Stations, as far South as the bay of Biscay (Norm. & Stebbing).

Gen. 2. *Leptanthura*, G. O. Sars, n.

Generic Characters.—Body in both sexes very slender and elongated, with the metasome distinctly segmented, and rather more fully developed in male than in female. Eyes absent. Both pairs of antennæ in female short and thick, with the flagellum rudimentary, the superior ones in the male, however, rather fully developed, with the flagellum large, multiarticulate, and densely clothed with

long sensory filaments. Mandibles of a similar structure to that in *Calathura*, but having the palp smaller, with the terminal joint rudimentary. Maxillipeds narrow, with the basal part imperfectly defined from the palp, which is only composed of 2 joints, the distal one very small and narrow, masticatory lobes obsolete. 1st pair of legs very strong, propodos produced at the end of the palm to a very conspicuous, thumb-like process, giving these legs an almost chelate character; the 2 succeeding pairs with the propodos of different shape in the two sexes. 1st pair of pleopoda less fully developed than in *Calathura*, so as not to obstruct the others below. Uropoda with the inner ramus rather slender, outer one very broad and but sparingly setous. Telson lanceolate, terminating in an acute point.

Remarks.—The present new genus is founded upon the form at first recorded by the present author as *Paranthura tenuis*, and subsequently referred by him to the genus *Ptilanthura* of Harger. On a closer examination, I have, however, found it necessary to separate this form also from the above-named genus, on account of some apparently very essential differences. Messrs. Norman & Stebbing retain it in the genus *Paranthura*; but this seems to me inadmissible, as it exhibits several very marked differences from that genus, both in the structure of the oral parts and in that of the other appendages. The structure of the 1st pair of legs in this genus is rather remarkable from the circumstance that it exhibits a very pronounced approach to a chelate character, like that found in the Tanaïde.

Leptanthura tenuis, G. O. Sars.

(Pl. XX.)

Paranthura tenuis,¹⁾ G. O. Sars, Bidrag til Kundskaben om Dyrelivet paa vore Havbaner.
Chr. Vid. Selsk. Forh. 1872, p. 89.

Specific Characters.—Body, especially in male, exceedingly slender, almost filiform, with all the segments very sharply defined. Cephalon about half the size of the 1st segment of mesosome and scarcely narrower, almost quadrate in outline, frontal margin slightly bi-sinuate. The first 2 segments of mesosome and the last of about equal size, the 1 others somewhat longer, being more than twice as long as they are broad; dorsal face of all segments perfectly smooth. Metasome, including the telson, in female about the length of the last 2 segments of mesosome combined, in male considerably longer, somewhat fusiform in shape,

¹⁾ *P. tenuis* of Harger, established some years afterwards, is a very different species, not even belonging to the same genus.

being conspicuously constricted at the base of the caudal fan, all segments very sharply defined, and having distinct rounded epimera. Superior antennae in female much shorter than the cephalon, first joint of the peduncle about the length of the other 2 combined, flagellum not exceeding in length the last peduncular joint, conic in form, and exhibiting 1 or 2 extremely small terminal joints; those in male more than twice as large, and, as a rule, reflexed, last joint of the peduncle very movably articulated to the 2nd, and gradually widening distally, flagellum fully as long as the peduncle, and rather thick at the base, being composed of about 10 articulations, each provided with a dense whorl of long sensory filaments, whereby the outer part of the antenna acquires a brush-like appearance. Inferior antennae of same structure in the two sexes, rather stout, flagellum very small, with 3—4 extremely minute terminal joints, carrying a dense brush of bristles. 1st pair of legs likewise of a similar appearance in the two sexes, propodos large, oval, set obliquely on the short carpus, palm deeply concave, and armed with a row of flattened denticles, thumb-like process very prominent. The 2 succeeding pairs of legs with the propodos in female comparatively short, subquadrangular, palm defined below by a distinct angle, that in male much longer, pyriform, palm occupying the whole lower edge. First pair of pleopoda having the outer plate oblong oval, gradually widening distally. Uropoda with the inner ramus rather narrow, and reaching considerably beyond the telson, terminal joint about the length of the proximal one, and having at the tip a dense brush of slender bristles, outer ramus broadly cordiform, arching over the base of the telson, so as almost to meet the corresponding ramus on the other side in the middle, edge smooth, only clothed with scattered bristles. Telson in male broad, scarcely more than twice as long as it is broad, in female considerably narrower, edges smooth, except at the tip, which carries 2 long and 2 short bristles. Colour a pure white. Length of female 7 mm., of male 8½ mm.

Remarks.—By its extremely slender, filiform body, this form is easily recognized from most other *Anthurida*, though the species of *Anthetura* and *Hyssura* in this respect would seem to approach it. On account of its pure white colour and comparatively small size, it may at first sight be mistaken for a Tanaid.

Occurrence. I first detected this form at Hvilingsö, outside Stavanger, in a depth of 150—200 fathoms, and have subsequently taken it in the inner part of the Stavanger Fjord at Jelse, as also rather plentifully in the Trondhjem Fjord in similar depths. It is a rather sluggish animal, creeping slowly along the bottom. At times it is seen to bend its body almost in a circle; but I have never seen it make any attempt to swim, though the structure of the pleopoda seems to admit of such a motion, at least in the male sex.

Distribution.—Stat. 22 of the Porcupine Expedition, located off Lisbon (Norm. & Stebbing).

Fam. 2. Gnathiidæ.

Characters.—Body of male and female of very different appearance, being, in the former, depressed and dilated in front, in the latter, more or less fusiform; body of immature animal (larva) also rather different, though more resembling that of female. Cephalon of male very large, as compared with that of female and larva. Mesosome apparently composed of only 5 segments, though a rudimentary anterior and posterior segment may be discerned. Metasome narrowing abruptly to a width much narrower than the mesosome, composed of 6 segments, the last triangularly produced behind, and forming together with the uropoda a normal caudal fan. Antennæ comparatively short, and of same structure in the two sexes, issuing close together from the outer corners of the cephalon. Oral parts in the adult animal much reduced, consisting in the male of a pair of mandibles freely projecting in front and a pair of peculiarly modified maxillipeds, in female of only the latter appendages. Oral parts in the larva present in the normal number, and densely crowded together, to form an apparatus for penetration and suction. Gnathopoda in male valve-like, arching over the lower face of the cephalon, in female much smaller and more distinctly segmented, in the larva pediform, terminating in a strong hook. Only 5 pairs of pereopoda present, the last pair being absent. Pleopoda of equal structure, natatory or exclusively respiratory (in the adult animal). No true incubatory pouch present, the ova undergoing their development within the dilated body-cavity.

Remarks.—This is one of the most anomalous families of the order, and in some points even differs more pronouncedly from the typical Isopoda, than do the *Apscaudida* and *Tanaida*. The sexual differences are highly remarkable, and the not yet mature animals differ also so widely from the adults, that they have long been referred to quite a separate family, *Pranizida*. The latter lead a true parasitic existence, as shown by the peculiarly modified oral parts, whereas the adults are scarcely at all parasitic. The complete absence of the last pair of pereopoda affords another very anomalous character, not found in other Isopoda, except in the recently hatched young.

The family comprises as yet but a single genus, *Gnathia* Leach; but it is most probable, that it will be found appropriate to subdivide this genus into several distinct genera, as there are some apparently essential differences to be found on comparing the several species. Indeed, the Rev. Mr. Stelbing has recently proposed to raise a most anomalous form described by Mr. Beddard from the Challenger Expedition, to the rank of a distinct genus *Euneognathia*, and he

has advanced the opinion that another species, established by the same author from a fragment of a specimen, may also require to be transferred to a new genus.

Gen. *Gnathia*, Leach, 1814.

Syn: *Auceus*, Risso (male).

„ *Praniza*, Latr. (larva).

Generic Characters.—Body in male subdepressed, and more or less dilated in front, with the cephalon very large, subquadrangular, and flattened anteriorly, mesosome divided by a more or less conspicuous constriction into 2 sections, the anterior comprising 2, the posterior 3 well-developed segments, the foremost rudimentary segment being consolidated with the head, the hindmost received between the projecting lateral parts of the 5th segment. Body in female and larva more or less fusiform, with the cephalon rather small, and some of the segments of mesosome fused together. Metasome in both sexes, as also in the larva, much narrower than the mesosome, sublinear in form. Eyes, when present, placed laterally. Antennæ comparatively short and subequal in length, both pairs with distinctly defined flagella. Mandibles in male of different form in the different species, more or less flattened, forceps-like. Maxillipeds without epignathus, masticatory lobe simple, palp consisting of 4 flattened joints fringed outside with strong plumose setæ; those in female much smaller, but of a similar structure. Oral parts in the larva combined into a rostrum-like cone projecting in front, and in a great measure styliform. Gnathopoda in male forming a pair of very large curved plates arching over the lower face of the cephalon, and terminating in a small apical joint; those in female much smaller and more pediform, being divided into 3 or 4 joints, and having at the base a thin lamella. Pereiopoda subequal and of normal structure. Pleopoda with the rami uni-articulate, tipped with long setæ, or quite naked (in the adult animal). Uropoda with both rami lamelliform, subequal, and edged with slender bristles.

Remarks.—This genus was established as early as in the year 1814 by Leach under the above name, which, according to the rules of priority, must be preferred to the more generally used terms *Auceus* (the male) and *Praniza* (the larva). To the French zoologist, E. Hesse, is due the merit of first having made out precisely the true relationship between the male, female, and larva, which had not formerly been fully recognized, though Leach had already conjectured, that the

Praniza might be the female of *Anceus*. Indeed, the 3 forms are so widely different both in their general appearance, and in the structure of some of the appendages, that one may be easily led to suppose that they belonged to as many distinct genera. The communications of M. Hesse therefore at first occasioned no little discussion among Crustalogists, and the correctness of his observations relating to the transformation of *Praniza* into *Anceus*, was even simply denied¹⁾; but subsequent investigations have, on the whole, fully confirmed his statements about the peculiar trimorphism occurring in this genus. A rather large number of species, amounting to more than 20 in all, have been recorded from different parts of the Oceans; but the far greater part of them have been only described from male specimens. To the fauna of Norway belong 4 species, to be described below.

1. *Gnathia maxillaris* (Mout.).

(Pl. XXI, Pl. XXII, fig. 1.)

Gnathia maxillaris, Montague, Trans. Linn. Soc., Vol. VII, p. 65, Pl. 6, fig. 2.

- Syn: *Anceus maxillaris*, Laank, ♂.
 " *Praniza coerulescens*, Desm. (Larva).
 " *Anceus oxyurus*, Lilljeb. ♂.
 " *Praniza Edwardii*, Sp. Bate ♀.
 " ? *Anceus manticornis*, Hesse.

Specific Characters.—*Male.* Body almost clavate in shape, being gradually expanded in front, with the anterior part of mesosome divided from the posterior by a rather deep constriction. Cephalosome transversely quadrate, deeply excavated above in its anterior part, dorsal face smooth and distinctly areolated, supraocular denticle comparatively small. Posterior division of mesosome narrower than the anterior, dorsal face quite smooth, without any areolation. Eyes well developed. Mandibles rather large, broadly lanceolate, with a slight obtuse notch outside, inner edge bulging in the middle, and obscurely crenulated in its outer part, tip scarcely incurved. Pereiopoda with scattered tubercles inside the outer joints. Pleopoda well developed, natatory. Uropoda with the rami foliaceous, and fringed with long ciliated setæ. Terminal segment of metasome triangular, gradually tapering to a point carrying 2 slender bristles. Sexual tubercle small, but little prominent. Colour yellowish brown, with the areole of the head whitish, defined by narrow dark brown grooves.—*Female:* Body oblong fusiform, with the 2

¹⁾ It may be noted that the strange controversy which at first took place between M. Hesse and Mr. Sp. Bate, was merely due to the fact that the latter author regarded the adult female as a *Praniza*, whereas M. Hesse more correctly named it a female *Anceus*.

posterior pedigerous segments coalesced. Cephalosome obtusely produced in front, being fully as long as it is broad at the base. Pleopoda, as in male, natatory. Body whitish, mottled all over with reddish brown specks. Length of male 5 mm., of female about the same.

Remarks.—The identification of this form with Montagu's species is somewhat doubtful; but as, at least off the coasts of Norway, it is by far the most common species, I am much inclined to believe, that it is the form originally described as *Cancer maxillaris*. The form recorded by Sp. Bate & Westwood under this name is a very different species, showing in some respects a closer relationship to the following species, though apparently specifically distinct. The present species may be easily distinguished in both sexes from the 3 other Norwegian species, the male especially being readily recognized by the very large lanceolate mandibles, and by the very pronounced areolation of the dorsal face of the head, the female, by the form of the cephalosome.

Occurrence.—I have met with this form rather abundantly along the whole south and west coasts of Norway, from the Christiania Fjord up to the Lofoten Islands, in depths varying from 20 to 100 fathoms, and generally on muddy bottom. Male specimens are much more frequent than female ones, both being always found slowly creeping on the bottom. The larvæ (*Praniza*) are much more agile, and are often seen swimming about with great speed. Occasionally I have found them clinging to the skin of living fishes of various kinds, when just brought up by the fishing-line. In such cases, the posterior part of the mesosome generally forms a greatly swollen, unsegmented division (see Pl. XXII, fig. 1) filled with the blood of their hosts, and this is, on the whole, invariably the case with more advanced larvæ, even when taken up by the dredge. In all probability, they all lead a true parasitic existence, but being well fitted for swimming, they may at times leave their hosts. I have once witnessed the transformation of a *Praniza* (larva) into the adult male form (*Ancus*). Immediately after the transformation, the integuments of the animal were still rather soft, senipellucid, and mottled all over with reddish brown specks, as in the larva, without as yet showing the distinct areolation of the dorsal face of the head, which distinguishes the fully grown male.

Distribution.—British Isles (Mont.), Kattegat (Meinert), coast of France (Hesse).

2. *Gnathia dentata*, G. O. Sars.

(Pl. XXII, fig. 2.)

Ancus dentatus, G. O. Sars, Undersøgelser over Hardangerfjordens Fauna I. Chr. Vid. Selsk. Forh. 1871, p. 32.

Specific Characters.—*Male*: Body comparatively more elongated than in *G. maxillaris*, and less clavate in form, with the posterior division of mesosome scarcely narrower than the anterior, both being defined by a very conspicuous constriction. Cephalosome rounded quadrangular, with the supra-ocular processes rather prominent, dorsal face, behind the anterior excavation, evenly convex, without any areolation, but, like the first 2 segments of mesosome, clothed all over with very small spikes and stiff hairs. Posterior division of mesosome quite smooth, middle segment divided dorsally into 2 areolæ, separated by a rather broad membranous space. Metasome comparatively shorter and broader than in *G. maxillaris*, with the epimera triangularly produced. Eyes well developed. Inferior antennæ with the last joint of the peduncle rather large, subfusiform. Mandibles much smaller than in *G. maxillaris*, with a very conspicuous tooth-like projection in the middle of the outer edge, tip slightly incurved, acuminate, inner edge distinctly crenulated, and obtusely produced near the base. Pereiopoda without any distinct tubercles inside the outer joints. Pleopoda well developed, natatory. Terminal segment of metasome triangular and rather broad. Uropoda with the rami well-developed, foliaceous. Sexual process very long, pointing anteriorly. Colour greyish white.—*Female*: Body rather narrow with the 3 posterior pedigerous segments completely coalesced, and forming together an oblong, subcylindric division, more than 4 times as long as that preceding it. Cephalosome very small, twice as broad as it is long, front but very slightly produced, minutely bidentate at the tip. Pleopoda, as in the male, natatory. Colour yellowish white, mottled with scattered reddish specks. Length in both sexes 4 mm.

Remarks.—The present species may be easily distinguished from the preceding one, in the adult state of both sexes, whereas the larvæ are of a very similar appearance to those of *G. maxillaris*. In the male, the structure of the mandibles and the non-areolated dorsal face of the head may serve as easily recognizable distinguishing marks; in the female, the very different shape of the cephalosome, and the complete fusion of the posterior dilated segments of the mesosome.

Occurrence. This form was first observed by the present author in the inner part of the Hardanger Fjord, and has subsequently been found occasionally in a few other places on the west coast of Norway, as also in the Trondhjem Fjord. It generally occurs on a stony bottom among Hydroïda, the depth varying from 20 to 50 fathoms. In habits it exactly agrees with the type species.

3. *Gnathia elongata*, Krøyer.

(Pl. XXIII, fig. 1.)

Anceus elongatus, Krøyer, Nat. Tidsskr. Ny Række, Bd. II, p. 388.

Specific Characters.—*Male*: Body rather elongated, with the mesosome of nearly uniform breadth throughout, and the median constriction not very much pronounced. Cephalosome of moderate size, rounded quadrangular, with the supra-ocular processes well-defined. Dorsal face of both cephalosome and mesosome very uneven, with irregular depressions, and clothed all over with minute spinules and short hairs. Penultimate pedigerous segment divided dorsally by a narrow longitudinal groove into 2 halves. Metasome comparatively narrow, and scarcely longer than the 2 posterior pedigerous segments combined, epimera small. Eyes well-developed, though not very large. Mandibles comparatively small, with only a very slight notch outside, inner edge obtusely produced in the middle, tip acute, slightly incurved. Pereiopoda with small tubercles inside the outer joints. Terminal segment of metasome considerably narrowed in its outer part, which is conical in shape. Uropoda with the rami comparatively narrow. —*Female*: Body much broader than in male, with the last 3 pedigerous segments well-defined, and together forming an oblong oval division about 3 times as long as that preceding it. Cephalosome with the frontal part slightly produced and bidentate at the tip. Pleopoda in both sexes with the rami quite smooth forming narrow sac-like plates not fitted for swimming, but apparently respiratory in character. Colour of male greyish white, with a light bluish tinge, of female, yellowish, semipellucid, with scattered brown dots. Length in both sexes 4 mm.

Remarks.—This form was first described by Krøyer from male specimens collected off the Greenland coast, and was subsequently figured in Gaimard's great work. The female, however, has hitherto been unknown. Both sexes are easily distinguishable from those of the other Norwegian species. The immature form (Praniza), however, looks very like that of the 2 preceding species.

Occurrence.—Along the whole Finmark coast, this arctic form is not infrequently met with. In the harbour of Hammerfest especially, I have taken it in great abundance at a depth of from 20 to 40 fathoms, both sexes occurring in nearly equal numbers, and in the same place, larvæ (the Praniza-form) were also found rather plentifully. It extends southwards to the Lofoten Islands; farther south, I have never met with it. The adult animal is very sluggish in habit, the structure of the pleopoda, indeed, showing it to be quite unable to swim. The larvæ, on the other hand, move through the water with great agility, and most probably, at times, lead a parasitic life on the skin of various fishes.

Distribution.—Greenland (Krøyer), the Kara Sea (Hansen), St. 223 & 290 of the Norwegian North Atlantic Expedition.

4. *Gnathia abyssorum*, G. O. Sars.

(Pl. XXIII, fig. 2.)

Auceus abyssorum, G. O. Sars, Undersøgelser over Hardangerfjordens Fauna, Crustacea, p. 34.

Specific Characters.—*Male*: Body very short and stout, subclavate in form, with the posterior division of mesosome somewhat narrower than the anterior, both being defined by a well-marked constriction. Cephalosome exceedingly large, rounded quadrangular in shape, with the supra-ocular processes well-defined and coarsely denticulate, dorsal face, like that of the anterior part of mesosome, clothed with small spinules and scattered hairs. Penultimate pedigerous segment divided dorsally into 2 lateral areas by a rather broad median, soft-skinned space, last segment considerably narrower, with the lateral corners obtusely produced. Metasome comparatively short, with simple, rounded epimera. Eyes unusually large, with light yellowish pigment. Mandibles powerfully developed, and pronouncedly securiform in shape, outer edge perfectly smooth, without any notch, inner, produced at the base to a large, obtusely conic expansion, tip pointed. Pereiopoda coarsely spinous inside. Terminal segment of metasome abruptly contracted in its outer part, which is narrowly conic in form. Uropoda with the rami comparatively narrow.—*Female*: Body fusiform, with the 3 posterior pedigerous segments well defined, and forming together an oval division, two and a half times as long as that preceding it. Cephalosome triangular, front rather produced, and bidentate at the tip. Pleopoda in both sexes not natatory, rami narrow saciform, the outer one considerably shorter than the inner. Colour of male bluish white, of female whitish pellucid, without pigmentary spots. Length in both sexes about 3 mm.

Remarks.—This form was at first observed by the present author only in the female sex; but subsequently I have also succeeded in finding the male, and am thus enabled to draw up a complete diagnosis of the species. The discovery of the male has shown this species to be very nearly allied to the form described by the present author from the Norwegian North Atlantic Expedition as *Auceus robustus*; but the present species is of much inferior size, and of a still shorter and more compact form, differing, moreover, in the shape of the mandibles, and in the larger size of the eyes. By the 2 latter characters, it is also easily distinguishable from the 3 other Norwegian species.

Occurrence.—A single female specimen of this form was first taken in the inner part of the Hardanger Fjord, at Utne, from the considerable depth of

200 fathoms. Some years afterwards, I met with this species in a widely distant locality, viz., at Hasvig, West Finmark, where a few specimens, males and females, were taken from depths of from 150 to 200 fathoms.

Fam. 3. Ægidæ.

Characters.--Body more or less broad, depressed, with the dorsal face evenly vaulted and very smooth. Cephalon comparatively small, transverse, front not produced above the bases of the antennæ. Segments of mesosome well-defined and closely crowded together, all, excepting the 1st, having distinct coxal plates firmly connected with them laterally. Metasome composed of 6 well-defined segments, the last large, scutiform, and ciliated at the edges, constituting together with the uropoda a well-developed caudal fan. Eyes, when present, large, extending more or less over the dorsal face of the head. Antennæ pointing laterally, the superior ones shorter than the inferior, and originating close together in front of them; both pairs provided with distinctly-defined, multiarticulate flagella. Oral parts of rather anomalous structure, being modified for piercing and tearing the skin of other animals. The first 3 pairs of legs short and thick, prehensile, terminating in a strongly curved, hook-like dactylus, the 4 posterior pairs more slender, and ambulatory in character. Pleopoda with the rami large, foliaceous, ciliated at the edges, serving partly for swimming, partly for respiration. Uropoda attached laterally beneath the base of the terminal segment, and having the rami of coarser structure, and partly fringed with spines. Sexual difference not very pronounced.

Remarks.--This is one of the 6 families comprised within the large group *Cymothoidæ*, and is chiefly distinguished from the other families by the comparatively broad, flattened body, and by the structure of the antennæ and oral parts. All the forms belonging to this family lead a parasitic existence, being generally found clinging to the skin of fishes of different kinds, though they are pretty well adapted for moving freely about by the aid of the largely developed pleopoda. Four or 5 genera are comprised within this family, 3 of which are represented in the fauna of Norway.

Gen. 1. *Æga*, Leach, 1815.

Generic Characters.—Body rather compact, with very hard integuments, and the segments of mesosome nearly equal in size, the 4 posterior ones generally having a line running across them dorsally. Coxal plates thick, sculptured outside with 2 curved ridges, and produced posteriorly to an acute point. Metasome not much narrower than the mesosome, its 5 anterior segments very short, and having the epimera acutely produced. Eyes large, reniform, sometimes approaching dorsally, so as to meet in the middle. Superior antennæ rather short, with the first 2 peduncular joints more or less expanded. Anterior lip having in front a smooth linguiform plate (epistome) projecting between the bases of the inferior antennæ. Posterior lip terminating in 2 comparatively small, lanceolate lappets. Mandibles having at the base outside a well-developed 3-articulate palp, inner part of the body greatly produced, and terminating in a sharpened, knife-shaped cutting edge, molar expansion wanting. Anterior maxillæ with only a single narrow masticatory lobe tipped by short spines. Posterior maxillæ broader, sublamellar, terminating in 2 unequal lobes armed with recurved denticles. Maxillipeds rather strong, epignath confluent with the basal part, masticatory lobe rudimentary, terminal part (palp) 5-articulate, incurved, subtoruous, and armed with strong recurved denticles. Anterior pairs of legs with the propodos simple cylindrical, not expanded, dactylus abruptly curved in the middle, and terminating in a very acute point; the 4 posterior pairs successively increasing in length, with the propodal joint short, and the dactylus comparatively small. Uropoda with the basal part produced at the inner corner to a narrow lanceolate process.

Remarks.—This genus was established as early as in the year 1815 by Leach, and represents the type of the family *Ægidae*. It is chiefly distinguished from the other 3 genera represented in the Norwegian fauna, by the comparatively broad metasome, the large reniform eyes, the structure of the antennæ and that of the mandibles and maxillipeds. Moreover, some differences are found in the structure of the legs. The *Ægæ* comprise some of the largest known Isopoda, and are well known by our fisher-men by their frequent occurrence on the skin of fishes of various kinds. They are generally named here in Norway "Fisk-Bjørn", that is, fish-bear. The genus comprises rather a large number of species from different parts of the Ocean, amounting to more than 20 in all. To the fauna of Norway belong 7 species, to be described below.

1. *Æga psora* (Linn.).

(Pl. XXIV.)

Oniscus psora, Linné, Fauna svecica, ed. II, 1761.Syn: *Æga emarginata*, Leach.

Specific Characters.—Body rather broad, oval in form, about twice as long as it is broad, with the dorsal face but slightly vaulted, and very smooth and polished; transverse lines of the 4 posterior pedigerous segments indistinct. Cephalon with the front slightly produced in the middle. Coxal plates of moderate size. Metasome about half the length of the mesosome, epimera well-developed and pointed. Terminal segment triangular, pointed at the tip, dorsal face smooth. Eyes subreniform, separated in the middle by a distinct, though rather small interspace. Superior antennæ with the first 2 peduncular joints rather broad, the 2nd being produced at the end anteriorly to a hood-like projection curving over the succeeding joint, flagellum about half the length of the peduncle. Inferior antennæ nearly twice as long as the superior, with the flagellum somewhat longer than the peduncle. 1st pair of legs with only 2 blunt spines at the end of the meral joint inside, the 2 succeeding pairs with a row of from 7 to 8 similar spines on the same joint; the 4 posterior pairs with the outer part densely clothed with short spines. Uropoda with the inner plate deeply emarginated near the end, outside, outer plate oblong, with about 12 short spines along the exterior edge. Colour light reddish brown. Length of adult animal reaching to 50 mm.

Remarks.—This is the species first recorded, and may accordingly be regarded as the type of the genus. It is easily recognizable by the rather broad, oval body, the distinctly separated eyes, and more especially by the form of the terminal segment of the metasome, and the deep emargination occurring on the inner plate of the uropoda, outside the tip. The name *emarginata* proposed by Leach, was, indeed, derived from this last character.

Occurrence.—This species occurs rather frequently along the whole coast of Norway, from the Christiania Fjord to Vadsö, being more generally found on the cod, but occasionally also on other kinds of fishes, for instance the haddock, the ling, the halibut and the shark. It is also not infrequently taken up in the dredge, but, as a rule, only young specimens are caught in this manner.

Distribution.—British Isles (Sp. Bate), Kattegat (Meinert), North Sea (Metzger), Ireland (Edwards), Spitsbergen (Miers), Greenland (Lütken), Atlantic coast of North America (Harger).

2. *Æga tridens*, Leach.

(Pl. XXV, fig. 1.)

Æga tridens, Leach, Trans. Linn. Soc. Vol. XI, p. 370.

Specific Characters.—Body somewhat more elongated than in the preceding species, being nearly 2 and a half times as long as it is broad. Cephalon rather broad in proportion to its length, and slightly produced in front. Mesosome moderately convex above, and quite smooth, though having the transverse lines of the 4 posterior segments very distinctly marked. Metasome rather broad, with projecting epimera; terminal segment subtriangular, with the tip bi-sinuate, or projecting in 3 obtuse dentiform projections, dorsal face with 3 obtuse carinæ, the median one rather narrow, the other 2 gradually widening in front. Eyes, antennæ, and legs nearly as in *Æ. psora*. Uropoda with the inner plate obliquely truncated at the tip, and devoid of any emargination outside. Length 38 mm.

Remarks.—This form, established by Leach, is nearly allied to the preceding species, though easily distinguishable by the shape and sculpturing of the terminal segment of the metasome, and by the absence of a sinus outside the inner plate of the uropoda. It is also of a somewhat more oblong form than the said species.

Occurrence.—Two specimens of this form are preserved in our University Museum, having been taken in the Christiania Fjord from the skin of the common cod. It has also been taken occasionally at Bergen and at Christiansund, but seems, on the whole, to be very rare. I have not myself observed it in a living state.

Distribution.—British Isles (Leach), Faroe Islands (Schödte & Meinert).

3. *Æga Strömii*, Lütken.

(Pl. XXV, fig. 2.)

Æga Strömii, Lütken, Vid. Medd. Nat. For. Kjøbenhavn 1858, p. 68, Pl. 1. A, figs 6-8.Syn: *Æga monophthalma*, var., Johnst." " *bicarinata*, Rathke (not Leach).

Specific Characters.—Body oblong oval, more than 2 and a half times as long as it is broad, and rather convex above. Cephalon moderately broad, slightly produced in front. Mesosome with the dorsal face smooth, transverse lines of the 4 posterior segments well defined. Terminal segment of metasome narrowly truncated at the tip, with the posterior edge very slightly emarginated, dorsal face with 2 rather slight and obtuse carinæ gradually disappearing in front, edges smooth, finely ciliated. Eyes very large, meeting above in the middle, along a

straight line. Antennæ about as in the 2 preceding species. Anterior pairs of legs rather strong, with the meral joint slightly sinuated inside, posterior pairs not much elongated. Uropoda as in *Æ. tridens*. Colour of a young specimen: light yellow, with scattered reddish specks, posterior part of mesosome dark bluish with opaque white pigmentary ramifications in the middle of the segments. Length of adult animal reaching to 48 mm.

Remarks.—According to prof. Lütken, the form recorded by Ström in his description of Söndmöre, as "Fiskebjørn", is undoubtedly referable to this species. The same form was subsequently observed off the British Isles by Johnston; but was only regarded as a variety of his *Æ. monophthalma*. II. Rathke referred the species erroneously to *Æ. bicarinata* Leach, which is a very different species not yet found on the coasts of Norway. Under such circumstances, the name *Æ. Strömii*, proposed by Lütken, ought to be retained for the species. It is easily distinguishable from the 2 preceding species by the very large eyes, which meet along the median line; and also by the shape of the terminal segment of the metasome.

Occurrence.—The species would seem to occur not infrequently along the whole south and west coasts of Norway, and extends northwards at least to the Lofoten Islands. It is generally found on the skin of the common cod, but, as is the case with several other species, it seems also to infest several other kinds of fishes. I have myself taken it in the Trondhjem Fjord, from the haddock and from the common picked dog-fish (*Acanthias*).

Distribution.—British Isles (Johnston), Skagerak (Schödte & Lütken), Faroe Islands (Lütken).

4. *Æga crenulata*, Lütken.

(Pl. XXV, fig. 3.)

Æga crenulata, Lütken, Vid. Medd. Nat. For. 1858, p. 70, Pl. 1. A, figs. 4, 5.

Specific Characters.—Very like the preceding species, but of larger size and coarser structure, the dorsal face being finely scabrous, owing to numerous small, depressed pits, and having the transverse lines of the 4 posterior pedigerous segments very distinctly marked. Coxal plates rather large, and less acutely produced posteriorly. Metasome rather broad, with the epimera of the anterior segments projecting beyond the sides of the mesosome; terminal segment narrowly truncated at the tip, with the posterior edge nearly straight, and distinctly crenulated, upper face plain, without a trace of carinae. Eyes large, meeting above along the median line. Antennæ about as in *Æ. Strömii*. The 3 anterior pairs of legs, on the other hand, distinguished by a very conspicuous cutriform spine, issuing from

the end of the propodos, inside the base of the dactylus. Posterior pairs of legs and uropoda nearly as in *A. Strömii*. Length of adult animal reaching to 52 mm.

Remarks.—The present species, established by Prof. Lütken, is very nearly allied to *A. Strömii*, and may easily be confounded with it. On a closer examination, it is, however, found to differ in the much coarser sculpturing of the dorsal skin, and the entire absence of any keels on the terminal segment of the metasome, the posterior edge of which, moreover, exhibits a pronounced crenulation, not found in *A. Strömii*. The peculiar cultriform spine issuing from the end of the propodos of the 3 anterior pairs of legs, affords another character, by which this species is distinguished from all the other Norwegian forms. It is the largest of our indigenous *Ægæ*.

Occurrence.—Several specimens of this species are preserved in our University Museum, having been procured from time to time, partly in the Christiania Fjord, partly off the south coast of Norway. It has, moreover, been observed at Bergen, in the Trondhjem Fjord and in Komag Fjord, West Finmark. In every instance, it has been taken from the skin of the great shark (*Scymnus microcephalus*).

Distribution.—Icehund (Lütken), Greenland (Lütken).

5. *Æga monophthalma*, Johnston.

(Pl. XXVI, fig. 1.)

Æga monophthalma, Johnston, Loud. Mag. Nat. Hist. VII, p. 233, fig. 43.

Specific Characters.—Body oblong oval, much depressed, somewhat widening behind, dorsal face coarsely sculptured with depressed pits more distinct on the posterior part, hind edges of the segments crenulated. Cephalon very broad in proportion to its length, semilunar in shape, front somewhat produced. First segment of mesosome with the anterior edge emarginated on each side, to receive the ocular parts of the head. Coxal plates rather strongly produced, the last pair reaching almost as far as the epimera of the anterior segment of metasome. Anal segment semi-oval, terminating in a well-marked conical projection, dorsal face very coarsely sculptured, and somewhat excavated on each side, having a distinct, though obtuse, carina running along the middle. Eyes exceedingly large, oblong, meeting in front. Superior antennæ with the 1st peduncular joint very large and expanded, 2nd hood-shaped. Epistomal plate sub-pentagonal in form. Legs and uropoda of normal structure. Length of adult animal 50 mm.

Remarks.—This is a very distinct species, easily recognizable by the coarse sculpturing of the dorsal skin, the very large, oblong, contiguous eyes, the greatly expanded 1st and 2nd peduncular joints of the superior antennæ, and the form

of the terminal segment of the metasome. According to Messrs. Schödte and Lütken, it sometimes attains a length of more than 56 mm., and is thus probably the largest of all hitherto known *Ægæ*.

Occurrence.—A few specimens of this pretty form are preserved in our University Museum, some having been procured in the Christiania Fjord, some at Farsund, on the south coast of Norway. It has, moreover, been found at Bergen, at Florö, and in the Troudhjem Fjord. The specimens have been taken, some from the skin of the common cod, some from that of the great shark.

Distribution.—British Isles (Johnston), Skagerak (Meinert), Iceland (Schödte & Lütken).

6. *Æga arctica*, Lütken.

(Pl. XXVI, fig. 2.)

Æga arctica, Lütken, Vid. Medd. Nat. Hist. Foren. 1858, p. 71, Pl. I. A., figs. 1—3.

Specific Characters.—Body oblong oval, with the dorsal face moderately convex, and very smooth. Cephalon but little more than twice as long as it is broad, front slightly produced in the middle. Mesosome with the transverse lines of the 4 posterior segments not very sharply marked; coxal plates of moderate size. Metasome rather large, considerably exceeding half the length of the mesosome, epimera bluntly produced; terminal segment semioval, tip evenly rounded, with a very small apical incision, dorsal face plain, edges in the outer part minutely serrated. Eyes of middle size, oval, separated above by a distinct, though small interspace. Antennæ unusually slender, the first 2 peduncular joints of the superior ones but slightly expanded, and, combined, scarcely longer than the last peduncular joint. Legs and uropoda normal. Length of an apparently adult specimen 32 mm.

Remarks.—This species, established by Prof. Lütken, may be easily distinguished from those previously described by the slender form of the antennæ, the comparatively large size of the metasome, and the shape of its terminal segment.

Occurrence.—A single specimen of this form is preserved in our University Museum, having been procured in Finmark, probably from the skin of the great shark.

Distribution.—Greenland (Lütken), Iceland (Schödte & Meinert).

7. *Æga ventrosa*, M. Sars.

(Pl. XXVI, fig. 3.)

Æga ventrosa, M. Sars, Chr. Vid. Selsk. Forh. 1848, p. 156.Syn: *Æga Lovéni*, Bovallius." *Ægiochus ventrosus*, Bov." — *Nordenskjöldi*, Bov.

Specific Characters. Body rather broad, oval in form, with the dorsal face slightly vaulted and quite smooth. Cephalon of moderate size, with the front, as usual, slightly produced in the middle. Coxal plates of usual structure. Metasome exceeding half the length of the mesosome, epimera acutely produced; terminal segment subtriangular, produced at the tip to an obtuse point, dorsal face plain, outer part of the edges distinctly serrated, and armed with minute spinules. Eyes rather narrow, separated in the middle by a distinct interspace. Antennæ very slender, resembling those in *Æ. arctica*, though the flagellum of the superior ones is somewhat longer. Anterior pairs of legs with the inner edge of the meral joint sinuated, and only armed with scattered small denticles. Uropoda with both plates distinctly serrate and denticulate, the inner one broader than the outer, and having a very slight emargination outside the tip. Colour pale yellowish, sometimes with a tinge of chestnut. Length of adult animal 23 mm.

Remarks.—I fully agree with Dr. Hansen in believing the 3 forms recorded by Dr. Bovallius as *Æga Lovéni*, *Ægiochus Nordenskjöldi* and *Ægiochus ventrosus*, to belong to one and the same species. The genus *Ægiochus* cannot be maintained, as, according to Dr. Hansen, it is only founded upon a spurious character, caused by an imperfect exuviation of some specimens. The differences pointed out by Dr. Bovallius between the 3 forms, appear, on the whole, to be quite insufficient as specific distinctions. The present species, first described by my late father, agrees with *Æ. arctica* in the structure of the antennæ, but is of rather inferior size, and, moreover, has the body comparatively broader, the eyes much narrower, and the terminal segment of the metasome of rather a different shape.

Occurrence.—The species would seem to occur not infrequently along the whole Norwegian coast, from the Christiania Fjord to Konag Fjord in West Finmark. As far as I know, all the specimens secured have been taken by the aid of the dredge from rather considerable depths descending to 300 fathoms. It may, however, be assumed that, like the other species, it at times infests fishes of one kind or another.

Distribution.—Coast of Bohuslän (Bovallius), Greenland (Bovallius).

Gen. 2. **Rocinela**, Leach, 1815.Syn: *Acherusia*, Lucas.

Generic Characters.—Form of body resembling that of *Ega*, though being somewhat less compact, and more depressed. Metasome generally less broad, with the terminal segment rounded off at the end, and finely ciliated. Eyes well developed, with very large and conspicuous corneæ. Antennæ slender, the superior ones much shorter than the inferior, and with the basal joints not expanded. Epistomal plate very small and narrow. Mandibles considerably produced, with the cutting edge expanded inside to a linguiform lamella (molar expansion?); palp well developed, with the basal joint much elongated. Maxillæ nearly as in *Ega*. Maxillipeds with the palp composed of only 2 joints, the terminal one armed with strong recurved teeth. The 3 anterior pairs of legs having the propodos more or less expanded and armed inside with strong spines, dactylus forming a very large and evenly curved hook; the 4 posterior pairs slender, resembling in structure those in *Ega*. Pleopoda and uropoda normal.

Remarks.—This genus, established by Leach, is nearly allied to *Ega*, though exhibiting some well-marked differences both in the structure of the oral parts, and in that of the anterior pairs of legs. The genus *Acherusia* of Lucas is undoubtedly identical with that of Leach. Nine species of the genus are recorded in the work of Schödte & Meinert, from different parts of the Oceanus. Of these, only a single species is represented in the fauna of Norway.

Rocinela danmoniensis, Leach.

(Pl. XXVII.)

Rocinela danmoniensis, Leach, Dict. sc. nat. XII, p. 349.Syn: *Acherusia rotundicauda*, Lilljeb.

Specific Characters.—Body somewhat varying in form, being, in sexually developed specimens of both sexes, comparatively broader and more compact than in younger, though equally large specimens, in which the 4 posterior segments of mesosome are particularly large, and defined by rather broad, thin-skinned interspaces. Cephalon subtriangular in form, being produced in front to an obtuse point. Coxal plates acutely produced, with the outer face smooth. Metasome defined from the mesosome by a conspicuous constriction, and of inferior breadth, 1st segment in adult specimens nearly concealed, cymera acutely produced; terminal segment semi-oval, or broadly linguiform, evenly rounded at the end, dorsal face plain, outer part of edge finely ciliated, and armed with minute adpressed

spinules. Eyes very large, nearly quadrangular, almost meeting above at one of their angles. Superior antennæ with the 1st joint of the peduncle rather short and concealed by the produced front, flagellum shorter than the peduncle and 6-articulate. Inferior antennæ more than twice as long as the superior, flagellum considerably exceeding the peduncle in length. Anterior pairs of legs rather strong, meral joint armed inside with 3 blunt spines, propodos rather broad, with 3 strong spines inside, dactylus large falciform. Uropoda with both plates oblong, densely ciliated, and partly edged with short spinules, the inner one a little broader than the outer, and rounded at the tip. Colour light reddish brown, caudal fan sub-hyaline. Length of adult animal reaching to 24 mm.

Remarks.—This form was described under the above name by Leach as early as in the year 1815. Subsequently it was recorded from the Norwegian coast by Prof. Lilljeborg under another name, viz., *Acherusia rotundicauda*. It looks, on the whole, very like an *Ega*, but may be at once distinguished by the more depressed, and less compact body, the large angular eyes, and the evenly rounded terminal segment of the metasome. Not yet sexually developed specimens are more frequently met with, and in these the body appears much more slender than in adult specimens, in which it is considerably shortened by the closer crowding together of the segments.

Occurrence.—The species occurs not infrequently along the whole south and west coasts of Norway, at least to the Trondhjem Fjord, and is not infrequently taken up in the dredge, though it is more generally found clinging to the skin of fishes of various kinds, for instance the common cod, the haddock, the ling etc.

Distribution.—British Isles (Leach), Öresund and Kattegat (Meinert), the Faroe Islands (Schöldte & Meinert).

Gen. 3. **Syscenus**, Harger, 1878.

Syn: *Harponyx*, G. O. Sars.

" *Rocinela*, Bovallius (not Leach).

Generic Characters.—Body depressed, with the cephalon comparatively small, and the metasome narrowing abruptly to a much smaller width than the mesosome; terminal segment very large. Eyes wanting. Antennæ nearly as in *Rocinela*. Mandibles with the cutting edge simple, acuminate, palp of moderate length. Maxillipeds with the terminal part bi-articulate. Anterior pairs of legs with the propodos smooth, cylindric, not expanded, dactylus extremely strong,

hooked, abruptly curved in the middle, and terminating in a very sharp point. The 4 posterior pairs of legs very slender, with the propodal joint elongated, and the dactylus hook-shaped. Uropoda with the basal part but slightly produced inside, terminal plates comparatively narrow, setiferous.

Remarks.—This genus, established by O. Harger, is nearly allied to *Rocinela*, but differs in the total absence of eyes, and in the abruptly narrowed metasome, as also in the structure of the mandibles. In some other points, for instance, the strongly hooked pereopoda, it seems to form a transition to the family *Cymothoidæ* (sens. strict.). The genus is as yet only represented by a single species.

Syscenus infelix, Harger.

(Pl. XXVIII.)

Syscenus infelix. Harger, Report on the marine Isopoda of New England. Rep. Un. St. Cou. Fish & Fisheries Part VI, p. 387.

Syn: *Harponyx pranzivoides*, G. O. Sars.
 „ *Rocinela Liljeborgii*, Bovallius.

Specific Characters.—*Immature form:* Body very slender and much depressed, with the anterior division oblong oval in form, the posterior one much narrower, and sublinear. Cephalon triangular, gradually narrowed in front to a somewhat projecting point. First segment of mesosome rather large, last segment much narrower than the preceding ones, and without coxal plates. Metasome fully as long as the mesosome, very slightly widening posteriorly, terminal segment about the length of the other 5 combined, and gradually tapering to an obtuse point carrying 2 juxtaposed spines, edges fringed with slender bristles. Superior antennæ with the flagellum about the length of the peduncle, and 5-articulate; inferior ones 3 times as long, with the flagellum twice the length of the peduncle, and composed of 11 articulations, clothed posteriorly with long and slender setæ. Anterior pairs of legs comparatively short and stout, with the dactylus enormously developed; the 3 posterior pairs very slender, and rapidly increasing in length, 6th pair about the length of the whole body, not including the caudal fan, propodal joint in all 3 pairs very much elongated, dactylus strong, hook-shaped. Last pair of legs wanting. Pleopoda with the lamellæ comparatively narrow, inner one of the posterior pair not ciliated. Uropoda with the basal part somewhat elongated, and produced inside to a rather short setiferous projection, terminal plates narrow oblong, and fringed with slender bristles, the outer one considerably smaller than the inner, and armed outside with a row of small spinules. Colour whitish, pellucid, cephalon tinged with light chestnut. Length 6 mm.

Remarks.—The above diagnosis refers only to the immature animal. In the adult state, this form was first described, but not figured, by O. Harger in the above-quoted paper from a solitary specimen taken north of Cape Cod, from a depth of 130 fathoms. Subsequently several more specimens were procured, and some additional remarks on the species, accompanied by a habitus-figure and some detail-figures, were given by the same author in another paper published in 1883. It may thereby easily be demonstrated, that the form described by Dr. Bovallius in the year 1885 as *Rocinela Lilljeborgii*, is the very same species, and, as, moreover, it must be regarded as beyond all doubt, that this form only represents a more advanced stage of the *Harponyx pranizoides* described in 1882 by the present author, all these 3 forms ought to be combined into one species, for which the name proposed by Harger, being the older one, must be retained. According to the latter author, the species grows to rather a large size, the largest specimen measuring 44 mm. in length. The specimen described by Dr. Bovallius had a length of 22 mm.

Occurrence.—Only 2 specimens of this form, both very young and exactly alike both in size and structure, have been examined by me. They were taken up by the dredge in 2 different localities of the west coast of Norway, viz., at Hvitingsö and at Bekkervig, the depth ranging from 80 to 150 fathoms.

Distribution.—Atlantic coast of North America (Harger), coast of Bohuslän, on the operculum of a whiting (Bovallius).

Fam. 4. Cirolanidæ.

Characters.—General habitus not unlike that in the *Egida*, though the back is much more strongly vaulted, giving the body a more or less semicylindric form. Cephalon with the front not produced in the middle. Coxal plates well-defined on all the segments of mesosome except the 1st. Metasome normally developed, with the terminal segment large, clypeiform, constituting together with the uropoda a well-developed caudal fan. Eyes not very large, lateral. Antenna very unequal, the superior ones being very small, the inferior long and slender. Oral parts formed for biting and masticating, and accordingly of more normal structure than in the *Egida*. All legs ambulatory in character, though the 3 anterior pairs may also serve for prehension, and the posterior ones for swimming.

Pleopoda well developed, adapted both for swimming and breathing. Uropoda of a structure similar to that in the *Ægidae*. Incubatory pouch composed of 5 pairs of lamellæ issuing from the bases of the 5 anterior pairs of legs; a supplementary pair of lamellæ originating moreover from the epignath of the maxillipeds. Second pair of pleopoda in male with a stylet inside the inner plate.

Remarks.—In outward appearance, the forms belonging to this family exhibit a great similarity to the *Ægidae*, and were indeed formerly referred to the very same family. They are not, however, like the latter, parasitic in character, but lead a free existence, and it is chiefly to this difference in habits that the apparently very different structure of the oral parts, and partly also of the anterior pairs of legs, is due. In other anatomical characters, the close relationship between the 2 families may be easily observed. The family has been made the subject of a very thorough investigation by the well-known Danish zoologist, Dr. H. J. Hansen, and the reader may therefore be referred for a more detailed description to his admirable work, in which also the nearly-allied families, *Alcinoridae*, *Corallanidae* and *Barybrotidae* are treated of in detail. The following 5 genera have been included within the present family: *Cirolana*, *Conilera*, *Bathynomus*, *Amropus*, and *Eurydice*. Of these only the first and last are represented in the fauna of Norway.

Gen. 1. *Cirolana*, Leach, 1818.

Generic Characters.—Body more or less elongated, with the dorsal face strongly vaulted and perfectly smooth. Cephalon semicircular, with the frontal edge evenly arched. First segment of mesosome forming on each side a linguiform expansion advancing over the sides of the cephalon. Coxal plates of the succeeding segments well-defined, humeral, turned downwards. Penultimate segment of metasome without projecting epimera; terminal segment large, more or less narrowed distally, ciliated at the tip. Eyes placed widely apart on the sides of the cephalon. Superior antennæ very small, with the flagellum subsfusiform, and composed of numerous very short articulations clothed with delicate sensory filaments. Inferior antennæ with the flagellum slender and elongated. Epistomal plate very narrow. Anterior and posterior lips normally developed. Mandibles very strong, with the cutting edge divided into a limited number of coarse teeth, and having, inside, a distinct denticulated secondary lamella, molar expansion narrow, ensiform, with a regular series of small denticles along the anterior edge, palp not very large. Anterior maxillæ with the masticatory lobe very large and

broad, coarsely spinous at the tip, basal lobe small, carrying 3 densely plumose setæ. Posterior maxillæ terminating in 2 narrow setiferous lobes, and having inside a short densely setous masticatory expansion. Maxillipeds with the basal part quite short, epignath linguiform, pointing outwards, masticatory lobe small but distinct, with 2 curved hooks inside, palp large, 5-articulate, the joints complanated and densely setous. Legs with the joints more or less expanded, and edged with spines and bristles, dactylus comparatively short, not hook-shaped; the 3 anterior pairs of legs much shorter than the posterior, and turned forwards. First pair of pleopoda not much differing from the others. Uropoda with the basal part produced inside, outer plate narrower than the inner.

Remarks.—This genus was established by Leach as early as in the year 1818, and may accordingly be regarded as the type of the family. Its nearest ally is undoubtedly the genus *Conilera*, which, in almost all anatomical details, agrees very closely, except in the structure of the first pair of pleopoda. The genus comprises rather a large number of species from different parts of the Oceans, amounting to nearly 30 in all. To the fauna of Norway belong 2 species only.

1. *Cirolana borealis*, Lilljeb.

(Pl. XXIX.)

Cirolana borealis, Lilljeborg, Öfvers. Vet. Akad. Förh. 1851, p. 23.

Syn: *Cirolana spinipes*, Bate & Westw. (not M.-Edw.).

Specific Characters.—Body oblong oval, broadest in the middle, and gradually tapering both in front and behind. Coxal plates rather large and perfectly smooth. Metasome considerably narrower than the mesosome, with the terminal segment scarcely longer than the preceding ones combined, and subtriangular in form, tip bluntly produced and fringed with rather long ciliated bristles, having also 6—8 small marginal spinules. Eyes of moderate size and oval in form. Inferior antennæ more than 4 times as long as the superior, with the flagellum very slender and composed of about 30 articulations. Legs with the outer joints densely spinous, ischiid and meral joints considerably expanded, and conically produced outside. Last pair of legs with the basal joint very broad, laminar, and densely fringed with delicate setæ, meral and carpal joints of moderate size, propodal joint much longer than the carpal one. Uropoda with the basal part produced inside to a comparatively short acute process, both plates armed with scattered spinules, the outer one narrow lanceolate, the inner somewhat broader, oblong oval, with the outer edge straight, the inner evenly curved. Body light

flesh-coloured, mottled with darker brown. Length of adult animal reaching to 26 mm.

Remarks.—This species was first described by Prof. Lilljeborg under the above name from specimens taken off the west coast of Norway. The form subsequently recorded by Sp. Bate & Westwood from the British Isles as *C. spinipes* is undoubtedly the same species. It is nearly allied to the Mediterranean form, *C. neglecta* Hansen, though differing in its more elongated body, the smooth coxal plates, and the form and armature of the terminal segment of the metasome.

Occurrence.—The species occurs along the whole south and west coasts of Norway, at least to the Trondhjem Fjord, and is not infrequently taken up in the dredge together with other animals. I had, however, no idea of the great abundance of this form, until I tried another method of catching it, viz., small weels baited with dead fish. By these means, I have taken it in extraordinary numbers, and in one night, all the soft parts of the bait were generally completely torn off by them, so as to leave only the skeleton. Subsequently I have also taken it in great abundance in the Trondhjem Fjord, from dead fish fastened on the fishing lines. Indeed, it seems to be one of the most effective scavengers of the sea, excelling in this respect even the most voracious species of *Anonyx* among the Amphipoda.

Distribution.—British Isles (Sp. Bate), Kattegat (Meinert), Shetland Isles (Norman), coast of France (Bonnier), Mediterranean at Naples (Hansen), Atlantic coast of North America (Harger).

2. *Cirolana microphthalma*, Hoek.

(Pl. XXX, fig. 1.)

Cirolana microphthalma, Hoek, Die Crustaceen gesammelt während den Fahrten des „Willem Barents“ in den Jahren 1878 und 79, p. 28, Pl. II, figs 13—17.

Syn: *Cirolana Cranchi*, G. O. Sars (not Leach.)

„ — *concharon*, G. O. Sars (not Stimpson).

Specific Characters.—Body oblong, semicylindric, considerably more than 3 times as long as it is broad, and slightly widening behind. Metasome scarcely narrower than the mesosome, 1st segment very short, nearly concealed, terminal segment large, exceeding in length the preceding ones combined, linguiform, abruptly narrowed behind the base, tip obtusely truncated and finely ciliated, having moreover 6 small marginal spinules. Eyes very small, rounded. Inferior antennæ comparatively short, scarcely more than twice as long as the superior, flagellum about the length of the peduncle, and composed of 12 articulations only.

Anterior pairs of legs nearly as in *C. borealis*, though somewhat less densely spinous; last pair rather different, the basal joint being scarcely at all expanded, and without the dense fringe of setæ found in *C. borealis*, meral and carpal joints rather large, but only sparsely spinous, propodal joint much shorter than the carpal one. Uropoda with the inner process of the basal part considerably produced, outer plate narrow lanceolate, and without any marginal spinules, inner one much broader, widening distally, with the tip blunted and the outer edge slightly emarginate near the end. Colour whitish. Length of an apparently adult specimen 10 mm.

Remarks.—This form was first recorded by the present author in 1872 as *C. Cranchi*, Leach. Subsequently, however, I found that it agreed much more closely with the North American species *C. concharum* Stimpson, and it was recorded under this name in the Report on the Crustacea from the Norwegian North Atlantic Expedition, as also in my synopsis of Crustacea of Norway. According to Dr. Hansen, who has studied the several species of this genus very carefully, it differs, however, in some particulars also from the North American species, so that it should more properly be regarded as a distinct species, for which the name proposed by Dr. Hoek in 1882 ought to be retained. From *C. borealis* it may be easily distinguished by its more oblong form, the small size of the eyes, the comparatively short inferior antennæ, the rather different structure of the last pair of legs, and finally by the form of the terminal segment of the metasome and that of the uropoda.

Occurrence.—Only 2 specimens of this form have hitherto been observed by me, the one being found, many years ago, inside the Storeggen bank, west coast of Norway, the other being taken during the Norwegian North Atlantic Expedition, east of Vardö.

Distribution.—The Barents Sea (Hoek).

Gen. 2. **Eurydice**, Leach, 1815.

Syn: *Staberina*, v. Beneden.

Generic Characters.—Body resembling in its external appearance that in the genus *Cirratana*, though having the metasome comparatively more fully developed, with the penultimate segment of same appearance as the preceding ones, and the terminal segment very large and broad. Eyes well developed, lateral.

Superior antennæ very small, with the first joint of the peduncle quite short, and extended straight in front, at a right angle to the remaining part of the antenna. Inferior antennæ very slender, with the last peduncular joint much elongated. Oral parts on the whole resembling those in *Cirrolana*. Anterior pairs of legs rather short and thick, the 4 posterior ones gradually increasing in length, and having the outer joints broad and compressed. Pleopoda of normal structure. Uropoda with the basal part only very slightly produced inside, rami comparatively broad, lamellar, and edged with long setæ.

Remarks.—This genus, established by Leach, is very nearly allied to *Cirrolana*, though differing in some particulars, so as to justify its separation. The genus *Slabberina* of v. Beneden is undoubtedly identical with Leach's genus. We know of about 8 species, one of which belongs to the fauna of Norway, and will be described below.

Eurydice pulchra, Leach.

(Pl. XXX, fig. 2.)

Eurydice pulchra, Leach, Trans. Linn. Soc. XI, p. 370.

Syn: *Slabberina agata*, v. Beneden.

" — *agilis*, G. O. Sars.

" — *gracilis*, Bovallius.

Specific Characters.—Body in adult specimens rather short and stout, oval in form, and rather convex above. Cephalon evenly rounded in front. Coxal plates well defined, and quite smooth. Metasome about the length of the 5 posterior segments of mesosome combined, 1st segment very short, almost concealed; terminal segment very large, about the length of the preceding ones combined, and semi-oval in form, tip obtusely rounded, and armed with 4 minute spinules, being, moreover, fringed with small bristles. Eyes rather large, oval triangular, extending a little up the dorsal face. Superior antennæ with the flagellum 5-articulate, 1st joint much larger than the other 4 combined. Inferior antennæ, when reflexed, reaching almost to the end of the mesosome, last joint of the peduncle about the length of the preceding joints combined, flagellum extremely slender, and composed of about 20 articulations. Legs densely setiferous, and armed with scattered short spines; last pair with the meral and carpal joints much expanded, propodal joint about the length of the carpal one, but considerably narrower; dactylus in all pairs rather small. Uropoda with the basal part densely setous outside, and having a single bristle at the inner corner, terminal plates rather unequal, the inner one being much broader than the outer, and obliquely truncated at the end. Body ornamented dorsally with richly ramified, dark, pig-

mentary stars, arranged in transversal rows on the segments, and partly confluent. Length of adult animal 7 mm.

Remarks.—As pointed out by v. Beneden, this form was recorded by Slabber as early as in the year 1778, under the Dutch name "Agaat-Pissebet", and the specific name *agata* applied to this form by v. Beneden should therefore perhaps be preferred to that proposed by Leach (*pudhra*); but the Leachian name has been so generally used, that it would be inappropriate to change it. The form recorded by the present author as *Slabberina agilis*, is undoubtedly the same species, and I also fully agree with Dr. Hansen in regarding the *Slabberina gracilis* of Bovallius as only founded on a young specimen of the present species.

Occurrence.—I have observed this form rather plentifully in the inner part of the Trondhjem Fjord, at Levanger, where it occurred close to the shore in quite shallow water, swimming rapidly about between the stones in a manner very similar to that observed in the *Dytisci* and *Gyrini*. I have also taken it near the sandy beach of Listerland, and occasionally in the Christiania Fjord, at Laurkullen and Fredriksværn. According to Dr. Bovallius, the specimen described by him as *Slabberina gracilis*, was taken up in the dredge at Dröbak from a depth of 100 fathoms; but it is most probable, as opined by Dr. Hansen, that it did not come from this depth, but had entered the dredge during its uphauling.

Distribution.—British Isles (Leach), Kattegat (Meinert), Baltic at Kiel (Möebius), Dutch coast (v. Beneden), coast of France (Bonnier).

Fam. 5. Limnoriidæ.

Characters.—Body subdepressed, capable of being rolled into a ball. Cephalon short and very convex. Coxal plates behind the 1st segment of mesosome well defined, laminar. Metasome composed of 6 well-defined segments, the last of which is very large, elypeiform. Antennæ small, subequal in size. Oral parts on the whole normal, adapted for biting. Legs of uniform structure, all being ambulatory in character. Pleopoda well developed, serving both for swimming and breathing; 1st pair of same structure as the succeeding ones; 2nd pair in male with a lateral stylet on the inner plate. Uropoda comparatively small, lateral, rami not lamelliform.

Remarks.—This family, first established by O. Harger, is not difficult to distinguish from any of the preceding ones, whereas in certain points it

exhibits an unmistakable likeness to the family *Spharomida*, not represented in the fauna of Norway, and I had, indeed, formerly combined the two. There are, however, some distinguishing characters which make it advisable to keep the two families apart. On the other hand, I find it quite inadmissible to associate this family with the *Asellota*, as proposed by some authors. The full segmentation of the metasome, the uniform structure of the pleopoda, and the lateral position of the uropoda, prove it unquestionably to belong to the group *Elabellifera*, as here defined. The family comprises as yet but a single genus.

Gen. *Limnoria*, Leach, 1815.

Generic Characters.—Body oblong, rather convex above, with the segments sharply marked off from each other. Cephalon comparatively short and blunt in front, with the buccal mass very prominent below. First segment of mesosome longer than the other, and partly advancing over the cephalon. Coxal plates on the succeeding segments, rather large, deflexed, the posterior ones triangularly produced. The 5 anterior segments of metasome with well-developed, laterally projecting epimera; terminal segment broad, flattened above. Eyes wide apart, lateral. Antennæ with the flagella rather short. Mandibles very strong, cutting edge terminating in a conically compressed, chisel-shaped point, molar expansion wanting, palp rather small. Anterior maxillæ with the masticatory lobe conically tapering and coarsely spinous at the tip, basal lobe narrow, turned anteriorly, and carrying 3 short, ciliated apical setæ. Posterior maxillæ terminating in 3 setiferous lobes, the innermost representing the masticatory lobe. Maxillipeds slender, with the basal part rather elongated and narrow, masticatory lobe well developed, palp composed of 5 flattened joints, epignath lanceolate, turned anteriorly. Anterior pairs of legs somewhat shorter than the posterior, dactylus in all pairs provided inside with a secondary claw-like projection. Pleopoda with the rami lamellar, and, excepting the last pair, densely fringed with setæ. Uropoda with the outer ramus short, unguiform; inner, linear.

Remarks.—This genus was established by Leach in the year 1815, to include the peculiar little creature, whose destruction of pile-work and other submerged timber had long been known. He associated the genus with the *Cymothoidæ* and *Spharomida*, thus recognizing its true relationship. We know, as yet, of only 3 species, one of which, *L. segnis* Chilton, has been found off New Zealand, the 2nd, *L. antarctica* Pfeffer, at the South Georgian Islands, the 3rd being widely distributed in the northern Ocean.

Limnoria lignorum (Rathke).

(Pl. XXXI.)

Cymothoa lignorum, Rathke, Skrifter af Naturh. Selsk. Vol. 101, Pl. 3, fig. 14.Syn: *Limnoria cerebrans*, Leach." — *uncinata*, Heller.

Specific Characters.—Body, when fully extended, about 3 times as long as it is broad, and almost semi-cylindric in form, slightly tapering in front. Cephalon nearly globular, and partly covered above by the 1st segment of mesosome, front obtusely rounded. First segment of mesosome considerably longer than the others and rather deep, forming below, on each side, a rounded lobe projecting over the lateral faces of the cephalon. Coxal plates fringed with ciliated bristles, the 2 anterior pairs oval quadrangular, the 4 posterior ones considerably larger, and produced to an acute corner pointing backwards. Metasome considerably exceeding half the length of the mesosome, and scarcely narrower, epimera triangular, projecting laterally; terminal segment about the length of the other 5 combined, and very broad, almost elliptical in form, posterior edge evenly arcuate and finely ciliated. Eyes comparatively small, rounded, with a limited number of large cornea. Superior antennae somewhat stronger than the inferior, with the flagellum extremely small, 3-articulate, and carrying a dense fascicle of long sensory filaments. Inferior antennae with the flagellum about half the length of the peduncle, and composed of 5 articulations, the 1st of which is much the largest. First pair of legs somewhat larger than the next succeeding ones, but otherwise of the very same structure, meral and carpal joints in most of the legs strongly tubercular inside. Last pair considerably more slender than the others, and without any tubercles. Dactylus in all legs distinctly bi-articulate, the 1st joint having at the end inside, a bidentate unguiform spine. Uropoda with the basal part strongly tuberculated outside, and projecting between the rami to an acute projection, outer ramus short, unguiform, turned outwards, inner sublinear, about the length of the basal part, and terminating in a dense bunch of slender bristles. Colour light greyish brown, with darker brown pigmentary ramifications. Length of adult animal 5 mm.

Remarks.—This form was described by Rathke as early as in the year 1799 as *Cymothoa lignorum*. By subsequent authors, it has generally been recorded under the name given to it by Leach, viz., *Limnoria cerebrans*. The *Limnoria uncinata* of Heller, from the Adriatic, is undoubtedly identical with the northern species.

Occurrence.—I have found this form not infrequently in the Christiania Fjord, at Dröbak and Moss, boring in immersed pieces of wood. A single

specimen was, moreover, taken by me many years ago at the Lofoten Islands. It thus appears that it occurs along the whole south and west coasts of Norway.

Distribution.— British Isles (Leach), Kattegat (Meinert), Dutch coast (Hook), coast of France (Bonnier), Adriatic (Heller), Black Sea (Sowinsky), atlantic coast of North America (Harger).

Tribe 3.

VALVIFERA.

Remarks.—The chief character by which this group is defined from all other known Isopoda, consists in the peculiar structure of the uropoda, which, like a pair of folding doors, arch over the lower face of the metasome, thus forming a shelter for the delicate pleopoda, the latter being for the most part branchial in character, though the anterior pairs may at times also serve as swimming limbs for propelling the animal through the water. We only know of 3 families belonging to this tribe, viz., the *Idotheidæ*, *Arcturidæ* and *Chetiliidæ*, the last of which, however, is still very imperfectly known. The first 2 families are represented in the fauna of Norway, and will be treated of below.

Fam. 1. *Idotheidæ*.

Characters.—Body more or less depressed, with the segments of mesosome of uniform appearance, coxal plates sometimes distinctly defined, sometimes confluent with the segments. Metasome with some, or all of the segments consolidated to form a large terminal piece, carrying the normal number of pleopoda. Superior antennæ comparatively small, with the flagellum uni-articulate. Inferior antennæ more or less elongated, and originating outside the superior, from the lateral corners of the cephalon. Oral parts on the whole normal, though the mandibles are always without palps, and the joints of the maxillipeds are often reduced in number. Legs rather strongly built, increasing in length posteriorly, the 3 anterior pairs

being sometimes pronouncedly subcheliform in structure. The anterior pairs of pleopoda with the rami densely setiferous, 2nd pair in male with the usual stylet. Uropoda very large, lamellar, valve-like, closing over the lower face of the metasome; outer part cut off by a transverse suture, and forming a separate plate, inside which sometimes occurs another much smaller plate. Incubatory pouch normal.

Remarks.—This family is chiefly distinguished from the *Arctoidæ* by the more or less broad, depressed body, the rather uniform segmentation of the mesosome, and the structure of the legs. Some of the largest known Isopoda are included in this family. Thus the huge *Glyptonotus antarcticus* measures no less than 3 inches and a half in length, and some of the arctic species of the genus *Chiridothea* are scarcely smaller. The family comprises about 10 genera, only one of which is represented in the fauna of Norway.

Gen. *Idothea*, Fabr., 1798.

Generic Characters.—Body oval or oblong, distinctly depressed, with the coxal plates, beyond the 1st segment of mesosome, well defined, laminar. Cephalon subquadrate, with the lateral parts not expanded. Metasome with 3 short segments exposed in front of the terminal one, the 3rd segment being, however, less perfectly defined dorsally. Eyes distinct, lateral. Superior antennæ with the flagellum short, clavate; inferior antennæ with the flagellum more or less elongated and multiarticulate. Mandibles very strong, with the cutting edge divided into 2 superposed dentated lamellæ, molar expansion large and thick. Both pairs of maxillæ of quite normal structure. Maxillipeds with the palp 4-articulate, last joint lamellarly expanded, masticatory lobe well developed, epignath oblong oval, turned in front. Legs of rather uniform structure, ambulatory, and as a rule more strongly built in male than in female, sometimes approaching to a subcheliform character, dactylus in all pairs strong, unguiform, unequally bidentate at the tip. Uropoda terminating in a single flattened joint, and having at the base of this joint, outside, a strong ciliated seta. Male, as a rule, much larger than female.

Remarks.—This is the genus first established, and it accordingly may be regarded as the type of the family. Numerous species have been described by different authors from different parts of the Oceans, but some of these ought certainly to be separated generically, and even in the restriction adopted by Mr.

E. Miers¹⁾, the genus comprises, in my opinion, forms which can hardly be placed in one and the same genus. As to the Norwegian *Idothea*, they have generally been considered by recent authors as only varieties of one and the same species. A closer examination of the large material at my disposal has, however, shown them in reality to be referable to no less than 6 different species, all easily recognizable in both sexes.

1. *Idothea baltica* (Pallas).

(Pl. XXXII.)

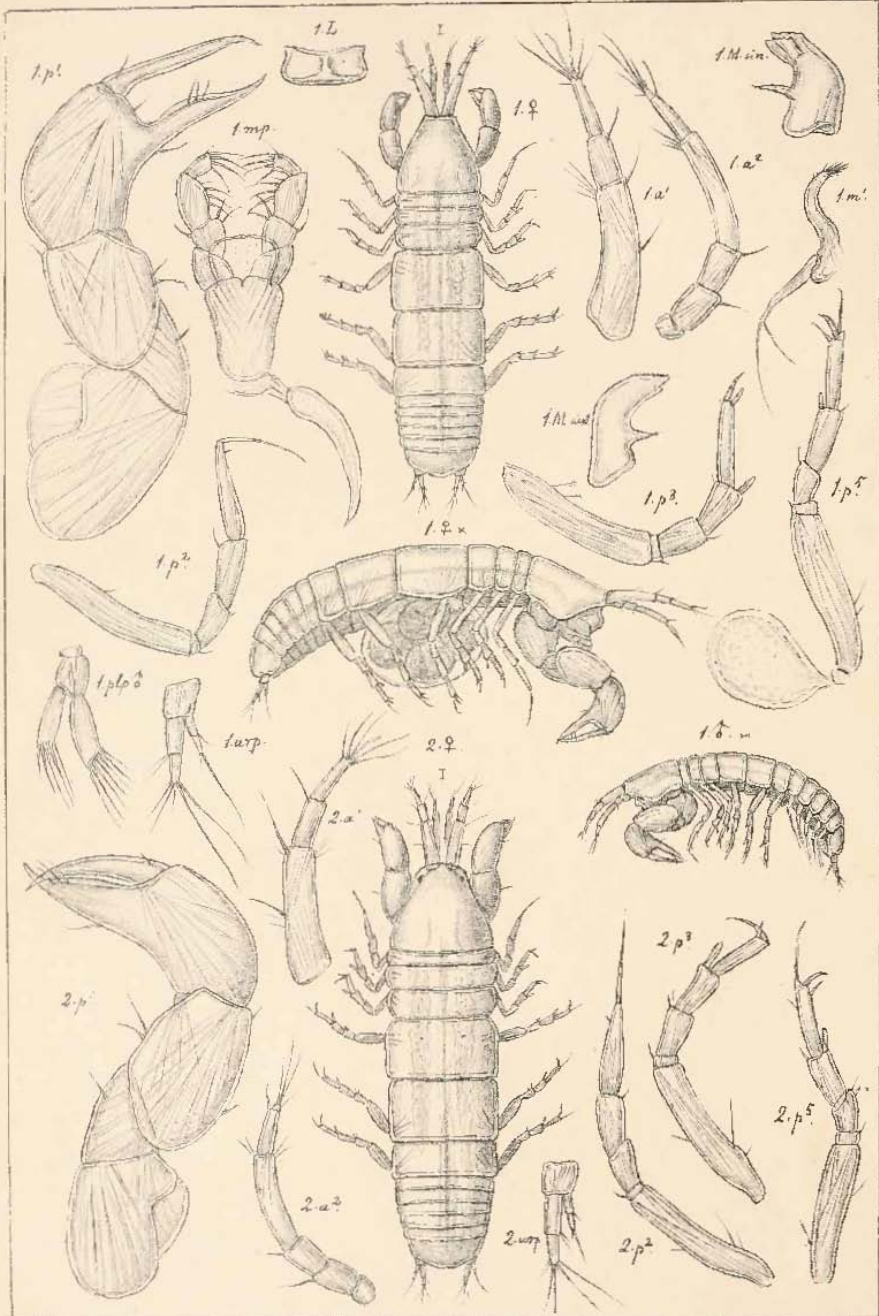
Oniscus balticus, Pallas, Spic. Zool. Vol. IX, p. 66, Pl. IV, fig. 6.

Syn: *Stenosoma irrorata*, Say.
 „ *Idothea tricuspidata*, Desm.
 „ — *tridentata*, Rathke.
 „ — *irrorata*, Harger.
 „ — *marina*, Miers.

Specific Characters.—Body oblong oval, about 3 times as long as it is broad, with the dorsal face perfectly smooth. Coxal plates rather large, occupying the whole length of the side-edges of the segments, so as to form a broad, continuous marginal area. Metasome about the length of the 5 posterior segments combined, terminal segment slightly tapering distally, side-edges straight, tip distinctly tridentate, middle tooth conically produced, lateral ones much shorter, though well defined, and each separated from the median tooth by a well-marked sinus. Eyes of moderate size, rounded. Superior antennæ with the 1st joint of the peduncle rather broad, irregularly angular, last joint much longer than the middle one, flagellum about the length of the former. Inferior antennæ rather elongated, reaching, when reflexed, almost to the end of the 3rd segment of mesosome, flagellum very slender, being much longer than the peduncle, and composed of from 16 to 20 articulations. Legs moderately strong, being, as usual, more powerfully developed in male than in female. Stylet of the 2nd pair of pleopoda in male not extending to the end of the inner plate. Uropoda with the terminal plate obtusely truncated at the tip. Colour extremely variable, sometimes uniformly yellowish or greenish with small dark dots, sometimes variegated, with dark brown pigment forming regular longitudinal bands or larger patches arranged in a perfectly symmetrical manner. Length of adult male reaching to 35 mm.

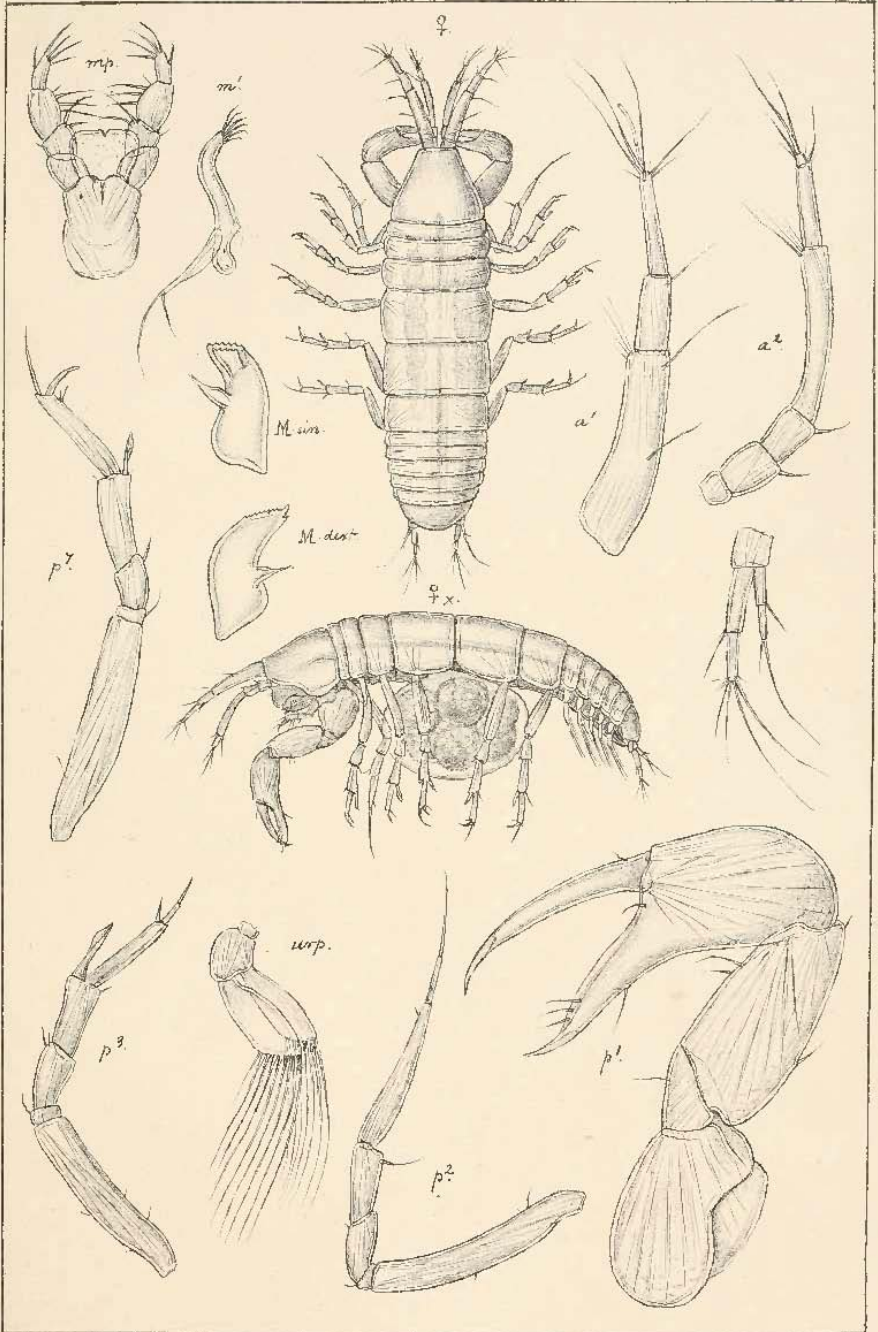
Remarks.—Mr. E. Miers names this form *Idothea marina*, believing that Linnaeus' *Oniscus marinus* refers to this species. This is, however, very doubtful, and as that specific name has been more properly applied to another Isopod,

¹⁾ Revision of the Idoteidae. Linn. Soc. Journal. Zoology, Vol. XVI.

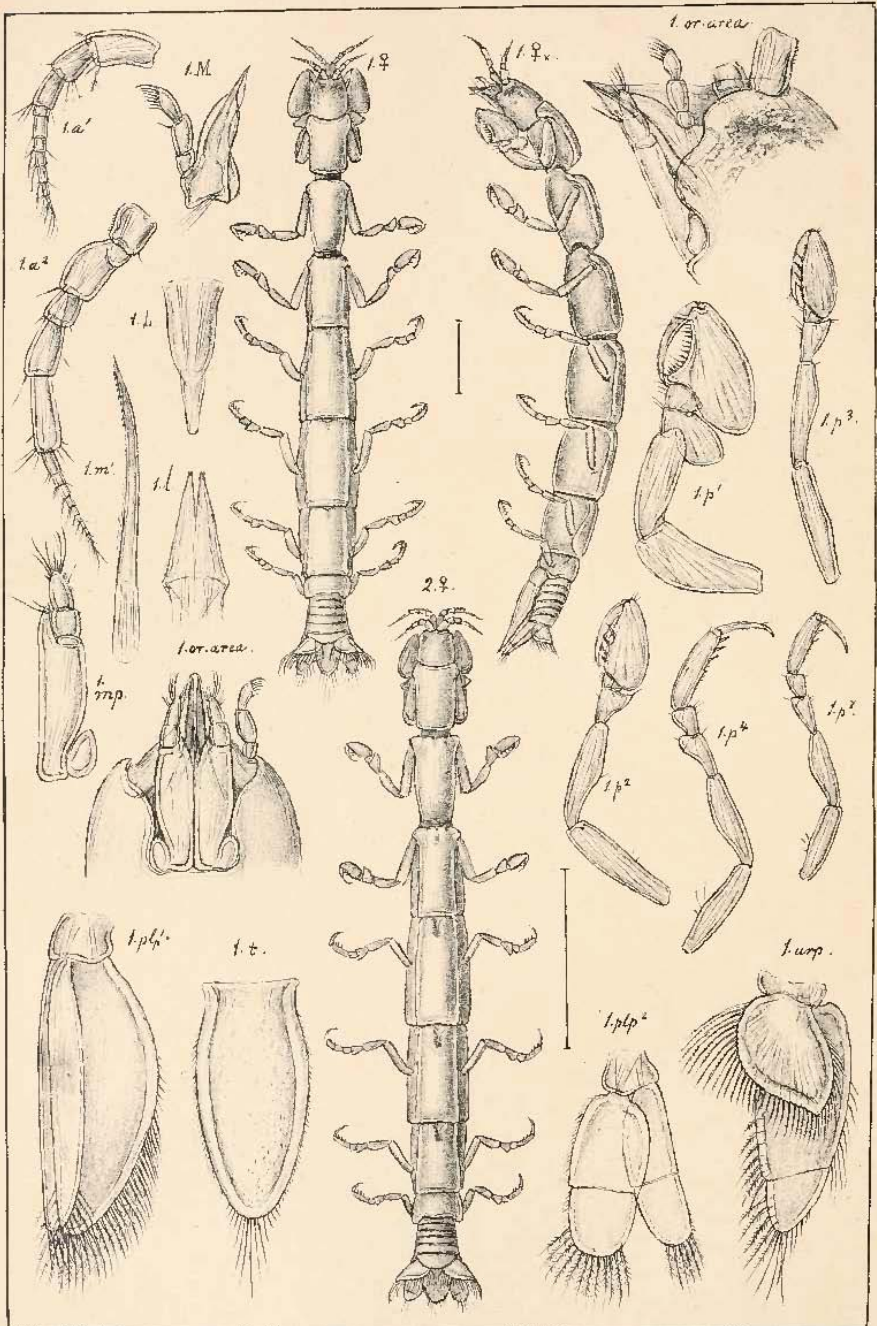


G.O. Sars, autogr.

1. *Pseudotaneis forcipatus*, (Lilljeb.)
 2. " *Pseudotaneis lilljeborgii*, G.O. Sars.

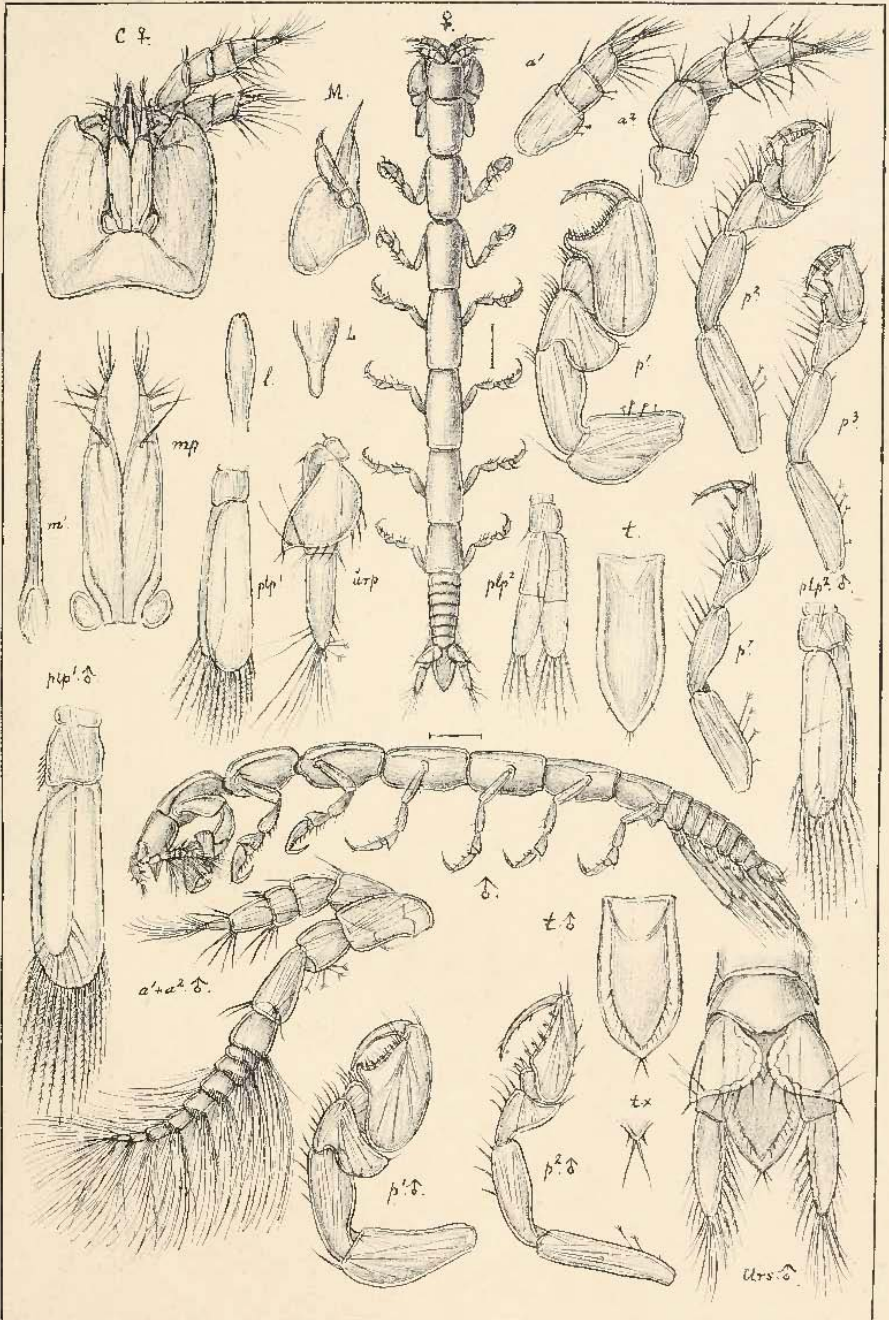




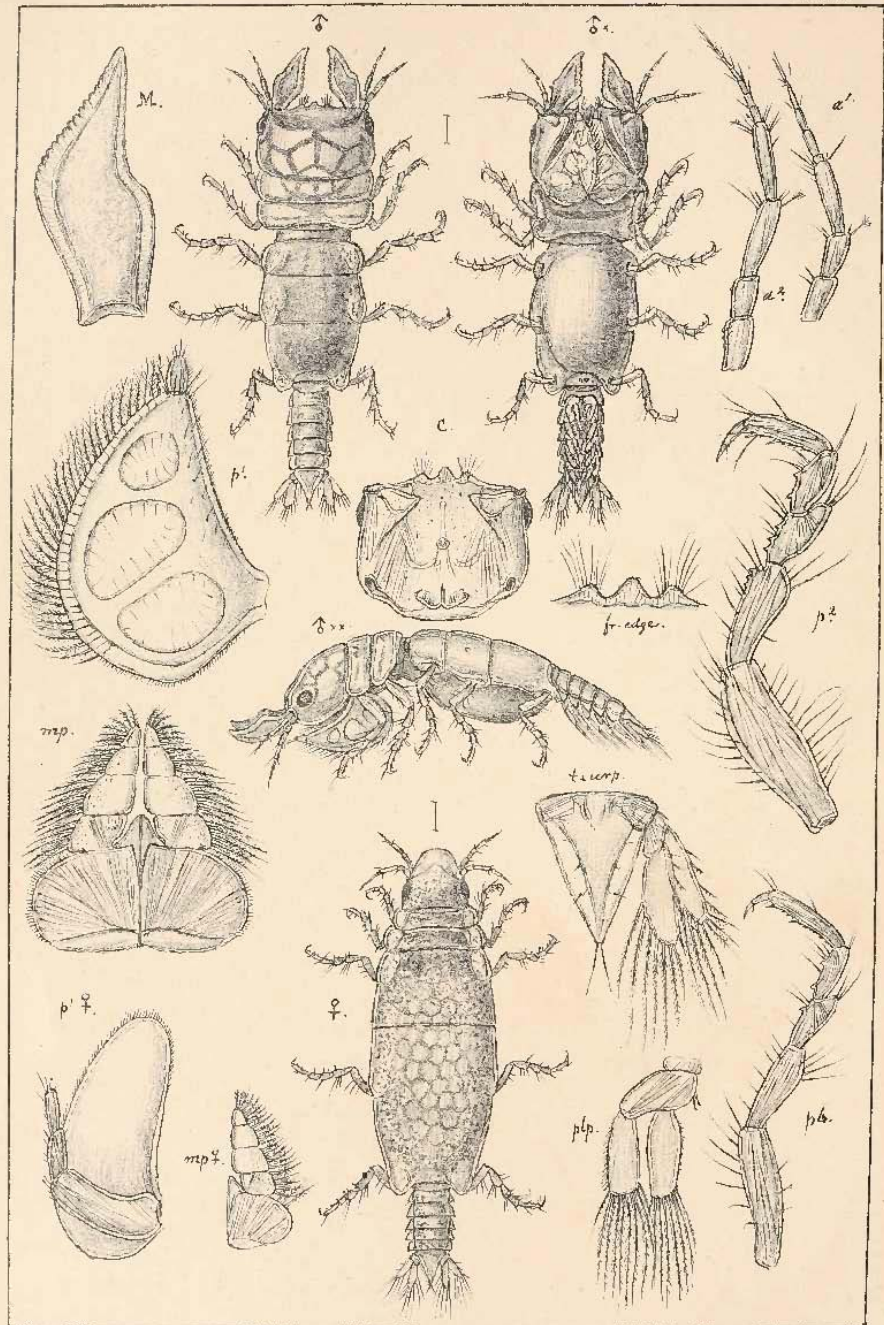


G.O. Sars, autogr.

1. *Calathura norvegica*, G.O. Sars.
2. „ *brachiata*. (Stimps).

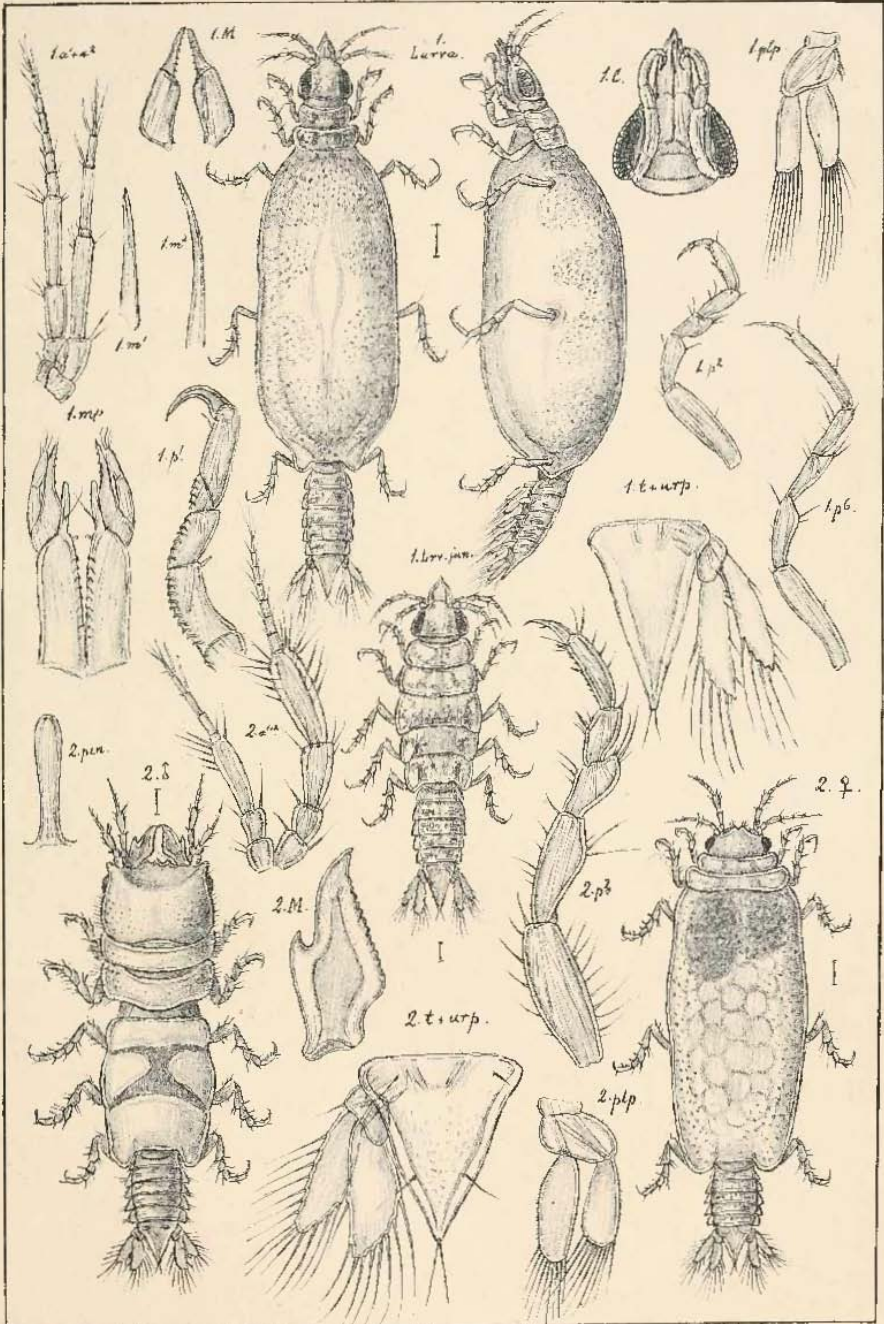






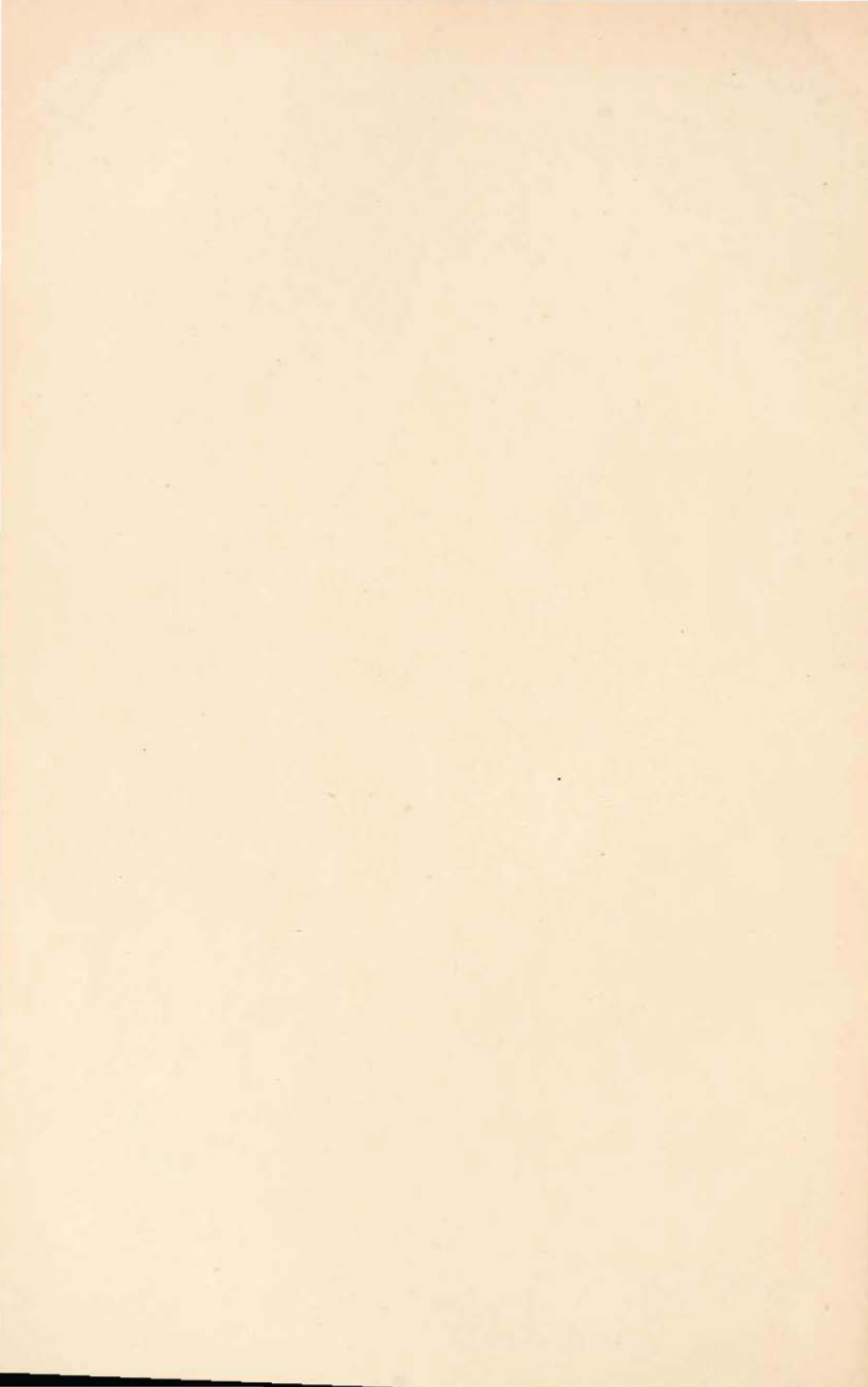
G.O. Sars, autogr.

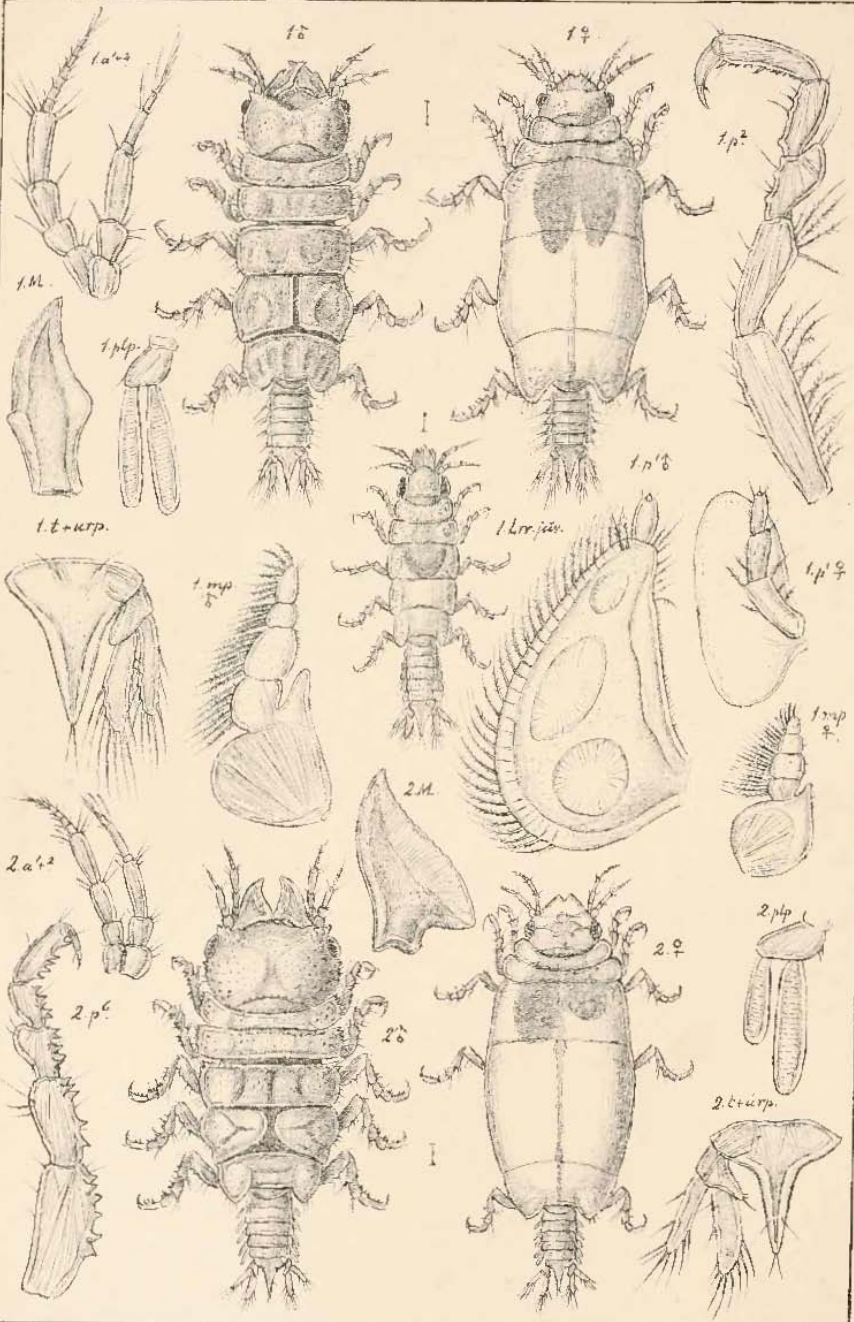
Gnathia maxillaris, (M-Edw).



G.O. Sars, autogr.

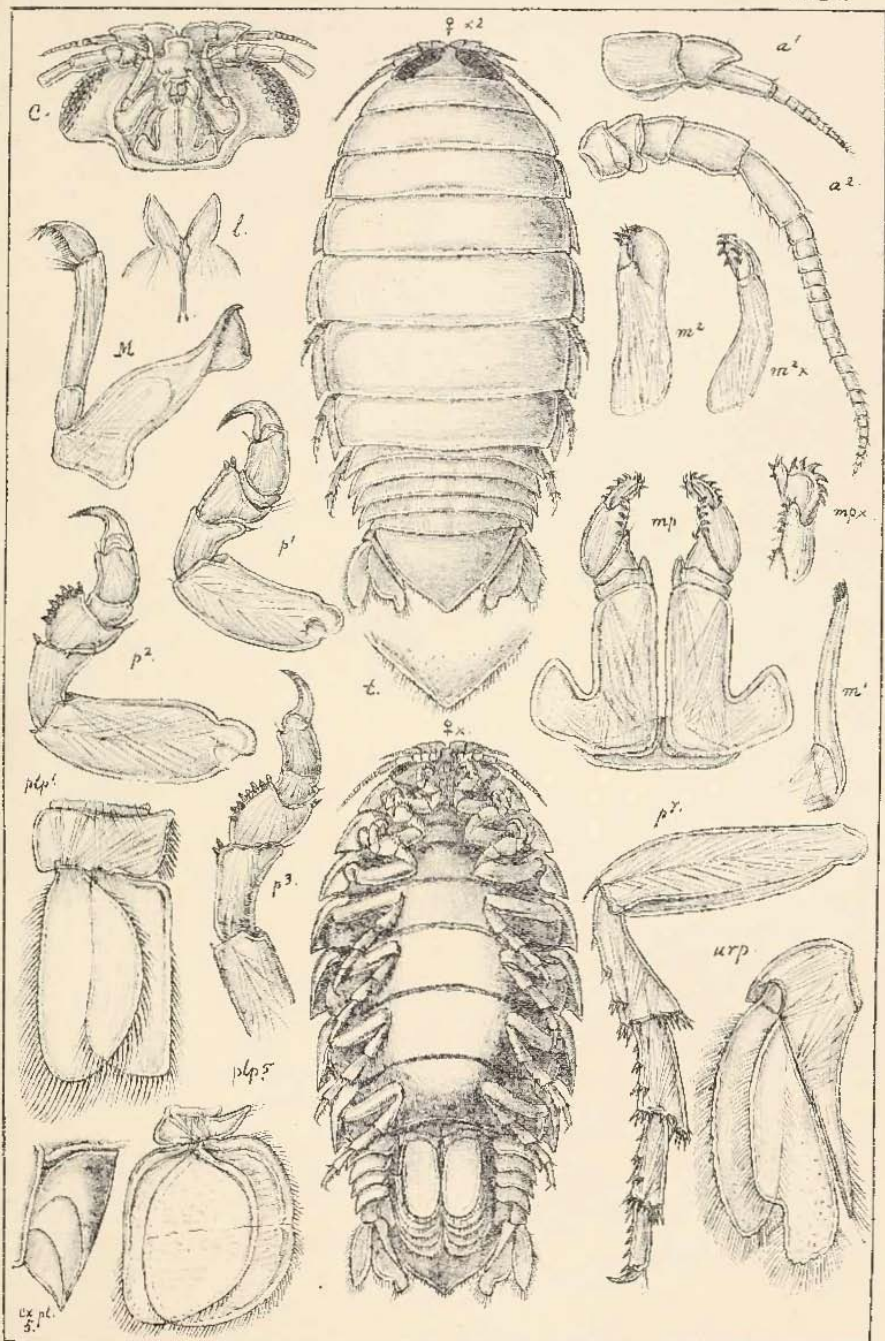
1. *Gnathia maxillaris* (contin.)
2. " *dentata*, G.O. Sars.

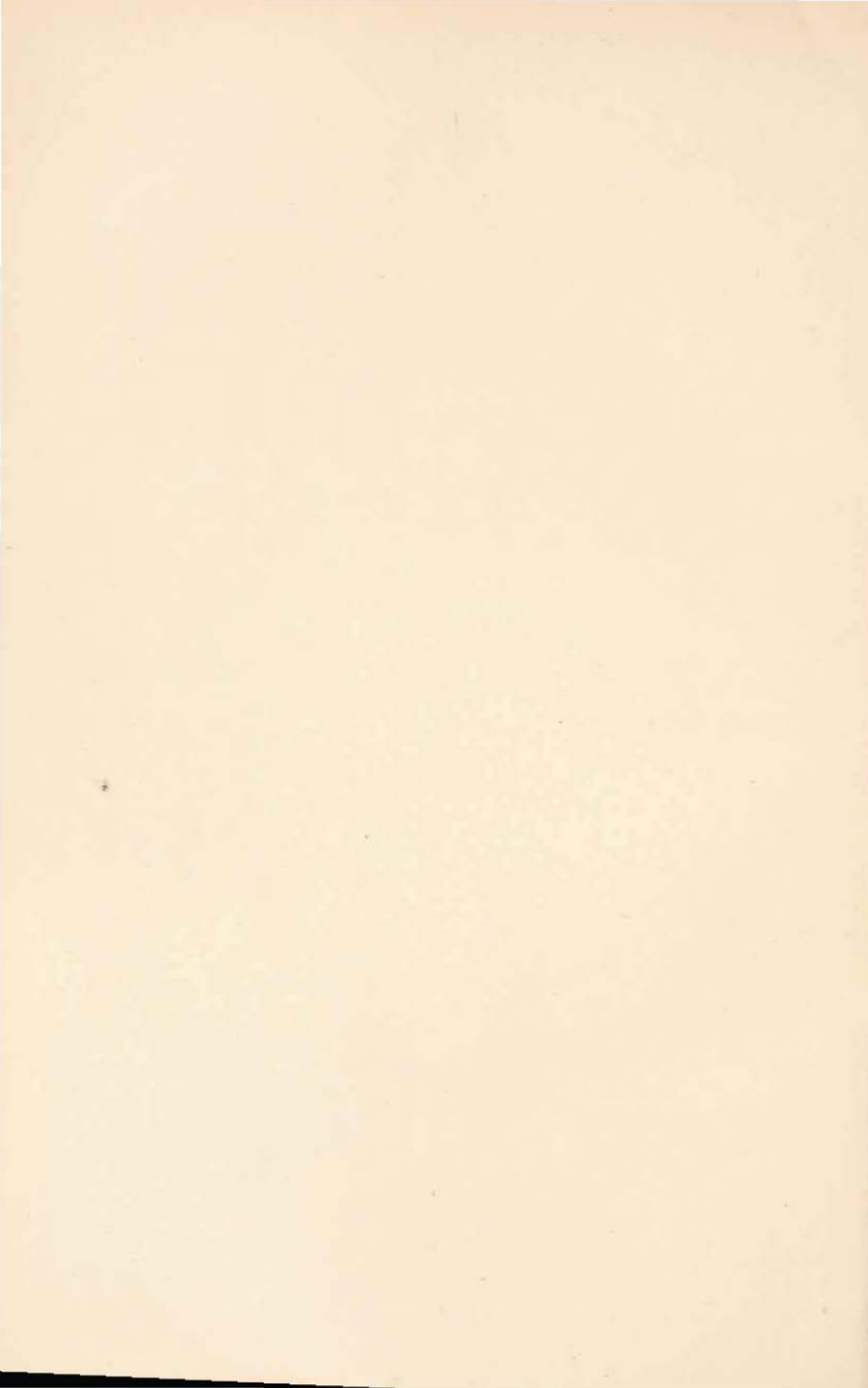


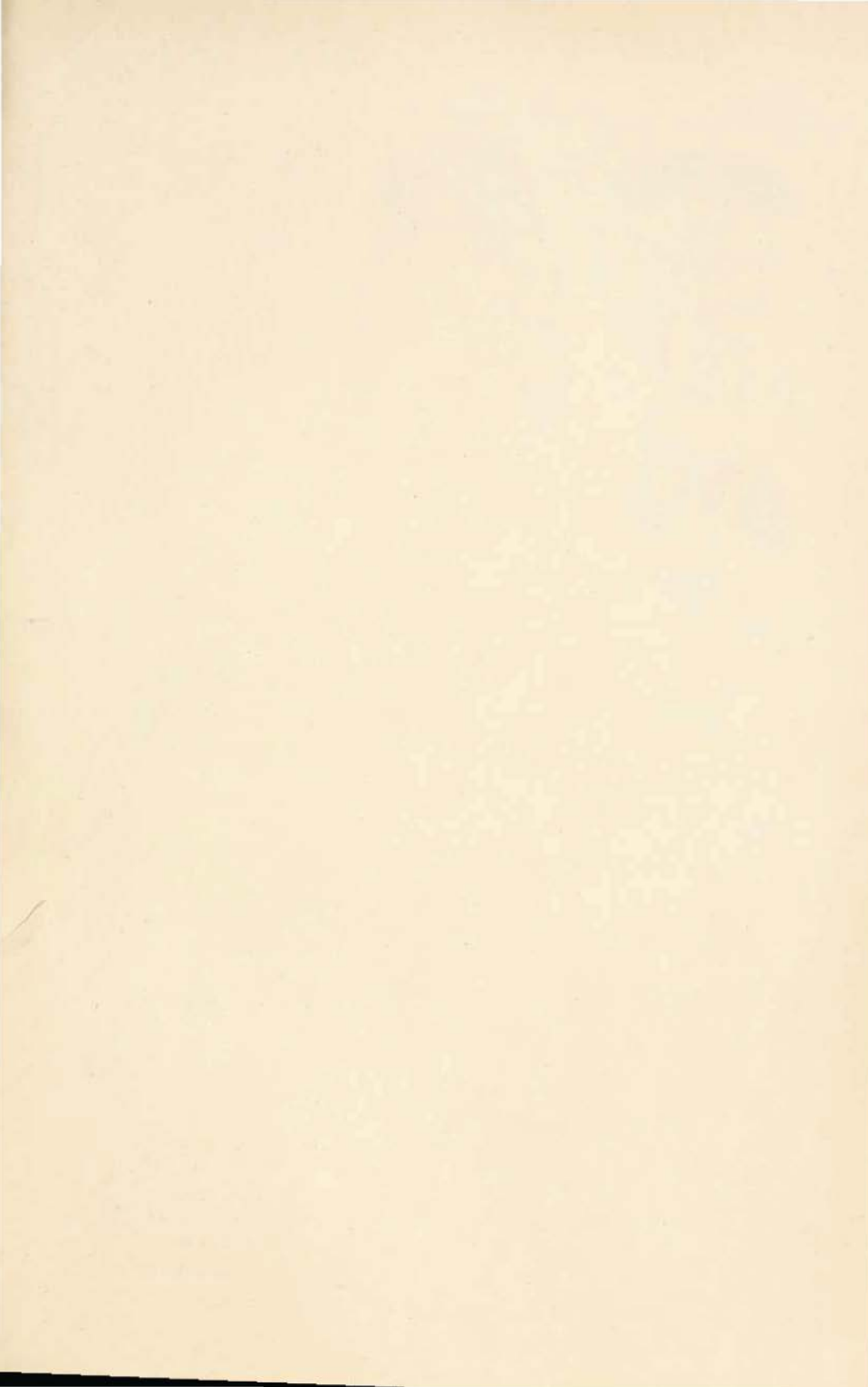


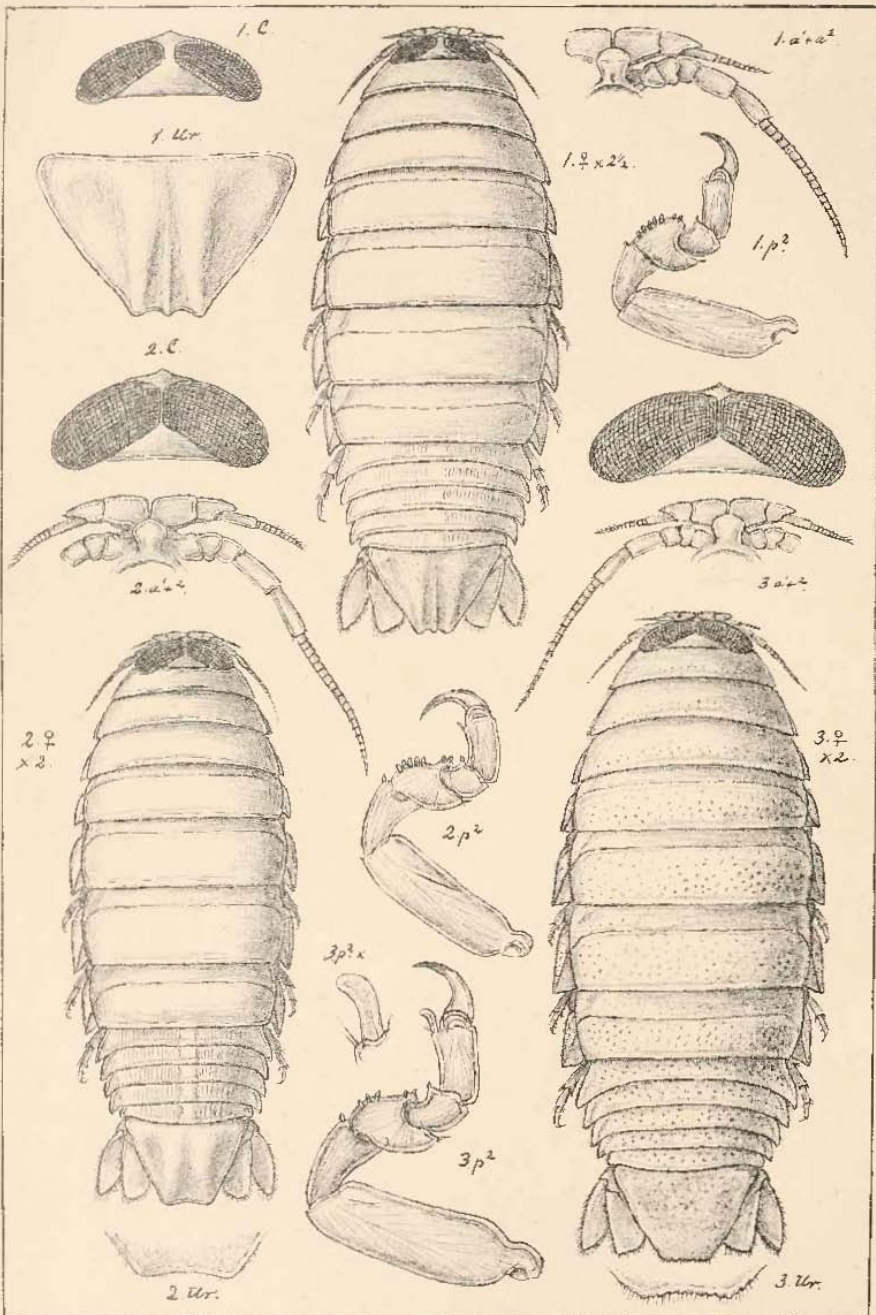
G. O. Sars, autogr.

1. *Gnathia elongata*, (Kröyer).
 2. " *abyssorum*, G. O. Sars.



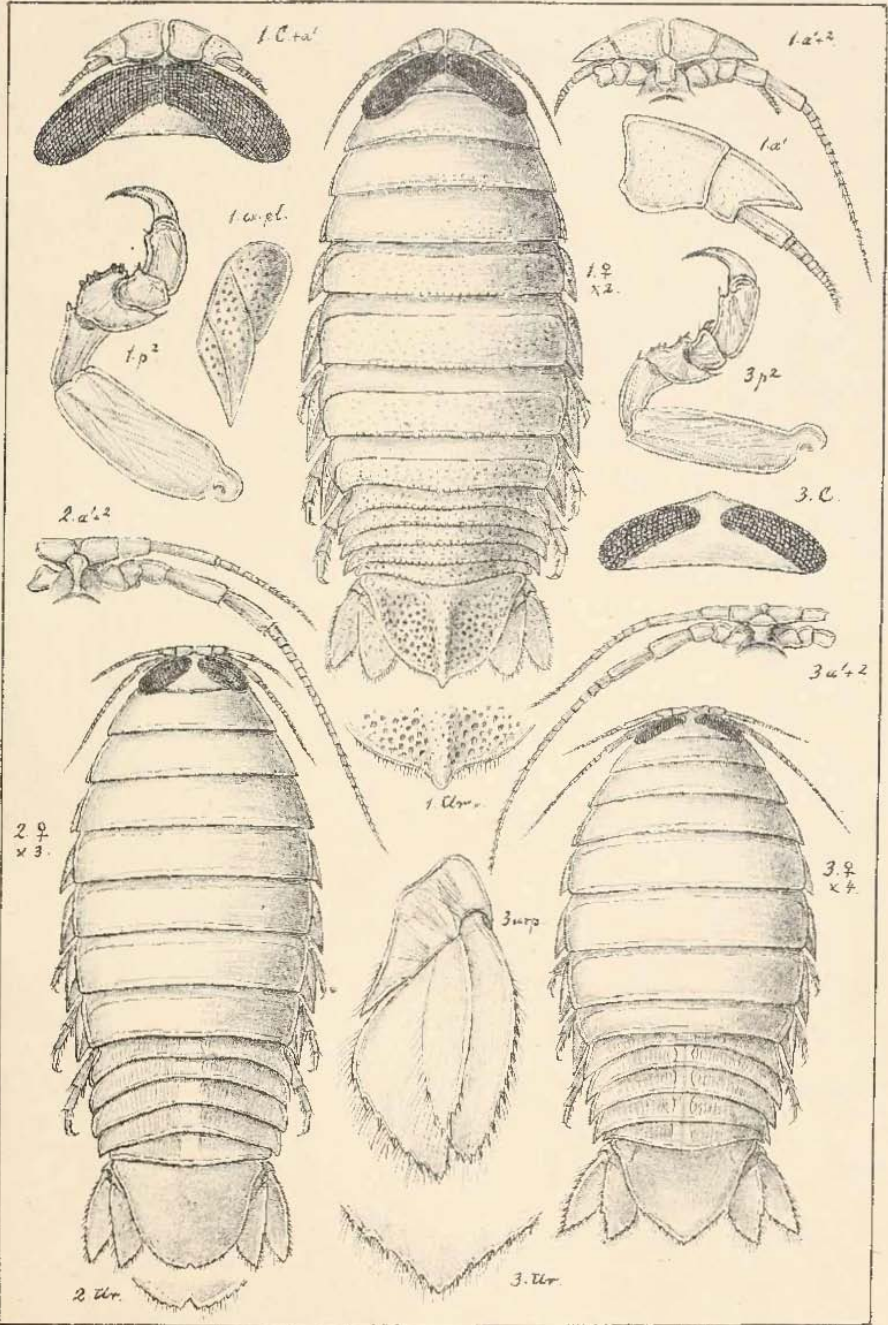






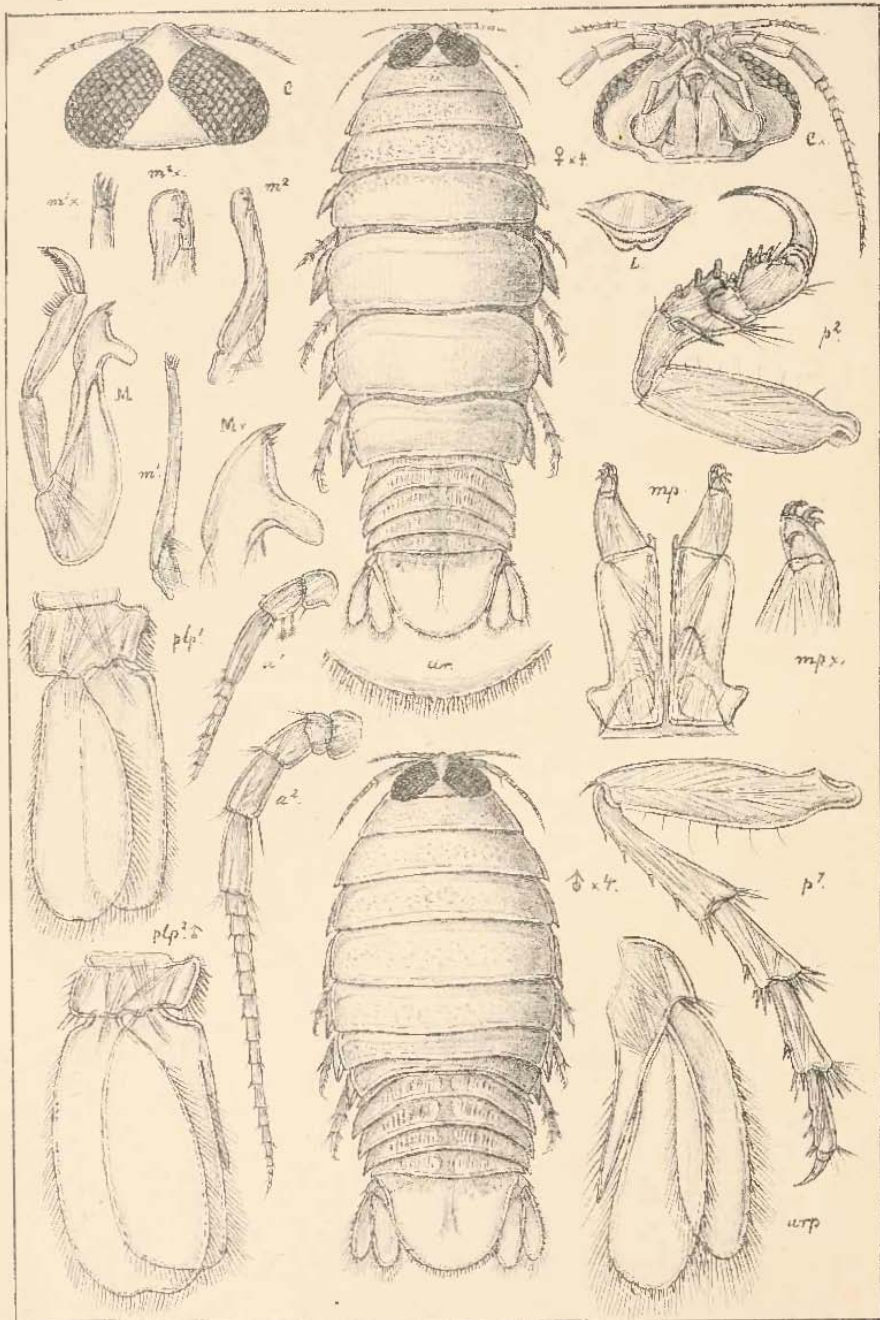
G. O. Sars, autogr.

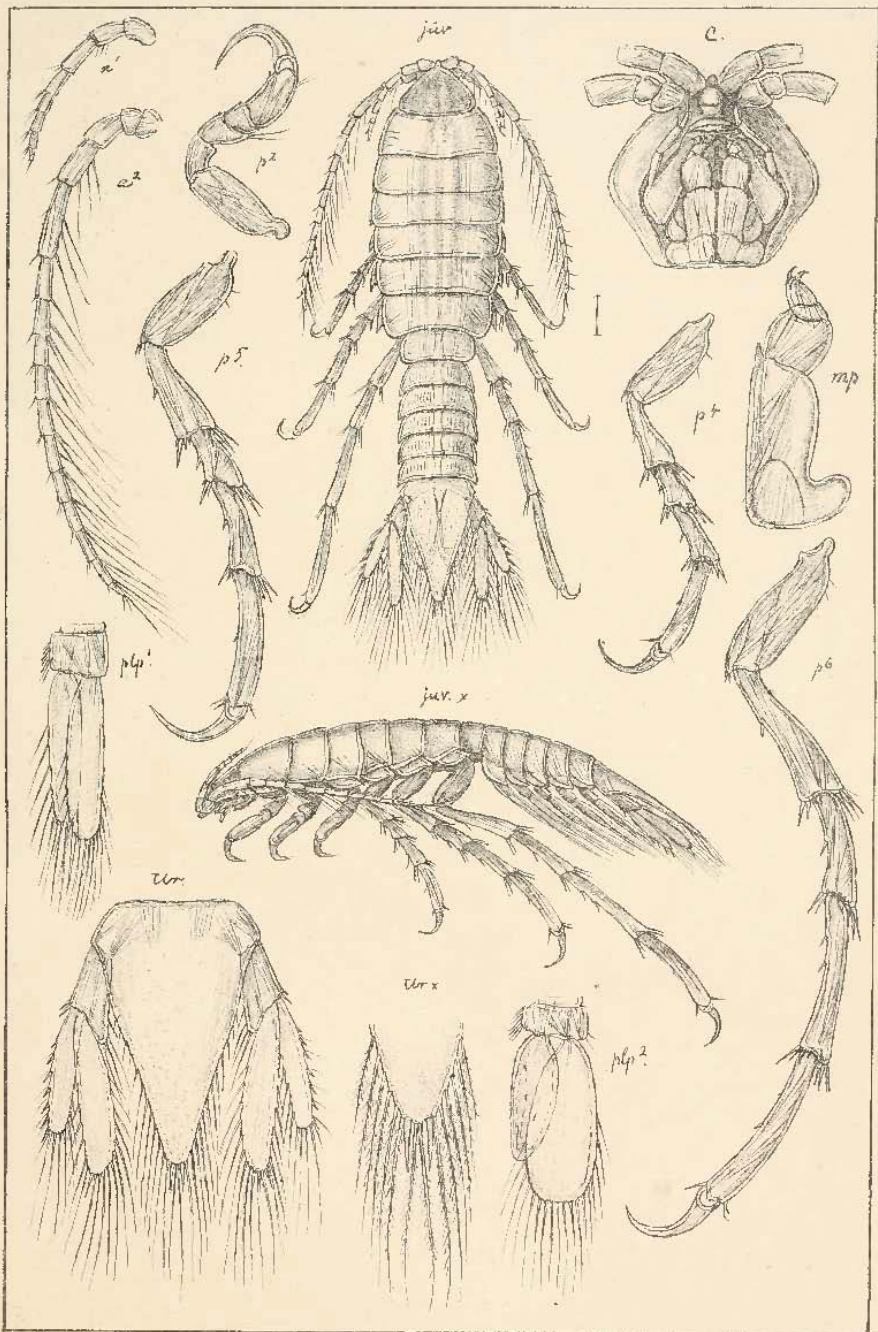
1. *Æga tridens*, Leach.
2. " *Strömii*, Lütken.
3. " *crenulata*, Lütken.

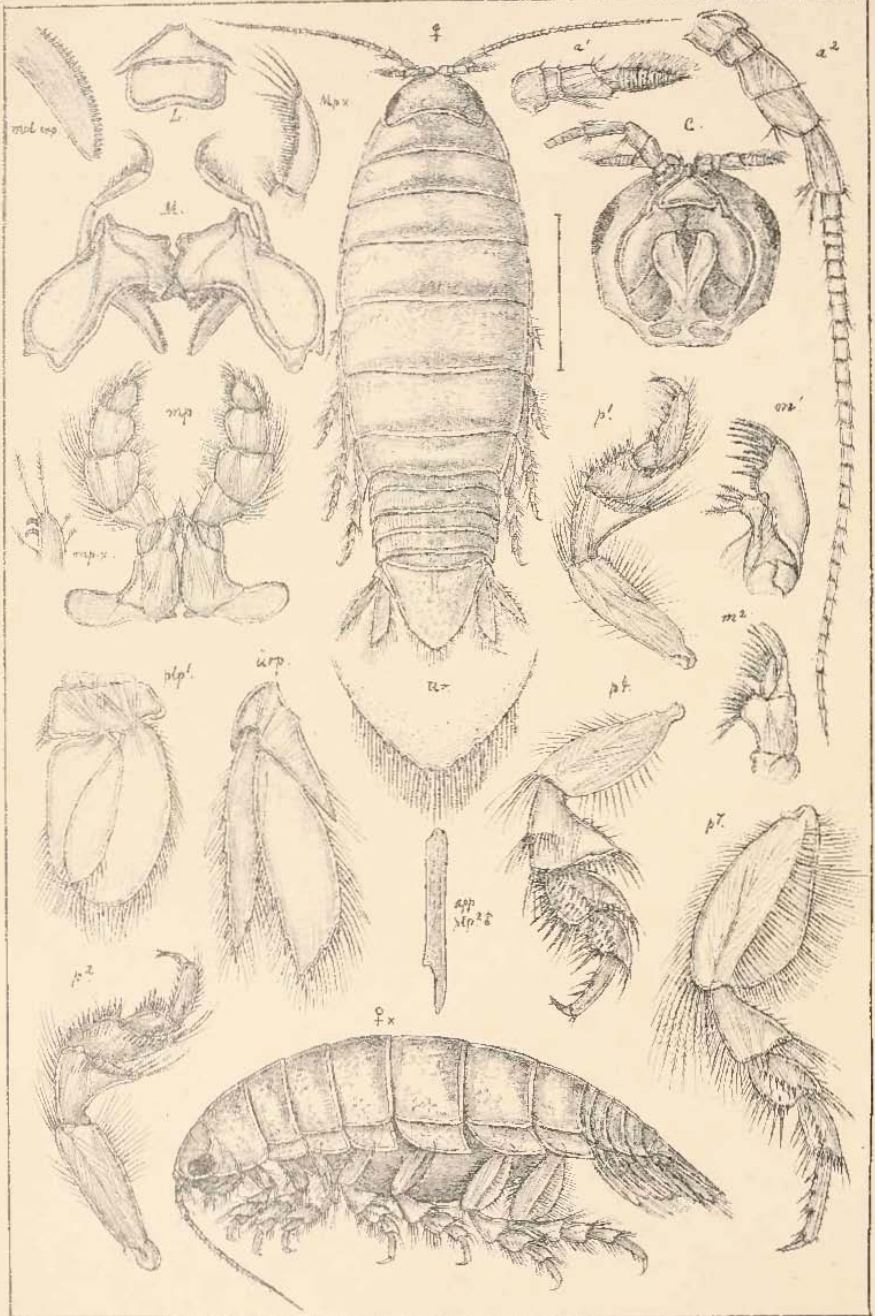


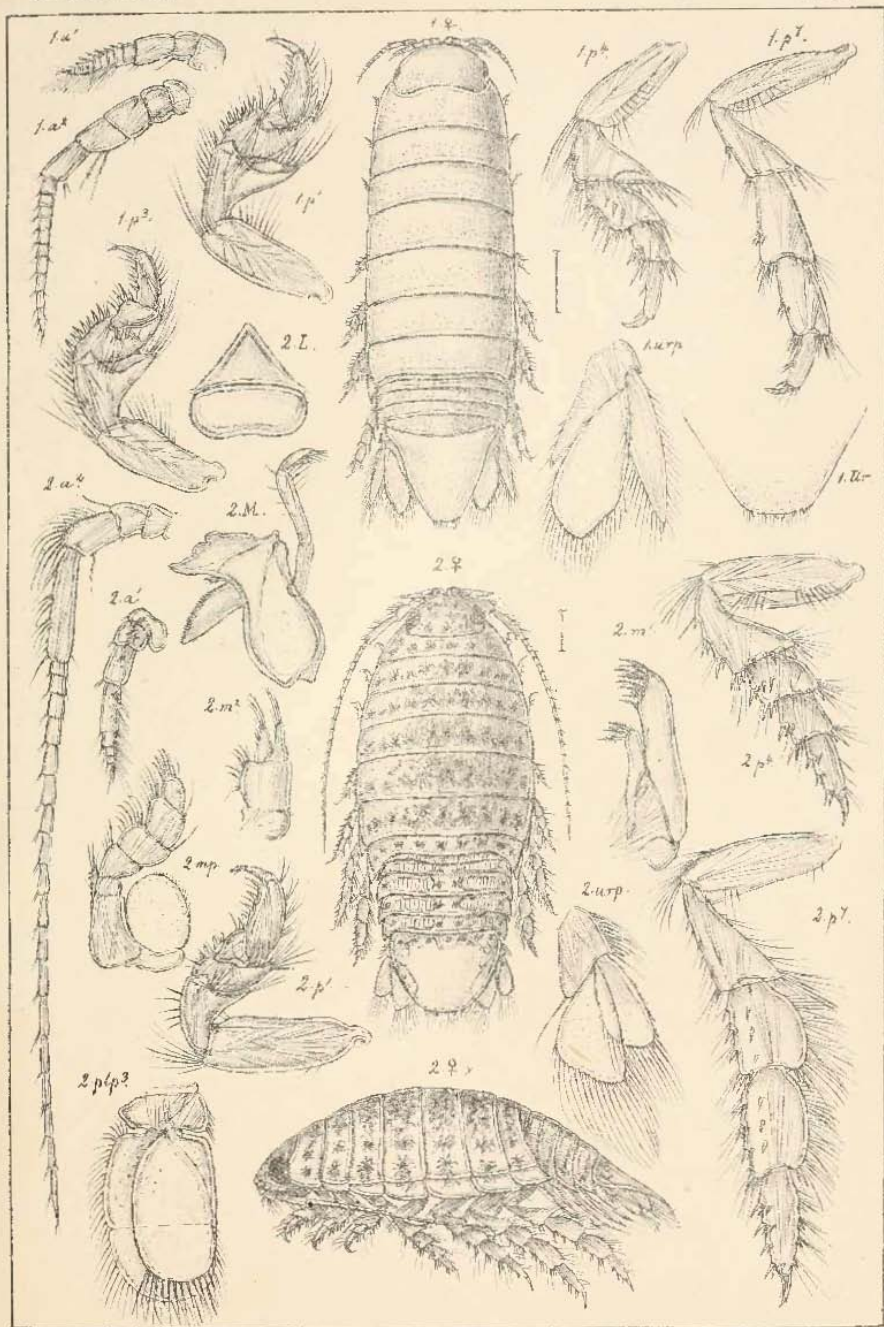
G. O. Sers., autogr.

1. Æge monophthalma, Johnst.
2. " arctica, Lütken.
3. " ventrosa, M. Sers.



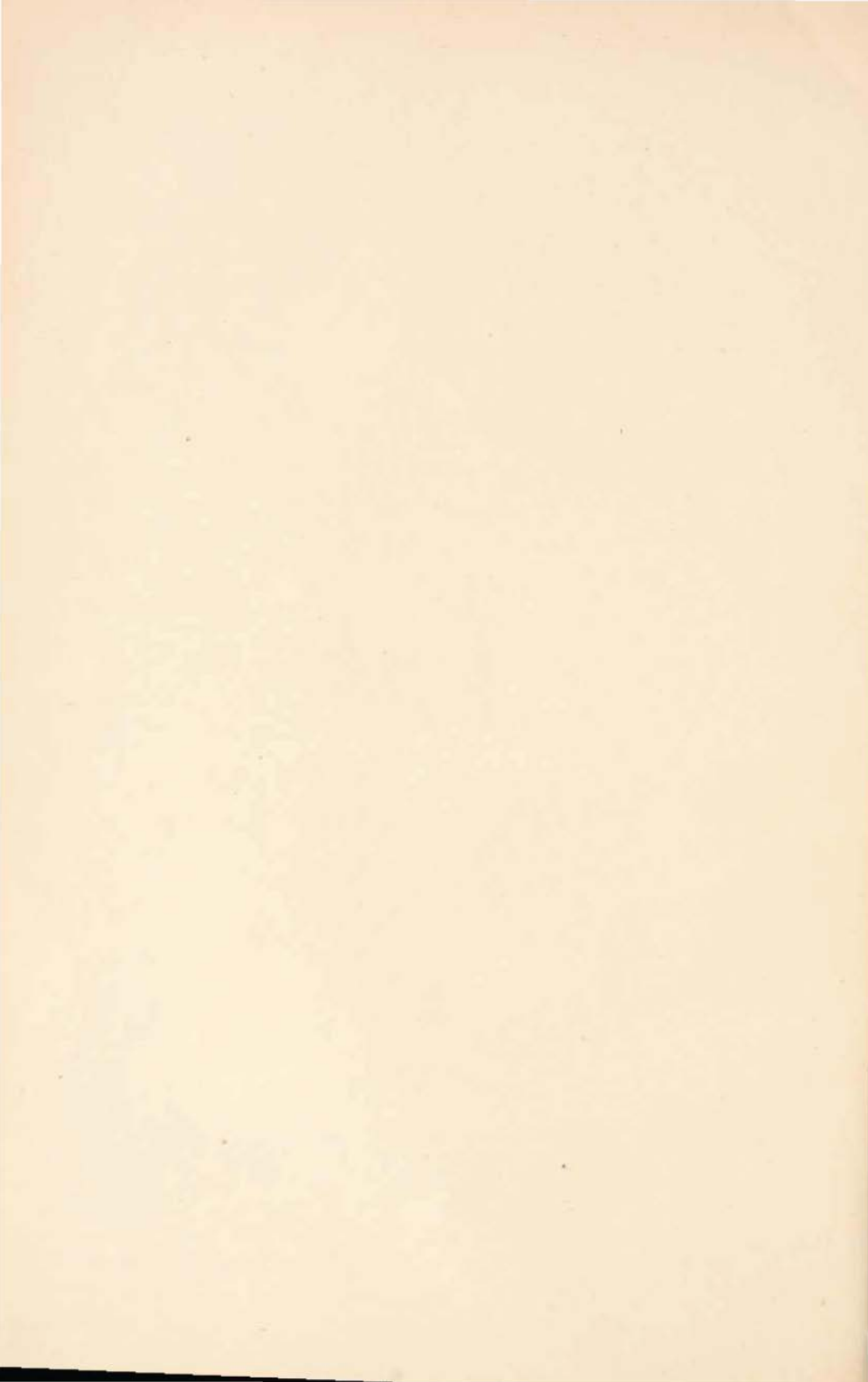


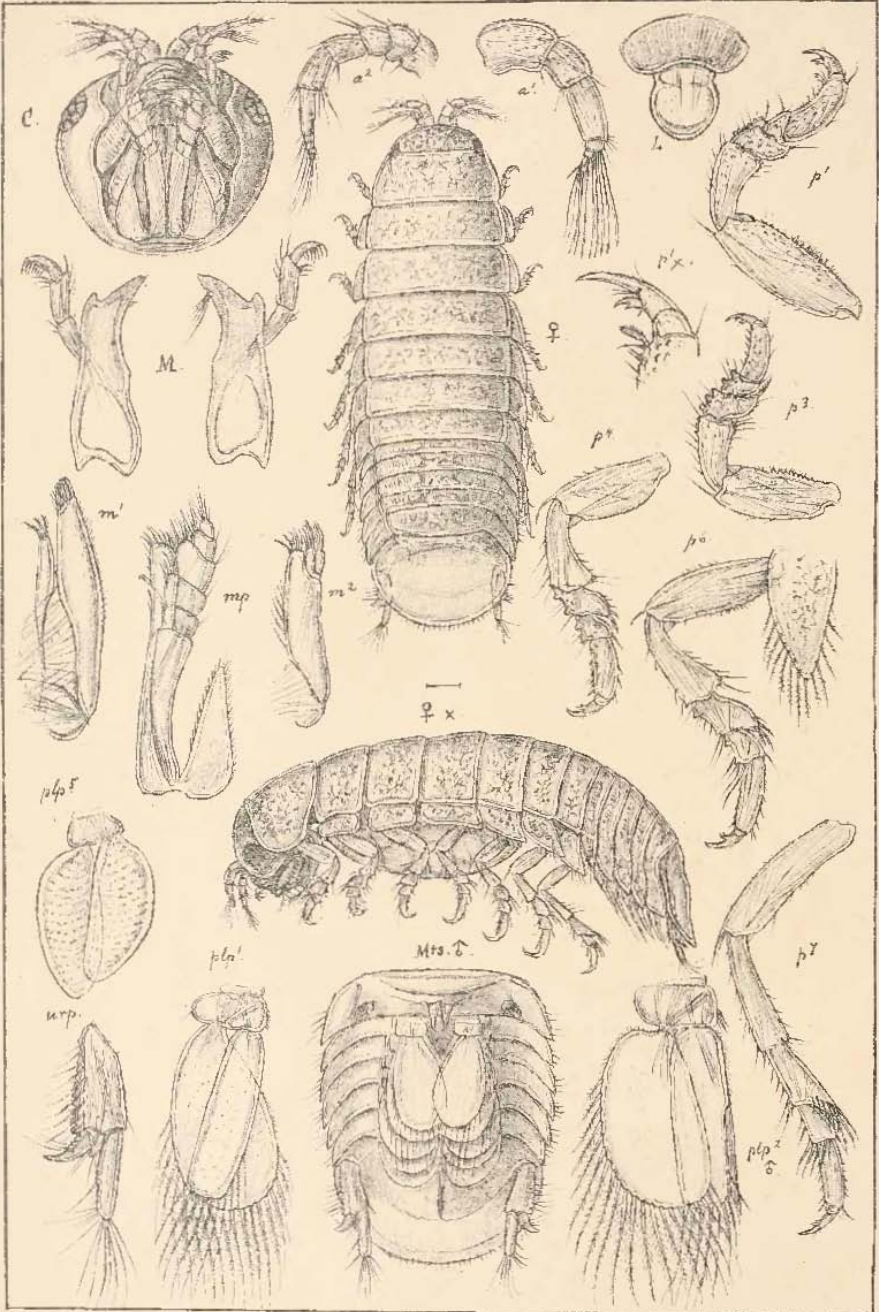


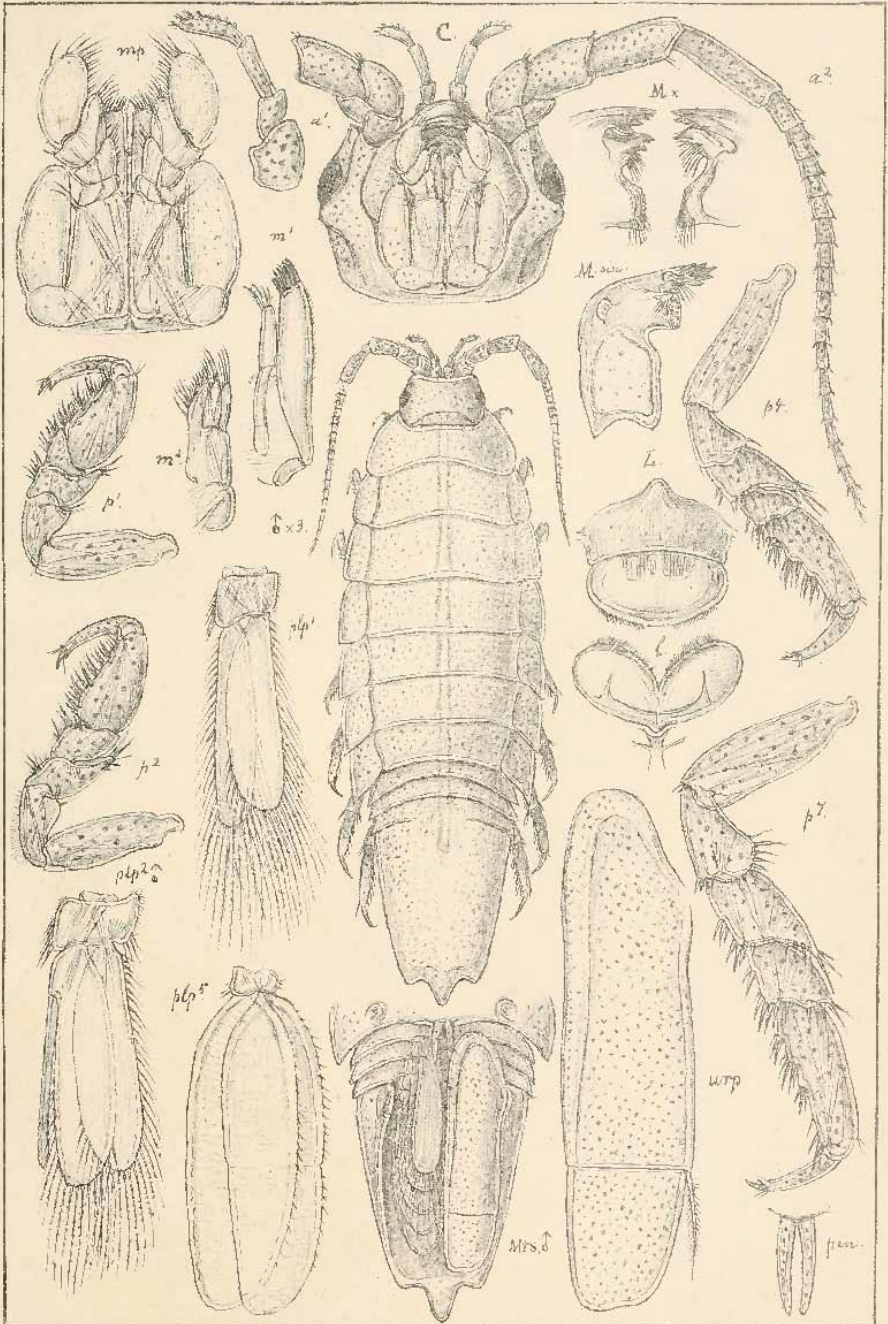


G.O. Sars, autogr.

1. *Cirolana microphthalma*, Hock.
2. *Eurydice pulchra*, Leach.







viz., *Icera marina*, it is best to adopt the name *baltica* proposed by Pallas, which name undoubtedly refers to the present species. The name under which this form has more generally been recorded, is that of *Idothea tricuspidata* Desmerest; but the Pallas' name ought certainly to be preferred as the much older one. It is the largest of the Norwegian Idothee, and easily recognizable in both sexes by the form of the terminal segment of the metasome, which I have found to be pretty constant even in very young specimens. As is the case with other species of the genus, the form of the body in fully grown, ovigerous females slightly differs from that in male specimens, in so far as the greatest width occurs somewhat farther forward, or across the middle of the incubatory pouch. The male is also considerably larger than the female, and has the coxal plates comparatively broader.

Occurrence.—The species occurs rather frequently along the whole Norwegian coast, from the Christiania Fjord at least to Tromsø, in comparatively shallow water among algae. Though being more generally of a rather stationary habit, slowly creeping about on the bottom, the animal is by no means devoid of swimming power. At times it may even be seen to move rather rapidly through the water. In doing so, the valvular uropoda are found to be widely separated, so as to allow the free play of the anterior pairs of pleopoda, by the strokes of which, the animal is propelled through the water.

Distribution.—British Isles (Sp. Bate), Kattegat (Meinert), Baltic (Pallas), Dutch coast (Hoek), coast of France (Bonnier), Mediterranean (Heller), Black Sea (Uzerniawsky), Atlantic coast of North America (Harger).

2. *Idothea pelagica*, Leach.

(Pl. XXXIII.)

Idothea pelagica, Leach, Trans. Linn. Soc. Vol. XI, p. 365.

Syn: *Idothea brevicornis*, Rathke.

" — *torosa*, Rathke.

Specific Characters.—Body comparatively short and stout, being scarcely 3 times as long as it is broad, with the segments very sharply marked off from each other. Coxal plates in both sexes comparatively small, not contiguous. Metasome scarcely more than half the length of the mesosome, terminal segment rather broad, and rounded at the tip, with only a very slight indication of a median prominence. Eyes comparatively large, rounded. Superior antennae with the last joint of the peduncle but little longer than the 2nd. Inferior antennae unusually short and robust, scarcely reaching beyond the 1st segment of mesosome

flagellum much shorter than the peduncle, and rather thick, being composed, in female, of 7, in male, of 9 articulations only. Legs in both sexes very strongly built, those in male having, inside the outer joints, a dense fringe of delicate cilia. Second pair of pleopoda in male with the stylet reaching beyond the inner plate. Uropoda rather broad, with the terminal plate blunted at the tip. Colour somewhat variable, more or less dark brownish, with irregular shadows of a darker hue. Length of adult female 9 mm., of male 13 mm.

Remarks.—There cannot be any doubt that this is the true *I. pelagica* of Leach, and that the form at first described by H. Rathke as *I. brevicornis* and subsequently named by him *I. torosa*, is the very same species. By recent authors this form has generally been regarded as only a variety of *I. baltica*; but I believe that in doing so, they cannot have examined the true Leachian species, which it is impossible to confound with *I. baltica*. As will appear from the figures here given, this form is in fact a very distinct and easily recognizable species, well distinguished in both sexes by its short and stout body, the small coxal plates, the short and robust inferior antennæ, and the unusually strongly built legs. Moreover, the terminal segment of the metasome exhibits a form rather different from that in the other Norwegian species.

Occurrence.—Rathke found this form at Christiansund among *Mytilus* growing close to the shore. I have myself taken it in another locality, viz. outside Lillesand, south coast of Norway, where it occurred likewise close to the shore, among algae.

Distribution.—British Isles (Leach, Sp. Bate), coast of France (Bonnier).

3. *Idothea granulosa*, Rathke.

(Pl. XXXIV, fig. 1.)

Idothea granulosa, Rathke, Beiträge zur Fauna Norwegens, p. 23.

Specific Characters.—Body oblong oval, somewhat more than 3 times as long as it is broad, with the dorsal face distinctly granular being covered with small depressed pits. Coxal plates comparatively small, not contiguous. Metasome in male comparatively longer than in female, equalling in length the 6 posterior segments of mesosome combined. Terminal segment in both sexes considerably attenuated, lanceolate, terminating in a rather prominent conical projection, lateral corners rounded off. Eyes of moderate size. Superior antennæ with the last joint of the peduncle about the length of the 2nd. Inferior antennæ a little longer than in *I. pelagica*, though scarcely reaching to the end of the 2nd segment of mesosome, flagellum not attaining the length of the peduncle, comparatively narrower than in the said

species, and composed of from 8 to 10 articulations. Legs moderately strong. Stylet of 2nd pair of pleopoda in male reaching somewhat beyond the inner plate. Uropoda with the terminal plate obliquely rounded at the tip. Colour uniformly light reddish brown. Length of adult female 11 mm., of male 15 mm.

Remarks.—This form briefly described, but not figured, by Rathke under the above name, has generally been regarded as only a variety of *I. baltica*. It is certainly, however, a well-defined species, differing, as it does, from the type species not only in the far inferior size, but also in several anatomical details mentioned in the above diagnosis. It is best recognized by the narrow, lanceolate form of the terminal segment of the metasome, which is perfectly constant in all specimens.

Occurrence.—Rathke found this form at Christiansund and Trondhjem. I have myself occasionally met with it on the sandy beach of Listerland, and in the outer part of the Christiania Fjord, where it occurred in quite shallow water. Out of Norway it has not yet been recorded.

4 *Idothea viridis* (Slabber).

(Pl. XXXIV, fig. 2.)

Oniscus viridis, Slabber, Naturk. verlustingen, p. 104, Pl. XII, figs 1—5.

Syn: *Idotea phosphorea*, Hoek (not Harger).

Specific Characters.—Body very slender, oblong linear in form, more than 4 times as long as it is broad; that of male, as usual, still more slender than in the female. Cephalon but little broader than it is long, frontal margin slightly concave. Coxal plates comparatively small, not contiguous. Metasome occupying about $\frac{1}{3}$ of the length of the body, last segment but very slightly narrowed distally, and terminating in a comparatively short and obtuse median prominence, lateral corners distinct, though obtuse. Eyes of moderate size. Superior antennæ nearly as in *I. granulosa*; inferior antennæ, on the other hand, comparatively more slender, reaching beyond the 2nd segment of mesosome, flagellum exceeding the peduncle in length, and composed of from 10 to 15 articulations. Legs more slender than in most other species, though, as usual, somewhat stronger in male than in female. Stylet of 2nd pair of pleopoda in male extending considerably beyond the inner plate. Uropoda with the terminal piece obtusely truncated at the tip. Colour uniformly greenish. Length of adult female 10 mm., of male 12 mm.

Remarks.—The 2 detail-figures (Pl. VII, figs 2, 2r) given by Dr. Hoek in the 2nd part of his "Crustacea Neerlandica") leave no doubt that the form

¹) Tijdschr. Nederl. Dierk. Vereeniging, 2 series, Vol. 2, Part 3.

he records as *I. phosphorea* Harger is the very same species as that here treated of. It can scarcely be identical with the North American species, whereas it is most likely that Dr. Hoek is right in considering the *Oniscus viridis* of Slabber to be the same species. In any case, the specific name proposed by Slabber ought to be retained as the much older one. Before becoming acquainted with Dr. Hoek's paper I had named this form *I. angusta*, owing to its unusually narrow form of body, and it is so named in the plate. From the other Norwegian *Idothea* it is at once recognized by its slender form, which approaches to that in the genus *Stenosoma*. The manner in which the last segment of the metasome terminates, somewhat resembles that in *I. baltica*, there being traces of a tridentate shape; but the median prominence is considerably shorter and blunter, and the lateral corners very obtuse.

Occurrence.—I have taken this form rather plentifully in the Christiania Fjord, at Moss, in quite shallow water among eel-grass.

Distribution.—Dutch coast (Hoek), coast of France (Hoek).

5. *Idothea neglecta*, G. O. Sars, n. sp.

(Pl. XXXV, fig. 1.)

Specific Characters.—Body oblong oval in form, scarcely 3 times as long as it is broad, and, as usual, comparatively shorter and stouter in female than in male, with the greatest width farther forward. Cephalon about twice as broad as it is long, frontal margin straight. Coxal plates in female not very large, and scarcely contiguous, in male much more fully developed, and forming together on each side, as in *I. baltica*, a broad marginal area. Metasome exceeding $\frac{1}{3}$ of the length of the body, last segment but slightly narrowed distally, and terminating in a blunt point, lateral corners obsolete. Eyes rather large. Superior antennae with the last joint of the peduncle longer than the 2nd. Inferior antennae rather slender, reaching to the end of the 2nd segment of mesosome, flagellum much longer than the peduncle, and composed of from 16 to 20 articulations. Legs moderately strong. Stylet of 2nd pair of pleopoda in male very short, not reaching far beyond the middle of the inner plate. Uropoda with the terminal piece transversely truncated. Colour generally very dark brown or almost black, sometimes lighter, variegated with small, irregular patches. Length of adult female 16 mm., of male 25 mm.

Remarks.—There cannot be any doubt that this very common form must have been observed by several authors. It has, however, not yet been recognized as a distinct species, but has either been regarded as merely a variety of *I. baltica*,

or as *I. pelagica* of Leach. The latter mistake has been previously committed by the present author; but after having become acquainted with the true *I. pelagica* Leach, I now find that it is a very different species, exhibiting a much closer relationship to *I. emarginata*. From this species, however, it is at once distinguished by the very different form of the last segment of the metasome, in which respect it also differs conspicuously from the North American *I. phosphorea*.

Occurrence.—The species occurs along the whole Norwegian coast, from the Christiania Fjord to Vadsö, and is often found in great abundance among decaying algae, in depths ranging from 6 to 20 fathoms. As to its distribution out of Norway, it is impossible at present to state anything with certainty; but it is most likely that it also occurs at any rate off the British Isles and in the Kattegat.

6. *Idothea emarginata* (Fabr.).

(Pl. XXXV, fig. 2.)

Cymothoa emarginata, Fabricius, Entom. Syst. II, p. 508.

Syn: *Idothea excisa*, Bosq.

" " *oestrum*, Pennant.

Specific Characters.—Body oblong oval, scarcely 3 times as long as it is broad, and much larger in male than in female. Coxal plates in female rather small and not contiguous, in male much larger, and forming on each side a broad marginal area. Last segment of metasome abruptly truncated at the tip, hind edge slightly emarginated, with the lateral corners distinctly projecting. Eyes and superior antennæ about as in *I. neglecta*. Inferior antennæ somewhat less slender, scarcely reaching to the end of the 2nd segment of mesosome, flagellum not much longer than the peduncle, and composed of from 12 to 16 articulations. Legs about as in *I. neglecta*. Stylet of 2nd pair of pleopoda in male somewhat longer than in *I. neglecta*, though not reaching to the end of the inner plate. Uropoda with the terminal piece slightly emarginated at the tip. Colour rather variable, sometimes uniformly dark brown, sometimes variegated with larger whitish patches, which are often confluent along the sides, so as to leave the marginal area, formed by the coxal plates, uncoloured. Length of adult female 18 mm., of male 39 mm.

Remarks.—This species was recorded as early as in the year 1793 by Fabricius, as *Cymothoa emarginata*. By earlier British authors (Pennant and Leach) it was named *Idothea oestrum*. Though very nearly allied to *I. neglecta*, this form is readily distinguished, both from that species and the other Norwegian *Idothea*, by the abruptly truncated and emarginated terminal segment of the metasome, for which reason it has never been confounded with any of the other species.

Occurrence.—The species has a distribution along the Norwegian coast similar to that of *I. neglecta*, and is generally found in company with that species. It is, however, on the whole, less frequent, though in one locality, at Færder, in the outermost part of the Christiania Fjord, I found it in considerable abundance among decaying algæ, in a depth of about 20 fathoms.

Distribution.—British Isles (Sp. Bate), Kattegat (Meinert).

Fam. 2. Arcturidæ.

Characters.—Body narrow, scarcely at all depressed, approaching to a cylindrical form. Coxal plates small, though distinct. Metasome with the segments more or less consolidated, the last one rather large. Superior antennæ small, with the flagellum uniaarticulate. Inferior antennæ very strongly developed, pedi-form, the outer joints of the peduncle being much elongated and connected by geniculated bends, flagellum comparatively short. Oral parts on the whole resembling those in the *Idotheidæ*. The 4 anterior pairs of legs very unlike the 3 posterior ones, and not ambulatory, nor strictly prehensile; the 1st pair very small and closely applied to the oral parts, so as to exhibit more the appearance of maxillipeds; the 3 succeeding pairs of very feeble structure, and fringed with long delicate setæ. The 3 posterior pairs of legs normally developed, and rather strongly built, diminishing somewhat in length posteriorly. Pleopoda present in the normal number, the 2 anterior pairs being natatory, with narrow and densely setiferous plates, the 3 posterior pairs exclusively branchial; 2nd pair in male with a long bi-setose stylet appended to the inner plate. Uropoda, as in the *Idotheidæ*, valve-like, arching over the lower face of the metasome, and having a small secondary plate inside the terminal one. Male much smaller than female.

Remarks.—In external appearance, the forms belonging to this family are very unlike those of the preceding one, and were, indeed, by some of the earlier authors, widely separated from them, and associated with a very different family, viz., the *Anthuridæ*. On a closer examination, however, they are, in fact, found to show nothing in common with the latter family, except the narrow, cylindrical form of the body, whereas they exhibit a close relationship to the *Idotheidæ*, both as regards the structure of the oral parts, and that of the metasome. The chief difference consists in the strong development of the inferior antennæ, and in the

peculiar structure of the 4 anterior pairs of legs. The family comprises as yet 3 genera, viz., *Arcturus*, *Astacilla* and *Arcturella*, the last 2 of which are represented in the fauna of Norway, and will be treated of below.

Gen. 1. *Astacilla*, Cordiner, 1795.

Syn: *Leacia*, Johnston.

Generic Characters.—Body extremely slender, subcylindric in form, with the middle segment of mesosome very much elongated, being in male narrow cylindrical, in female somewhat thicker, and carrying beneath it the incubatory pouch. The 3 posterior segments of mesosome short and very movably articulated, so as to allow the anterior part of the body to be bent dorsally at right angles to the posterior. Metasome with only a single segment distinctly separated in front of the terminal one, which is conically produced behind, and exhibits at the base on each side a small projecting lappet, really indicating the presence of another imperfectly defined segment. Eyes large and prominent, lateral. Superior antennæ with the flagellum more fully developed in male than in female, and in both sexes carrying a number of delicate olfactory filaments arranged along the outer edge. Inferior antennæ very much elongated, though having the flagellum extremely short, and only composed of 3 articulations finely denticulated inside, the last terminating in a small spine. Maxillipeds with the palp well developed, 5-articulate, epignath comparatively small, basal part in female produced in a thin ciliated plate extending posteriorly. 1st pair of legs densely setous, proximal part of dactylar joint lamellarly expanded; the 3 succeeding pairs very slender, and fringed with a double row of long setæ, dactylus obsolete. The 3 posterior pairs of legs smooth, dactylus strong, bidentate at the tip. Uropoda with the terminal piece triangularly pointed, secondary lamella very small, setous at the tip. Incubatory pouch only formed by a single pair of elliptical valvular lamella issuing from the middle segment of mesosome.

Remarks.—As stated by the Rev. Mr. Stebbing, the generic name *Astacilla*, which has generally been attributed to Fleming, was in fact proposed at a much earlier date (1795) by the Rev. Charles Cordiner to designate a species of the present genus. The name *Leacia* proposed by Johnston in 1825, and used by some subsequent authors, was merely abandoned, because a very similar name, that of *Leachia*, had been previously applied to a genus of Cephalopods. In any case, the name *Astacilla* should be given the precedence, as it is still older than the name

Arcturus given by Latreille to another genus which has generally been regarded as the type of the family. The name of the family should therefore perhaps more properly be changed to *Astacillidae*. The present genus is chiefly distinguished from *Arcturus* by the great length of the middle segment of the mesosome, which gives the body an extremely slender, nearly cylindrical form, whereas in *Arcturus* it is more fusiform in shape. Moreover the structure of the 1st pair of legs is slightly different, and the incubatory pouch, which in *Arcturus* is formed by 3 pairs of distinct lamellæ issuing from the 2nd, 3rd and 4th segments, is here only confined to the middle segment of the mesosome. The genus comprises several species, amounting to about 10 in all. To the fauna of Norway belong 4 species, to be described below.

1. *Astacilla longicornis* (Sowb.)

(Pl. XXXVI.)

Oniscus longicornis, Sowerby, Brit. Miscell. T. 19.

Syn: *Leacia lacerfosa*, Johust.

" *Arcturus longicornis*, Westw.

" — *gracilis*, Goobsir (male).

Specific Characters.—Body of female very slender, subcylindric in form, and sculptured with obtuse tubercles. Cephalon produced on each side to a linguiform lobe extending forwards, and covering the bases of the inferior antennæ, frontal margin deeply emarginated, dorsal face with 2 juxtaposed obtuse prominences. The first 3 segments of mesosome short and, when combined, scarcely exceeding the cephalon in length, each with a rather slight dorsal tubercle, lateral parts of 1st segment rather large and deep, triangularly produced in front, so as partly to cover the oral area, those of the 2 succeeding segments rounded and extended laterally. Middle segment of mesosome about twice the length of the preceding part of the body, and covered with small obtuse tubercles, 2 of which placed side by side in its most anterior part dorsally, are more conspicuous, lateral parts confined to a small rounded lamella issuing from the segment on each side quite in front. The 3 posterior segments of mesosome irregularly angular, and deeply emarginated dorsally. Coxal plates of 1st segment obsolete, those of the 3 succeeding segments very small, and concealed beneath the lateral parts, those of the 3 posterior segments well developed, triangular, extending laterally. Metasome about half the length of the mesosome, its 1st segment evenly vaulted above, last segment conically tapering, and terminating in a long acuminate point. Eyes large and convex, triangular in outline. Superior antennæ with the flagellum about the length of the 2 preceding joints combined, and carrying 9 olfactory filaments.

Inferior antennae attaining the length of the body, not including the terminal segment of metasome, flagellum scarcely more than $\frac{1}{2}$ as long as the last peduncular joint, and having the 1st articulation twice as long as the other 2 combined. *Male* much smaller than female, and extremely slender, with the middle segment of mesosome narrow cylindrical in form, and quite smooth. Superior antennae with the flagellum much larger than in female, and provided with a greater number of olfactory filaments. Colour yellowish, clouded with irregular dark brown shadows. Length of adult female reaching 20 mm., that of male scarcely more than half that size.

Remarks.—The present species was first described by Sowerby in the above quoted paper under the name of *Oniscus longicornis*. It is, however, very probable that the form observed by the Rev. Charles Cordiner several years previously, and named *Astacilla*, without any specific denomination, was the very same species. The form recorded by Johnston as *Leucia laevigata*, is undoubtedly this species. By most of the earlier authors, it has been referred to the genus *Areturus* of Latreille. The *Areturus gracilis* of Goodsir is, in my opinion, nothing else than the adult male of the present species. From the other Norwegian species, it may be chiefly distinguished by its slender and elongated body, and by the rather slight development of the dorsal tubercles.

Occurrence.—This species would seem to occur along the whole coast of Norway, from the Christiania Fjord to Vadsö. It is generally found in moderate depths, ranging from 10 to 30 fathoms, clinging to Hydroids and Polyzoa, several specimens, females, males and young, being often associated in the same colony. By the aid of its 3 posterior pairs of legs, the animal is capable of getting a rather firm hold on the object to which it is clinging, moving the fore part of its body freely to and fro in search of food, which is first seized by the long pediform inferior antennae. At times it is seen to leave go its hold, and to start off rather rapidly through the water, in order to affix itself on some other place. This motion is effected by the aid of the 2 anterior pairs of pleopoda, which in such cases are protruded from the shelter of the valvular uropoda, and push the animal forwards. Not infrequently female specimens are found carrying their young brood affixed all round the long inferior antennae, which thereby acquire a peculiar velvety appearance.

Distribution.—British Isles (Sp. Bate), Kattegat (Meinert), Iceland.

2. *Astacilla arietina*, G. O. Sars.

(Pl. XXXVII, fig. 1.)

Astacilla arietina, G. O. Sars, Oversigt af Norges Crustaceer I, p. 62, Pl. 2, fig. 2.

Specific Characters.—Very like the preceding species as to the general form of the body, and the structure of the several appendages, but differing in the strange development of some of the dorsal tubercles, those of the cephalon assuming the appearance of a pair of very conspicuous, acute horns pointing slightly forwards, and somewhat divergent. Middle segment of mesosome not quite twice as long as the preceding part of the body, and exhibiting in its anterior part, dorsally, 4 remarkably strong pyramidal prominences, disposed in pairs; the posterior part of the segment very rough, owing to the presence of numerous obtuse tubercles. Colour greyish, with irregular dark brown patches. Length of adult female 19 mm.

Remarks.—This form is very closely allied to *A. longicornis*, and I have indeed been in some doubt as to whether it should not more properly be regarded as a more accidental variety of that species. But, on going through the vast material of *A. longicornis* at my disposal, I have failed to detect any sign of the peculiar development of the dorsal tubercles characteristic of the present species.

Occurrence.—The only place where this form has come under my notice, is Tjernagel in the outer part of the Hardanger Fjord. From a depth of 60 to 100 fathoms, stony bottom. I there took up in the dredge 2 adult specimens, female and male, the former with the inferior antennæ densely clothed with the adhering newly-hatched brood. The male had much the same appearance as that of *A. longicornis*, though the tubercles of the cephalon were quite conspicuous, whereas in the male of *A. longicornis* they are always wholly absent.

3. *Astacilla affinis*, G. O. Sars.

(Pl. XXXVII, fig. 2.)

Arcturus affinis, G. O. Sars, Nye Dybvandscrustaceer fra Lofoten. Chr. Vid. Selsk. Forh. 1869, p. 163.

Specific Characters.—Body of female comparatively less slender than in the 2 preceding species, and but slightly tubercular. Middle segment of mesosome not nearly twice as long as the preceding part of the body, and exhibiting, quite in front, 2 juxtaposed dorsal tubercles of somewhat larger size than the others. Eyes comparatively smaller than in the 2 preceding species. Superior antennæ with the flagellum twice as long as the 2 preceding joints combined, and carrying only 5 olfactory filaments. Inferior antennæ with the flagellum not attaining $\frac{1}{3}$

of the length of the last peduncular joint, its 1st joint not twice as long as the other 2 combined. 1st pair of legs with the proximal part of the dactylus comparatively longer and more expanded than in *A. longicornis*. Male resembling that of the latter species, though somewhat less slender. Colour uniformly greyish, semipellucid, without any patches. Length of adult female 13 mm.

Remarks.—This form is also very nearly allied to the type species, and may, at first sight, easily be confounded with it. It is, however, of far inferior size and of somewhat less slender form. On a closer comparison, moreover, some differences in the structure of the several appendages may be found to exist, showing it to be evidently specifically distinct. The uniform greyish colour is another character by which this form may be easily distinguished from *A. longicornis*, which always exhibits a more or less variegated colouring.

Occurrence.—I first discovered this form off the Lofoten Islands, in the considerable depth of 250 to 300 fathoms. Subsequently I have found it rather abundantly in the inner part of the Trondhjem Fjord, in depths ranging from 100 to 200 fathoms, sometimes clinging to deep-water Hydroids and Gorgonids, sometimes to the spines of *Echinus elegans* Düb. & Koren. Out of Norway it has not yet been recorded.

4. *Astacilla pusilla*, G. O. Sars.

(P. XXXVII, fig. 3.)

Arctonus pusillus, G. O. Sars. Bidrag til Kundskaben om Dyrelivet paa vore Havbanker. Chr. Vid. Selsk. Forh. 1872, p. 93.

Specific Characters.—Body of female less slender than in the type species, and very tubercular, some of the tubercles assuming a spiniform character. Cephalon with 2 very conspicuous juxtaposed pyramidal prominences above in the middle. Each of the 3 succeeding segments with a transverse row of 4 tubercles, the 2 uppermost being rather prominent. Middle segment of mesosome coarsely tubercular both dorsally and laterally, the tubercles being unequal in size. The 3 posterior segments of mesosome, as also the metasome, likewise distinctly tubercular dorsally. Superior antennae about as in *A. affinis*. Inferior antennae with the flagellum very small, its 1st joint not being longer than the other 2 combined. Colour uniformly light yellow. Length of adult female scarcely exceeding 8 mm.

Remarks.—In the general form of the body, this species somewhat resembles *A. affinis*. It is, however, of rather inferior size, and much more tubercular. The colour also is different.

Occurrence.—It would seem to be a very rare species. The first specimen was found by the present author on the Storeggen bank, clinging to a spine of *Echinus varispinus* G. O. Sars, taken up from a depth of 80 to 100 fathoms. Another specimen was taken off the Lofoten Islands in about the same depth.

Distribution.—Skagerak (Meinert).

Gen. 2. *Arcturella*, G. O. Sars, n.

Generic Characters.—Body less elongated than in *Astacilla*, and in female, slightly depressed, the middle segment being very large and broad, scutiform. Metasome about as in *Astacilla*. Superior antennæ with only a very restricted number of olfactory filaments issuing from the tip of the flagellum. Inferior antennæ of no considerable length, flagellum 3-articulate and terminating in a long spine. Maxillipeds with the palp rather slender, 5-articulate, epignath very large and ciliated at the tip. 1st pair of legs with the proximal part of the dactylus narrow, linear; the 3 succeeding pairs less elongated than in *Astacilla*, and less richly supplied with setæ. Incubatory pouch confined to the middle segment of mesosome. Male much smaller than female, and having the middle segment of mesosome simple, cylindrical in form.

Remarks.—This new genus is founded upon the peculiar form described by the present author as *Astacilla dilatata*. A closer examination of this form has shown it also to differ from the species of the genus *Astacilla* in some anatomical details mentioned in the above diagnosis, so that it should more properly be regarded as the type of a distinct, though nearly-allied genus.

Arcturella dilatata, G. O. Sars.

(Pl. XXXVIII.)

Astacilla dilatata, G. O. Sars, Oversigt af Norges Crustaceer I, p. 63, Pl. 2, fig. 3.

Specific Characters.—Body of female very tubercular, some of the tubercles assuming a spiniform character. Cephalon with 2 dorsal juxtaposed, and somewhat procurved pyramidal prominences, in front of which occur several smaller tubercles. Each of the 3 succeeding segments with a transverse series of 5 conical tubercles, the median one being the most prominent, lateral parts triangularly produced, those of 1st segment larger and deeper than those of the 2 other segments. Middle segment of mesosome exceedingly large and broad, somewhat

longer than the preceding part of the body, and almost quadrate in form, with the anterior and posterior corners laminae expanded, and connected by a lateral, crenulated crest; dorsal face armed in the middle with 2 very strong juxtaposed spines, slightly curved in front, and having behind them scattered tubercles, hind edge raised, and armed with 3 strong tubercles. The 3 posterior segments of mesosome carinated dorsally, and having laterally scattered tubercles. Metasome with the proximal segment distinctly carinated dorsally and constricted in the middle; terminal segment only carinated in its anterior part, and tapering to an acute point. Eyes rather large and convex, rounded. Superior antennæ with the flagellum longer than the 2 preceding joints combined, and carrying, in female 2, in male 3 apical olfactory filaments. Inferior antennæ scarcely more than half as long as the body, flagellum very small, with a discontinuous row of denticles inside, 1st joint scarcely as long as the other 2 combined, terminal spine nearly as long as the last joint. Colour greyish brown, with more or less distinct, darker brown pigmentary ramifications. Length of adult female 6 mm., of male scarcely more than half that size.

Remarks.—This is as yet the only known species of the genus, and may be easily recognized, at least in the female sex, by the large size and peculiar shape of the middle segment of the mesosome.

Occurrence.—I have met with this form not infrequently in several places, both on the south and west coasts of Norway, in depths ranging from 20 to 30 fathoms, on a muddy bottom covered with decaying algae.

Distribution.—British Isles (Robertson), Mediterranean at Messina and Spezia (the present author), Skagerak and Kattegat (Meinert).

Tribe 4.

ASELLOTA.

Remarks.—In the present group of Isopoda all the segments of the metasome are fused together, forming a more or less broad shield-like plate, the caudal segment. The pleopoda have wholly lost their swimming power, being exclusively branchial in character, and they are moreover considerably reduced in number. In by far the greater number of the forms, the 1st pair are transformed to a single opercular plate, to protect the extremely delicate succeeding pairs, this operculum being, in the male, peculiarly modified. The uropoda, as in the group *Chelifera*, are terminal, never forming part of a caudal fan, nor being valvular in character. Though, as above stated, the appendages of the metasome are quite unserviceable for locomotion, there are some forms belonging to this group, which show themselves to be very expert swimmers; but the swimming is here effected in a very different manner, viz., by the aid of the 3 posterior pairs of legs, which, in such cases, are found to be peculiarly modified, forming oar-like swimming implements, by the strokes of which, the animal is propelled backwards. This is more particularly the case in one of the families, the *Munnopsidae*; but some of the *Desmosomidae* are also enabled to move in a similar manner, though never so rapidly as the first-named. As to the general form of the body, it is greatly variable, sometimes very broad and depressed, sometimes slender and elongated, approaching to a cylindrical shape. The cephalon is always well defined, and the mesosome exhibits the normal number of segments, which sometimes arrange themselves with tolerable distinctness into 2 sets by a median constriction. The coxal plates are very small or quite obsolete, never forming a marginal area, as is generally the case in the two preceding groups. Of the antennae, the superior ones are generally smaller than the inferior, which sometimes attain an excessive length. The oral parts are, on the whole, normally developed, and of the legs, only the 1st pair sometimes assume a

subcheliform structure. None of the forms belonging to the present group lead a parasitic existence. The group contains as yet 5 families, all of which are represented in the fauna of Norway. It is, however, very probable that it will be found convenient to establish more families subsequently.

Fam. 1. Asellidæ.

Characters.—Body more or less broad, depressed, with the lateral parts of the segments lamellar. Cephalon of moderate size, without any rostrum, lateral parts scarcely expanded. Caudal segment large, shield-like. Eyes, when present, small, lateral. Both pairs of antennæ with multiarticulate flagella, the superior ones much smaller than the inferior, and issuing close together. Oral parts normal. Legs ambulatory, except the 1st pair, which are distinctly subcheliform. Pleopoda in female 4 pairs, the 1st being very small, not operculiform, consisting each of a single rounded lamella; the 3 succeeding pairs biramous, with both rami lamelliform, outer lamella of 2nd pair very large and incrustated, so as to form, together with the corresponding lamella of the other side, a sort of operculum, completely covering the 2 succeeding pairs. Pleopoda in male 5 pairs, an additional very small pair, constituting the copulative appendages, being interposed between the 1st and 2nd. Uropoda comparatively large, biramous, with the rami styliform or lamellar.

Remarks.—In the restriction here adopted, this family is chiefly characterized by the structure of the pleopoda, which differs considerably from that found in the other *Asellota*. Whereas in these, the 1st pair in the female are invariably transformed to a single large opercular plate, completely covering the succeeding pairs, this pair, in the forms belonging to the present family, are of inconsiderable size and not at all opercular, forming 2 discrete, simple, setiferous lamellæ. On the other hand, the outer plate of the 2nd pair is very large and incrustated, lying in close contact with that of the other side, so as to obstruct completely the 2 succeeding pairs. In the male, there is found, immediately behind the 1st pair of pleopoda, an additional pair of very small biramous appendages, of which no trace can be detected in the female, and which represent the copulative organs. As regards the other *Asellota*, the male operculum is apparently split into 3 juxtaposed segments, one narrow median segment, which exhibits a well-marked

suture along the middle, and 2 lateral segments of a more or less oval form, and carrying inside 2 peculiar movable appendages (see Pl. XL and succeeding). A closer examination of this compound operculum will, however, soon show, that the suggestion at first put forward by Dr. Hansen is quite correct. According to the opinion of this distinguished carcinologist, the male operculum is more properly composed of 2 pairs of successive appendages; the median piece representing the 1st pair of pleopoda, and accordingly answering to the female operculum, whereas the lateral pieces represent the copulative appendages peculiar only to the male. By such an explanation, indeed, more uniformity is obtained, as to the number of appendages of the metasome, which, in fact, is the very same in all *Asellota*, viz., 4 pairs in the female, and 5 pairs in the male, the additional pair constituting the copulative appendages. In any case, however, the structure of the 2 first pairs in the forms here treated of, is very anomalous, and the remaining pairs are also rather different in appearance from those in other *Asellota*, thus justifying the establishment of a distinct family. This family comprises as yet 4 genera, viz., *Asellus*, *Mancasellus*, *Cavidothea* and *Stenotrium*, all, except the last-named, containing exclusively fresh-water species. Of these 4 genera, only the first is represented in the fauna of Norway.

Gen. *Asellus*, G. St. Hillaire, 1764.

Generic Characters.—Body broad, depressed, with the lateral parts of the segments simple, not lacinate. Cephalon not very large, rounded, truncated in front, lateral faces convex. Caudal segment very broad, slightly produced at the tip. Eyes, when present, very small, consisting of a limited number of visual elements. Superior antennae scarcely longer than the peduncle of the inferior ones, the latter slender and elongated, without any outer appendage to the peduncle. Mandibles with a well developed palp, molar expansion thick, subcylindric in form. Second pair of maxillæ with the outer lamellæ broad, laminar, and edged with numerous curved and coarsely denticulated spines. Maxillipeds having in female at the base a posteriorly pointing setous lappet, epignath broad, edged with bristles. 1st pair of legs with the carpus very small, propodos much larger and broader in male than in female. The succeeding pairs rapidly increasing in length, and having the carpal joint well developed, propodal one linear, dactylus spinulose inside. Uropoda with the rami subequal, slender, styliform.

Remarks.—This genus was established as early as in the year 1764 by Geoffroy St. Hillaire, and may accordingly be regarded as the type of the family.

From the nearly-allied genus *Mancusellus* Harger it is prominently distinguished, among other things, by the presence of well-developed mandibular palps. Five species of this genus have been recorded, only one of which belongs to the fauna of Norway.

Asellus aquaticus (Lin.).

(Pl. XXXIX.)

Oniscus aquaticus, Linné, Fauna Sveciæ, ed. 2da, p. 500.

Syn: *Squilla asellus*, de Geer.

" *Cymothoa aquatica*, Fabr.

" *Asellus vulgaris*, Latr.

" *Idothea aquatica*, Latr.

Specific Characters.—Body oblong oval, in male slightly widening behind, in female with the greatest width about in the middle, and equalling half the length, not including the caudal segment. Cephalon broader than it is long, with a slight setous prominence on each side near the base, frontal edge straight. Segments of mesosome of nearly uniform size, lateral parts transversely truncated at the tip, and clothed with stiff hairs. Caudal segment about half the length of the mesosome, rounded quadrangular in form, and fringed all round with stiff hairs; terminal edge bisinuate, with an obtuse median prominence. Eyes consisting each of only 4 visual elements, ocular pigment not confluent. Superior antennæ about the length of the peduncle of the inferior ones, flagellum composed of 10—12 articulations. Inferior antennæ not quite as long as the body, flagellum more than twice the length of the peduncle. Legs densely clothed with spiniform bristles; 1st pair rather short, with the propodus in female oblong oval, in male subtriangular, inner edge forming an obtuse prominence, armed with 3 strong spines. Uropoda with the rami more than twice as long as the basal part, and edged with scattered spiniform bristles. Colour very dark, fuscous, spotted with white. Length of adult female 8 mm., of male 12 mm.

Remarks.—This form has been treated of in detail by the present author in one of his earlier works: "Crustacés d'eau douce de Norvège", to which the reader may be referred for detailed information on the more minute anatomy and the development.

Occurrence.—The species would seem to occur everywhere in Norway, especially in small ponds that have a muddy bottom, and are covered at the surface with *Lemna*. It is also occasionally met with in slow streams, and in larger lakes, but never at any considerable depth.

Distribution.—The European continent everywhere, Siberia, Algeria (the present author).

Fam. 2. Ianiridæ.

Characters.—General habitus that of the *Asellidæ*, but the lateral parts of the cephalon always lamellarly expanded. Eyes, when present, subdorsal. Superior antennæ sometimes well developed, with the flagellum multiarticulate, sometimes very small, with rudimentary flagellum. Inferior antennæ always longer than the superior, with the peduncle 6-articulate, and generally carrying a small accessory appendage (scale) outside the 3rd joint. Oral parts normal. Legs subequal in length, with the dactylus generally bi- or tri-unguiculate; 1st pair sometimes differing from the others in being prehensile. 1st pair of uropoda in female transformed into a single, large, opercular plate, in male constituting the median piece of the compound operculum, the lateral pieces of which are formed by the copulative appendages. The 3 succeeding pairs very delicate, the last pair forming simple smooth lamellæ, the 2 preceding ones with the outer ramus narrow and confluent with the basal part. Uropoda biramous, more or less developed.

Remarks.—The forms belonging to this family resemble the *Asellidæ* very much, as regards their external appearance, and have also hitherto been combined with them. Yet the very different structure of the pleopoda makes it, in my opinion, necessary to place them in a separate family. As additional distinguishing characters may be mentioned the laterally-expanded cephalon, the subdorsal situation of the eyes, the distinctly 6-articulate peduncle of the inferior antennæ, on which, in the greater number of the forms, a small outer appendage, apparently answering to the scale in higher Crustacea, may be distinguished; finally, the more uniform length of the legs, the dactylar joint of which moreover, as a rule, is bi- or tri-unguiculate. All the known forms are exclusively marine, and, as it were, replace the *Asellidæ* in the Oceans. Several genera have been established, amounting to 9 or 10 in all, 4 of which only are represented in the fauna of Norway.

Gen. 1. *Ianira*, Leach, 1813.

Syn: *Oniscoda*, Latr.
 " *Henopomus*, Krøyer.
 " *Asellodes*, Stimpson.

Generic Characters.—Body oblong, depressed, with the lateral parts of the segments but slightly produced. Cephalon large, transversely oval, obtuse in front, or with a comparatively small rostral projection. Caudal segment rounded.

not expanded laterally. Eyes distinct, subdorsal. Superior antennæ well developed, with the flagellum composed of numerous short articulations carrying long olfactory filaments. Inferior antennæ very much elongated, with a well-marked scale-like appendage outside the 3rd joint of the peduncle. Mandibles with the cutting part divided from the molar expansion by a deep incision, palp rather slender. Second pair of maxillæ with the outer lobes narrow, conic in form, and tipped by a limited number of simple setæ. Maxillipeds normal. Legs nearly equal in length, 1st pair of same structure in the 2 sexes, prehensile, the carpus being very large, subfusiform, and edged inside with spines, propodos narrow, linear, and very movably articulated to the former, so as to admit of being bent in against it, dactylar joint in all legs very small, 3-unguiculate. Uropoda largely developed, with the rami slightly unequal, and clothed with fascienlated bristles.

Remarks.—This genus was established as early as in the year 1813 by Leach. The genera *Oniscoda* of Latreille, and *Asellodes* of Stimpson, as also that of *Henoponius* Kröyer, are all undoubtedly identical with the Leachian genus, which, as the much older one, ought to be retained. It is the type of the family *Ianiridae*, and the genus which in external appearance exhibits most resemblance to the fresh-water genus *Asellus*. Five species have as yet been recorded, viz., *I. maculosa* Leach, *I. tricornis* Kröyer, *I. alta* Stimpson, *I. abyssorum* Beddard, and *I. Tristani* Beddard. Of these, only the first-named belongs to the fauna of Norway.

Ianira maculosa, Leach.

(Pl. XI.)

Syn: *Oniscoda maculosa*, M.-Edw.

" *Henoponius muticus*, Kröyer.

Specific Characters.—Body oblong oval in form, about 3 times as long as it is broad, and slightly narrowed both in front and behind. Cephalon with the lateral expansions evenly rounded, frontal edge straight, without a trace of rostrum. Anterior segments of mesosome with the lateral parts slightly produced at both corners, but not covering the small coxal plates, which are bi-lobulate. Caudal segment sub-circular, distal part of lateral edges coarsely serrated. Eyes well developed, rounded oval, with dark pigment. Superior antennæ reaching about to the end of the penultimate peduncular joint of the inferior ones, flagellum more than twice as long as the peduncle, and composed of about 30 articulations. Inferior antennæ considerably exceeding the length of the body, the last 2 peduncular joints rather elongated, subequal, flagellum about twice the length of the

peduncle. Epignath of the maxillipeds with the outer edge angular in the middle. 1st pair of legs with the carpus about the length of the 2 preceding joints combined, and armed inside with 18—20 spines; dactylar claws in all pairs nearly equal. Middle piece of male operculum not expanded at the end, which is quadrilobate. Uropoda exceeding in length the caudal segment, basal part rather elongated, though not quite as long as the inner ramus, outer ramus somewhat smaller than the inner, both being linear in form. Colour yellowish, densely mottled with reddish brown specks. Length of adult female 7 mm., of male 10 mm.

Remarks.—This is the first described species of the genus, and is easily recognizable from the other as yet known forms, by the form of the cephalon and the armature of the caudal segment. The *Henopomus muticus* of Krøyer is undoubtedly identical with the form here treated of.

Occurrence.—This species occurs along the whole Norwegian coast, from the Christiania Fjord to Vadsö, and is generally found in depths ranging from 30 to 100 fathoms, on a rocky bottom, overgrown with Hydroïda and Polyzoa. It is rather brittle, and therefore difficult to preserve in a perfect state. The long inferior antenna and the uropoda are especially liable to be broken or detached from the body, when the animal is put in alcohol.

Distribution.—British Isles (Sp. Bate), Kattegat (Meinert), Dutch coast (Hock), coast of France (Bonnier), Greenland (Hansen).

Gen. 2. *Ianthe*, Bovallius, 1881.

Generic Characters.—General form of body as in *Ianira*. Cephalon with a strong rostral projection, and having the lateral parts produced to very prominent, acute lappets. Segments of mesosome with the lateral parts lacinate, and produced so as wholly to cover the coxal plates. Caudal segment forming at the end, on each side, a triangular expansion. Antennæ about as in *Ianira*, except that the inferior ones are comparatively less elongated. Epignath of maxillipeds simple lanceolate, outer edge not angular. Oral parts otherwise, as also the legs and appendages of metasome, nearly as in *Ianira*.

Remarks.—This genus was established in the year 1881 by Dr. Bovallius, to include a supposed new species from Baffin's Bay, *I. speciosa*, which, however, in the opinion of Dr. Hansen, is not specifically distinguishable from *Ianira spinosa* of Harger. The genus agrees very closely in almost all anatomical details

with *Tanira*, and it is therefore somewhat questionable, whether it can in reality be maintained. As, however, there are at least 3 species, which closely agree in the distinguishing characters recorded by Dr. Bovallius for his genus, I am unwilling at present to reject it.

Ianthe laciniata, G. O. Sars.

(Pl. XLI.)

Tanira laciniata, G. O. Sars, Bidrag til Kundskaben om Dyrelivet paa vore Havbanker, Chr. Vid. Selsk. Forh 1872, p. 92.

Specific Characters.—Body much flattened, oval in form, being scarcely twice as long as it is broad. Cephalon provided with a long, spiniform, somewhat upturned rostrum, lateral parts each produced to a strong lanceolate lappet pointing obliquely anteriorly. Segments of mesosome with the lateral parts laminae expanded, and each produced into 2 lanceolate lappets separated by a deep incision, those of the 4 anterior segments subequal, those of the 3 posterior ones rather unequal, the anterior lappet being much the larger. Caudal segment much broader than it is long, gradually widening behind, and produced at the end, on each side, to an acute triangular expansion, median prominence blunted, all the lappets finely serrated at the edges, and, like the dorsal face, clothed with scattered hairs. Eyes comparatively small, rounded. Superior antennæ reaching somewhat beyond the penultimate peduncular joint of the inferior ones, flagellum about twice the length of the peduncle, and composed of 20—30 articulations. Inferior antennæ scarcely longer than the body, squamiform appendage of the peduncle distinctly developed, flagellum not quite twice as long as the peduncle. Legs almost exactly as in *Tanira muculosa*, except that one of the dactylar unguiculi is much smaller than the other 2, and somewhat remote from the tip of the dactylus. Middle piece of male operculum very slightly expanded at the end, which is irregularly serrulated, with a small hamiform projection on each side. Uropoda fully as long as the caudal segment, and densely clothed with spiniform bristles, inner ramus scarcely as long as the basal part, outer ramus a little shorter, both being narrow linear in form. Colour pale yellowish white, semipellucid, without any pigmentary ornament. Length of adult male 8 mm.

Remarks.—This form was first recorded by the present author in 1872 as *Tanira laciniata*. It is nearly allied to the North American species, *I. spinosa* Harger, but differs in the greater development of the lateral laciniae, as also in the shape of the caudal segment.

Occurrence.—I first met with this pretty form outside the Storeggen bank, where 2 specimens were brought up in the dredge from the considerable depth

of 400 fathoms. Subsequently I have found it occasionally off the coasts of Nordland and Finnmark, in depths ranging from 100 to 150 fathoms. Out of Norway it has not yet been recorded.

Gen. 3. *Ianiropsis*, G. O. Sars, n.

Generic Characters.—General habitus that of *Ianira*. Lateral parts of the segments but slightly expanded, not lacinate. Eyes well developed. Superior antennæ comparatively small, with the flagellum only composed of a limited number of articulations. Inferior antennæ of moderate length, being much more strongly built in male than in female; squamiform appendage in both sexes very small, but distinctly defined. Maxillipeds with the 2nd and 3rd joints of the palp very much expanded, laminar. Legs comparatively short and thick, with the dactylus bi-unguiculate; 1st pair in female not differing at all from the others, in male, on the other hand, remarkably developed, prehensile, much longer than any of the other pairs, with the carpal joint fusiformly dilated. Middle piece of male operculum remarkably dilated at the tip. Uropoda of same structure as in *Ianira*, but much shorter.

Remarks.—This new genus is founded upon the form recorded by the present author as *Ianira breviremis*. A closer examination of this form, and more especially of the male, has revealed some characteristic features, which make it advisable to separate it generically from *Ianira*, and such a separation was also opined by Dr. Bovallius to be necessary. It is especially the structure of the 1st pair of legs which is characteristic. In the female, this pair, unlike what is the case in *Ianira*, do not differ in any manner from the others legs, being, like these, ambulatory. On the other hand, this pair assumes in the male a quite extraordinary development, being pronouncedly prehensile, and much larger than any of the other legs. Moreover, the structure of the superior antennæ and the maxillipeds is slightly different, as also the middle piece of the male operculum. The genus contains as yet but a single species, to be described below.

Ianiropsis breviremis, G. O. Sars.

(Pl. XLII.)

Ianira breviremis, G. O. Sars, Oversigt af Norges Crustaceer I, p. 64, Pl. 2, fig. 4.

Specific Characters. Body oblong oval in form, fully twice as long as it is broad, and very slightly narrowed both in front and behind. Cephalon rather

large, subquadrangular, lateral parts but slightly expanded, frontal edge transversely truncated. Segments of mesosome with the lateral parts bluntly truncated. Caudal segment circular in outline, lateral edges serrated, tip bluntly produced. Eyes rather large, rounded oval. Superior antennæ scarcely reaching beyond the middle of the penultimate peduncular joint of the inferior ones, flagellum but little longer than the peduncle, and composed in female of 8, in male of 12 articulations. Inferior antennæ in female not nearly attaining the length of the body, in male considerably larger, equalling the body in length. 1st pair of legs in female a little shorter than the next succeeding, but of the very same structure; those of male more than twice as large, almost attaining the length of the whole body, carpal joint oblong fusiform and, like the other joints, densely clothed with short spiniform bristles. Middle piece of male operculum produced at the end, on each side, to a lanceolate lappet minutely bifid at the tip. Uropoda much shorter than the caudal segment, and clothed with scattered fascicles of spiniform bristles, inner ramus somewhat longer than the basal part, outer, considerably smaller. Body yellowish, mottled everywhere with reddish brown specks. Length of adult female 4 mm., of male 6 mm.

Remarks.—As above stated, this is as yet the only known species of the genus, and may easily be recognized from *Ianira maculosa*, to which it bears some resemblance in colour and external appearance, by the comparatively much shorter antennæ and uropoda.

Occurrence.—I have only met with this form off the west coast of Norway, in the neighbourhood of Bergen. In one locality, at Bratholmen, it occurred in considerable numbers on the roots and stems of Laminariæ overgrown by Hydroïda and Polyzoa.

Distribution.—Bohuslän (Bovallius).

Gen. 4. *Iaera*, Leach, 1813.

Syn: *Iacridina*, M.-Edw.

Generic Characters.—Body, as a rule, broad and much depressed, with the lateral parts of all the segments laminarily expanded and fringed with bristles. Cephalon broad, without any true rostrum, but with the lateral parts considerably produced. Caudal segment with a more or less deep apical emargination, within which the uropoda are contained. Eyes distinct, dorsal. Superior antennæ extremely small, with the flagellum rudimentary. Inferior antennæ of moderate

length, without any distinctly defined squamiform appendage. Oral parts nearly as in *Iovira*. Legs comparatively short and of uniform structure, the 1st pair not being prehensile in either sex, dactylar joint 3-unguiculate. Middle piece of male operculum considerably expanded at the end. Uropoda extremely small, biramous, rami very short, nodiform. Male smaller than female.

Remarks.—This genus, established by Leach in the year 1813, is chiefly distinguished by the short and flat body, the very small superior antennae and uropoda, and the uniform structure of the legs. It comprises as yet about 7 species, only one of which belongs to the fauna of Norway.

Iovira marina (Fabr.).

(Pl. XLIII.)

Oniscus marinus, O. Fabricius, Fauna Grönlandica, p. 252.

- Syn: *Iovira albifrons*, Leach.
 " — *Krøyeri*, Zaddach.
 " — *ballica*, Fr. Müller.
 " — *copiosa*, Stimpson.
 " — *nivalis*, Krøyer.

Specific Characters.—Body oval in form, scarcely more than twice as long as it is broad, in male somewhat shorter and stouter than in female, and slightly widening behind, lateral edges of the segments in both sexes fringed with rather short and simple hair-like bristles. Cephalon more than twice as broad as it is long, lateral expansions obliquely truncated, frontal edge slightly bisinuate, obtusely produced in the middle. Caudal segment semicircular in shape, comparatively larger and broader in male than in female, apical notch not very deep. Eyes of moderate size, rounded oval in form. Superior antennae reaching but little beyond the antepenultimate peduncular joint of the inferior ones, flagellum very small, bi-articulate. Inferior antennae about the length of the body, not including the caudal segment, outer appendage of the peduncle replaced by a simple spine, flagellum fully twice as long as the peduncle. Legs but slightly increasing in length posteriorly, one of the 3 dactylar claws rather small, and somewhat removed from the tip, the other 2 strongly curved. Female operculum semicircular; middle piece of male operculum forming at the end, on each side, a rather large expansion terminating in a hook-like, anteriorly-curving point. Uropoda projecting somewhat beyond the apical notch of the caudal segment, both rami well defined, though very small, and tipped by a fascicle of bristles, the inner one about half the length of the basal part, the outer considerably smaller. Body more or less thickly dotted with dark brown, sometimes uniformly blackish or variegated with large whitish patches. Length of adult female 4 mm., of male 3 mm.

Remarks.—By most authors, this form has been recorded under the specific name *albifrons*, proposed by Leach; but as there cannot be any doubt that the *Oniscus marinus* of O. Fabricius is this species, the latter specific name, as the older one, ought to be preferred to that of Leach. Four more synonyms are quoted above. The *Icera Nordmanni* Rathke, of which I have had specimens for examination from the Caspian Sea, is a very nearly-allied species, but is distinguished pretty well by the dense and regular garniture of spiniform bristles, and by the still more poorly developed uropoda, the rami of which look merely like small sciferous noduli. It seems to me somewhat doubtful whether the form figured by Sp. Bate and Westwood under this name, is the true Rathkian species, or perhaps more properly the male of *I. marina*.

Occurrence.—This species occurs along the whole coast of Norway, from the Christiania Fjord to Vadsø, in quite shallow depths. At low water, it is often found in great numbers beneath stones on the beach, and sometimes at a considerable height above the level of the sea, together with *Ligia oceanica* and other terrestrial Isopoda. Its flat body makes it admirably well adapted to cling to the stones of the beach, and to conceal itself in their crevices.

Distribution.—British Isles (Sp. Bate), Kattegat (Meinert), Dutch coast (Höck), coast of France (Bonnier), Greenland (Hansen), Atlantic coast of North America (Harger).

Fam. 3. Munnidæ.

Characters.—Body generally short and stout, with the 3 posterior segments of mesosome, as a rule, sharply marked off from the 4 anterior, and much smaller. Caudal segment more or less vaulted above, sub-pyriform. Eyes, when present, placed on the tips of lateral, peduncle-like projections of the head. Superior antennæ placed widely apart, and more or less developed, with the flagellum generally multiarticulate. Inferior antennæ issuing immediately beneath the superior, and without any outer appendage. Oral parts normal. 1st pair of legs much shorter than the others, prehensile; the succeeding pairs more or less rapidly increasing in length, simple, ambulatory. Uropoda generally small, somewhat removed from the tip of the caudal segment, being sometimes subdorsal. Male much smaller than female.

Remarks.—The type of this family is the peculiar genus *Munna* of Kröyer, with which several other genera may be conveniently associated, to form a rather well-defined group of *Asellota*. From the *Ianiridae*, these Isopods may be easily distinguished by the comparatively short and stout body, which, unlike the body in that family, is conspicuously narrowed behind, with the 3 posterior segments of the mesosome much smaller than the 4 anterior ones, and the caudal segment ob-pyriform in shape. Besides the 4 Norwegian genera treated of below, the following genera may with certainty be referred to this family: *Leptaspidia* Bate & Westw., *Neasellus* Beddard, *Astrurus* Beddard, *Munnella* Bonnier, and *Haliacris* Pfeffer. The last-named genus, however, is, scarcely different, generically, from *Munna*.

Gen. 1. *Munna*, Bocck, 1839.

? Syn: *Haliacris*, Pfeffer.

Generic Characters.—Body sub-pyriform in shape, with the dorsal face somewhat vaulted, and the last 3 segments of mesosome very small, with the lateral parts curving more or less posteriorly. Cephalon very broad, with the frontal margin obtusely produced. Caudal segment narrow, ob-pyriform, and very sharply defined from the mesosome. Eyes distinct, placed on the tips of greatly produced lateral projections of the head. Superior antennæ comparatively small; inferior antennæ, on the other hand, very much elongated, with the peduncle 5-articulate, the 2 outer joints long and slender. Mandibles with the cutting part divided from the cylindrical molar expansion by a deep incision, palp well developed. 1st pair of legs in female comparatively small, imperfectly subcheliform, in male more strongly developed, and sometimes of quite an extraordinary size. The remaining legs rapidly increasing in length, with the carpal and propodal joints much elongated and edged with spines, dactylar joint small, bi-unguiculate. Middle piece of male operculum rather narrow, sublinear, truncated at the tip. Uropoda very small, simple.

Remarks.—This genus was established by Kröyer in the year 1839, to include a peculiar Isopod found by him off the Norwegian coast. Subsequently several additional species were detected by different authors, and the relation of this genus to other Isopoda was more fully recognized. The external appearance is rather peculiar, the apparently stalked eyes especially being very striking. In ovigerous females, moreover, owing to the greatly projecting incubatory pouch, the fore-part of

the body appears less depressed than in most other Isopods, and, as the very much elongated legs in alcoholic specimens are generally stretched downwards, the body, unlike that of other Isopods, presents itself to the observer, as a rule, in a lateral position. We know of 9 or 10 species of the genus, 5 of which belong to the fauna of Norway, and will be described below.

1. *Munna Boeckii*, Kröyer.

(Pl. XLIV.)

Munna Boeckii, Kröyer, Nat. Tidsskr. Bd. II, p. 612, Pl. VI, figs. 1—9.

Specific Characters.—Body of female very short and thick, with the anterior division, seen from above, almost circular in outline; last segment of mesosome very small. Caudal segment about half the length of the anterior division of the body, ob-pyriform, lateral edges somewhat bulging in their anterior part, and each armed with 4 short denticles, tip obtusely produced, and exhibiting ventrally, on each side of the anal orifice, a coarsely serrated lamella. Eyes rather large, semiglobose. Superior antennae scarcely reaching to the middle of the penultimate peduncular joint of the inferior ones, flagellum composed of 6 articulations, the apical one being extremely small. Inferior antennae moderately strong, about twice the length of the body, flagellum somewhat longer than the peduncle. Legs rather strongly built, and rapidly increasing in length posteriorly; 1st pair with the carpus gradually widening distally, and armed inside with a double row of slender spines, propodos oval in form. Last pair of legs exceeding the body in length, carpal joint about the length of the 3 preceding joints combined, and rather strong, widening distally, propodal joint long and slender, linear. Uropoda very small, with the tip transversely truncated. Colour yellowish, very slightly clouded with darker shadows. Length of adult female 4 mm.

Remarks.—This is the species first recorded, and ought accordingly to be regarded as the type of the genus. It may be easily recognized from the other species by the very broad, nearly circular fore-part of the body, the form and armature of the caudal segment, the comparatively large eyes, and the long, but rather strongly built legs.

Occurrence. I have met with this form occasionally in a few localities on the west coast of Norway, in depths ranging from 20 to 50 fathoms, on a rocky bottom, overgrown with Hydroids and Polyzoa. Kröyer observed the species at Tromsø.

Distribution.—Kattegat (Meinert).

2. *Munna limicola*, G. O. Sars.

(Pl. XLV, fig. 1.)

Munna limicola, G. O. Sars, Beretning om en i Sommeren 1865 foretagen zoologisk Reise ved Kysterne af Christianias og Christiansands Stifter, p. 29.

Specific Characters.—Body of female somewhat less robust than in the type species, with the anterior division oval in form. Ocular processes very much projecting. Caudal segment rather large, nearly equalling the mesosome in length, and oval pyriform in shape, lateral edges evenly curved, and without any denticles, but clothed with scattered bristles, tip without any serrated lamellæ. Eyes comparatively smaller than in *M. Boeckii*, and narrowly rounded. Superior antennæ reaching to the middle of the penultimate peduncular joint of the inferior ones, flagellum 5-articulate, last articulation, as usual, extremely small. Inferior antennæ twice the length of the body, flagellum much shorter than the peduncle. Legs greatly increasing in length posteriorly, and far less strongly built than in *M. Boeckii*; 1st pair with the carpus but slightly widening distally, and nearly as long as the propodos; last pair considerably exceeding the body in length, and having the carpal joint rather narrow, propodal joint extremely slender, being almost twice as long as the former. Uropoda nearly as in the type species. Colour uniformly pale yellowish grey. Length of adult female 3 mm.

Remarks.—Though rather nearly allied to *M. Boeckii*, this species may, on a closer examination, be easily distinguished by its less robust body, the smaller eyes, the form of the caudal segment, and the absence on it of lateral denticles and apical serrated lamellæ, and finally, by the extremely slender and elongated legs.

Occurrence.—This species occurs not infrequently both off the south and west coasts of Norway, from the Christiania Fjord, at least to the Lofoten Islands. It is only found in greater depths, ranging from 60 to 300 fathoms, on muddy bottom. Out of Norway, it has not yet been recorded.

3. *Munna Fabricii*, Krøyer.

(Pl. XLV, fig. 2.)

Munna Fabricii, Krøyer, Nat. Tidsskr. Bd. 11, p. 380.

Specific Characters.—Body rather short and compact, with the anterior division rounded oval in outline. Ocular processes rather thick, and less prominent than in *M. limicola*. Caudal segment oblong oval, but slightly narrowed behind, lateral edges evenly convex, and each armed in front with a single slender denticle; apical lamellæ distinctly serrated. Eyes rather large, semi-globosc. Superior antennæ scarcely reaching to the middle of the penultimate peduncular joint

of the inferior ones, flagellum composed of only 4 joints, including the very small apical one. Inferior antennæ rather slender, with the flagellum longer than the peduncle. Legs comparatively slender, though less rapidly increasing in length posteriorly than in the 2 preceding species; 1st pair, as usual, much the shortest, with the carpus somewhat shorter than the propodus, and armed inside with 3 spines; last pair scarcely longer than the body, carpal joint somewhat dilated distally. Uropoda obliquely truncated at the tip, and setous at each corner. Colour dark brown, from numerous pigmentary spots forming irregular shadows. Length of adult female scarcely reaching to 3 mm.

Remarks.—This species was established by Krøyer from Greenland specimens; but its true specific characters were not fully recognized. For the figures given by the same author in the great work of Gaimard, evidently belong to two distinct species, confounded by him at that time. From the 2 preceding species, it may be distinguished by the comparatively more slender inferior antennæ, the less elongated legs, and the form and armature of the caudal segment. It is also rather inferior in size, and always exhibits a very dark colour.

Occurrence.—The species is rather common off the Lofoten Islands and along the whole Finmark coast, in moderate depths, among Hydroïda. It also occurs occasionally off the west coast of Norway, but nowhere in any abundance.

Distribution.—Greenland (Krøyer), Atlantic coast of North America (Harger), Iceland and Spitsbergen (Norw. North Atl. Exped.).

4. *Munna Krøyeri*, Goodsir.

(Pl. XLVI, fig. 1.)

Munna Krøyeri, Goodsir, Edinb. New Phil. Journ. Vol. XXXIII, p. 365, Pl. 6, fig. 6.

Syn: *Munna Whiteana*, Sp. Bate & Westw. ♀.

“ — *Fabricii*, Krøyer (part).

Specific Characters.—Body of female somewhat robust, with the anterior division oval in form, and the segments very sharply marked off from each other, and clothed laterally with scattered hairs. Body in male, as usual, much narrower. Ocular processes conically tapered. Caudal segment comparatively short, scarcely more than half as long as the mesosome, and rounded oval in form, lateral edges rather bulging in front, and each armed with 4 strong denticles, the posterior pair subdorsal, tip bluntly produced, and without any serrated lamellæ. Eyes comparatively small, at least in female. Superior antennæ very short, extending not nearly to the middle of the penultimate peduncular joint of the inferior ones, flagellum composed of only 3 articulations, including the very small apical joint.

Inferior antennæ, as compared with those in the other known species, of inconsiderable length, scarcely as long as the body, flagellum not attaining the length of the peduncle. 1st pair of legs in female of the usual structure, in male considerably stronger, with the carpus considerably expanded, and produced at the end inside to an acute thumb-like projection, the inner edge of the joint densely setiferous. Ambulatory legs in both sexes shorter and stouter than usual, last pair scarcely exceeding in length the anterior division of the body. Uropoda produced at the tip into several dentiform projections, one of which assumes a hook-like appearance. Colour pale yellowish, slightly mottled with light brown. Length of adult female about 3 mm.

Remarks.—This form was first described by Goodsir from male specimens. The female was subsequently recorded by Sp. Bate and Westwood as a new species under the name of *M. Whiteana*. Krøyer confounded the species with his *M. Fabricii*, a fact which may easily be proved on examining the several figures he gives in the work of Gaimard. Indeed, the greater number of these figures evidently belongs to the present species, and not to *M. Fabricii*. The present form may be easily distinguished from any of the preceding species by the comparatively short and stout inferior antennæ and legs, as also by the peculiar structure of the uropoda. The caudal segment, moreover, differs both in shape and armature from that in the said species.

Occurrence.—I have found this form occasionally off the south and west coasts of Norway, in comparatively shallow water.

Distribution.—British Isles (Goodsir, Sp. Bate), Kattegat (Krøyer)?.

5. *Munna palmata*, Lilljeborg.

(Pl. XLVI, fig. 2.)

Munna palmata, Lilljeborg, Öfvers. Vetensk. Akad. Förhandl. 1851, p. 23.

Specific Characters.—♂. Body rather robust, with the anterior division oblong oval in form, and but slightly dilated in the middle. Caudal segment comparatively large, exceeding half the length of the anterior division of the body, lateral edges bulging in front, and each armed with 4 strong denticles, tip obtusely rounded, and without any serrated plates. Eyes comparatively large, semi-globose, placed on very prominent processes. Superior antennæ rather small, flagellum 4-articulate. Inferior antennæ considerably exceeding the body in length, and unusually strongly built, the last 2 joints of the peduncle being rather thick and somewhat dilated at the end, flagellum narrowing very abruptly, and scarcely longer than the last peduncular joint. 1st pair of legs exceedingly strong with the carpus of quite an extraordinary size, oval in form and very tumid, being produced at

the end inside to 2 strong denticles, inner edge only very slightly setiferous, propodos about half as long as the carpus, and much narrower, being constricted at the base, and projecting at the end inside, to a rounded lobe. Ambulatory legs likewise rather strong, and resembling in structure those in *M. Krøyeri*. Uropoda, like those in the said species, terminating in an incurved, hook-like point. Colour very dark, nearly black. Length scarcely exceeding 2 mm.

Remarks.—This form, first recorded by Prof. Lilljeborg, is nearly allied to *M. Krøyeri*, and indeed, I at first believed it to be the male of that species. Having, however, subsequently had an opportunity of examining the male of *M. Krøyeri*, I find it to differ in several points from the male here treated of, and I have therefore thought it right to retain Prof. Lilljeborg's species, though as yet only known in one of the sexes.

Occurrence.—I have only seen a single specimen of this form, which was taken off the coast of Jæderen from a depth of about 20 fathoms. Prof. Lilljeborg found it at Christiansund. Out of Norway, it has not yet been recorded.

Gen. 2. *Paramunna*, G. O. Sars, 1866.

Generic Characters.—Body short and stout, depressed, less narrowed behind than usual. Cephalon rather large, and produced in front into 2 broad, diverging lobes, laterally to well-marked ocular processes. Caudal segment comparatively short and broad. Eyes distinct, placed, as in *Munna*, on the tips of pedunciform lateral projections of the head. Antennæ comparatively small, the inferior ones longer than the superior, with the peduncle 6-articulate and doubly geniculate, outer appendage absent. Mandibles normally developed, with the molar expansion subcylindric, and the palp distinctly 3-articulate, but rather small. 1st pair of legs short and stout, subcheliform, the others slender, ambulatory, and but slightly increasing in length posteriorly, dactylus simple. Middle piece of male operculum unusually large and expanded at the end. Uropoda extremely small, biramous, somewhat removed from the tip of the caudal segment.

Remarks.—This genus was established by the present author in the year 1866, to include a very small Isopod, which showed some points of agreement with *Munna*, though not sufficient to admit of its being combined with that genus. It seems also to be rather nearly allied to the genus *Leptaspidia* of Sp. Bate & Westwood, though differing very prominently in the presence of well-developed, pedunculated eyes, and in the uropoda being biramous, not simple. We know, as yet, of only a single species, to be described below.

Paramunna bilobata, G. O. Sars.

(Pl. XLVII, fig. 1.)

Paramunna bilobata, G. O. Sars, Beretning om en i Sommeren 1865 foretagen zool. Reise ved Kysterne af Christianias og Christiansands Stifter, p. 31.

Specific Characters.—Body oval in form, scarcely twice as long as it is broad, with the segments very sharply marked off from each other. Cephalon rather broad, deeply incised anteriorly in the middle, and forming on each side of the incision an obtusely truncated lobe finely denticulated at the tip; ocular processes conical and greatly projecting. Lateral parts of the 4 anterior segments of mesosome truncated at the tip; those of the 3 posterior acuminate and projecting laterally. Caudal segment about half as long as the mesosome, rounded cordiform, lateral edges rather bulging in front, and each armed with a regular row of about 12 strong serrations increasing in size posteriorly, outer part of the segment obtusely conic and smooth. Eyes well developed, and placed on the tips of the ocular processes. Superior antennæ projecting laterally between the cephalic lobes and the ocular processes, and equaling in length about half the breadth of the head, the first 2 joints of the peduncle rather large, subequal, 3rd joint extremely small, flagellum nearly as long as the peduncle, and composed of 3 articulations, the last carrying a single long apical filament. Inferior antennæ extending beyond the superior, and nearly twice as long, flagellum much shorter than the peduncle, and 7-articulate. 1st pair of legs very strongly built, with the joints considerably expanded, carpus rather broad, and armed inside with 3 strong spines, propodes about the size of the carpus, and oval in form, dactylus strong, with a secondary tooth inside. Uropoda issuing just behind the serrated part of the lateral edges of the caudal segment, rami very unequal, the outer one being extremely small. Colour bright red. Length of adult female scarcely exceeding 1 mm.

Remarks.—This dwarfed Isopod may be easily recognized from the other *Munnida* by its rather regular oblong oval body, the peculiar form of the cephalon, and the shape and armature of the caudal segment. The distinct, pedunculated eyes distinguish it at once from the species of the nearly-allied genera, *Leptaspidia*, *Neasellus* and *Pleurogonium*.

Occurrence.—I have met with this form occasionally in several places of the Norwegian coast, from the Christiania Fjord up to the Lofoten Islands. It generally occurs in moderate depths ranging from 20 to 40 fathoms, among Algae and Hydroïdæ, more rarely in greater depths amounting to 100 fathoms. Owing to its small size, it may easily be overlooked, or taken for some Copepods of the *Scutellian* group. Out of Norway it has not yet been recorded.

Gen. 3. *Pleurogonium*, G. O. Sars.Syn: *Pleuracantha*, G. O. Sars (olim).

Generic Characters.—Body short, depressed, with the 4 anterior segments of mesosome more or less strongly dilated, the 3 posterior ones much smaller, and having the lateral parts obliquely recurved. Cephalon comparatively small, deeply sunk within the 1st segment of mesosome, and without any frontal lobes or ocular processes. Caudal segment narrowly cordate or pyriform, constricted at the base, tip more or less produced. Eyes wholly absent. Antennae differing but little in size, and of a structure similar to that in *Paramunna*. Mandibles without palps, cutting part narrowly produced, molar expansion slender, lappet-shaped. 1st pair of legs short and strong, subcheliform; the others slender, increasing in length posteriorly. Female operculum lanceolate, male, of a similar structure to that in *Paramunna*. Uropoda very small, biramons, placed somewhat dorsally, and at a considerable distance from the tip of the caudal segment.

Remarks.—This genus was established by the present author in the year 1863; but the name *Pleuracantha*, proposed at that time, having been already appropriated, he changed it subsequently to *Pleurogonium*. The genus is nearly allied to *Paramunna*, but differs very markedly in the shape of the cephalon and caudal segment, as also in the absolute want of eyes and of mandibular palps. In addition to the 3 Norwegian species described below, Mr. Beddard has recorded 3 other species from the Challenger Expedition as *P. allidum*, *seriatum* and *minutum*.

1. *Pleurogonium rubicundum*, G. O. Sars.

(Pl. XLV11, fig. 2.)

Pleuracantha rubicunda, G. O. Sars, Om en anomal Gruppe af Isopoder (Chr. Vid. Selsk. Forh. 1863), p. 16.

Specific Characters.—Anterior division of body in female nearly circular in outline, the breadth almost equalling the length. Cephalon sub-pentagonal in form, with the front obtusely produced, and the sides obtusangular. Lateral parts of the 4 anterior segments of mesosome subangular, and each carrying in the middle a very conspicuous rod-like spine, all the spines pointing in different directions, so as to exhibit a radiating arrangement. The 3 posterior segments of mesosome very small, with the lateral parts extended obliquely behind, and each terminating in a knob-like projection. Caudal segment rather narrow, considerably constricted at the base, side-edges evenly curved, and fringed with short

hairs in their outer part, tip obtusely pointed. Superior antennæ exceeding in length the breadth of the cephalon, 1st joint of the peduncle rather elongated, flagellum scarcely longer than that joint, and composed of 3 articulations. Inferior antennæ but little longer than the superior, and of the structure characteristic of the genus; flagellum 7-articulate. 1st pair of legs with the carpus strongly dilated distally, being considerably broader than it is long, and armed inside with 2 strong spines, anteriorly with 2 smaller ones; propodos oblong oval, exceeding the carpus in size; dactylus strong, with 2 small denticles inside. Ambulatory legs about of same structure as in *Parananna bilobata*. Middle piece of male operculum likewise rather similar, though comparatively smaller. Uropoda with the outer ramus extremely small. Colour bright red. Length of adult female $1\frac{1}{3}$ mm.

Remarks.—This is the species first recorded, and it may accordingly be regarded as the type of the genus. It is easily recognized from the other 2 Norwegian species by the peculiar rod-like spines radiating from the sides of the fore-part of the body.

Occurrence.—The species occurs along the whole Norwegian coast, from the Christiania Fjord to Vadsö, and is often found in considerable numbers on a muddy bottom, in depths ranging from 6 to 30 fathoms. It is a rather sluggish animal, creeping slowly along the bottom, and is often so thickly covered with muddy particles as only with great difficulty to be discerned. Out of Norway, it has not yet been recorded.

2. *Pleurogonium inerme*, G. O. Sars.

(Pl. XLVIII, fig. 1.)

Pleurogonium inerme, G. O. Sars, *Oversigt af Norges Crustaceer* 1, p. 67, Pl. 2, fig. 5.

1832

Specific Characters.—Very like the preceding species, but without a trace of the rod-like lateral spines characteristic of that form, the lateral parts of the segments being only obtusely angular. Cephalon somewhat less produced in front, and almost twice as broad as it is long. Caudal segment comparatively larger and broader than in the type species, obovate in form, tip pointed. The several appendages of the body nearly exactly as in *P. rubicundum*. Colour pale greyish, with a very faint reddish tinge. Length of adult female about 2 mm.

Remarks.—The present form is so very like the preceding one, that at first I only regarded it as an accidental variety. Having, however, subsequently found it in several places, and of pretty constant appearance, I am now of the opinion that it represents a distinct, though very closely allied species. It is

best recognized by the absolute want of lateral spines, and the pale colour of the body.

Occurrence.—Though nowhere in any abundance, I have met with this form in several places on the west coast of Norway, and always in rather considerable depths, ranging from 60 to 150 fathoms.

Distribution.—British Isles (Robertson), Kattegat (Meinert).

3. *Pleurogonium spinosissimum*, G. O. Sars.

(Pl. XLVIII, fig. 2.)

Leuvarcantha spinosissima, G. O. Sars, Beretning om en i Sommeren 1865 foretagen zool. Reise ved Kysterne af Christianias og Christiansands Stifter, p. 30.

Specific Characters.—Body oblong oval in form, slightly tapering posteriorly. Cephalon blunted in front, and slightly emarginated on each side at the insertion of the superior antennae. Lateral parts of the 4 anterior segments of mesosome irregularly angular, and each projecting into 2 diverging serrated processes, the anterior of which more properly represents the produced coxal plate of the corresponding segment. The 3 posterior segments of mesosome, as usual, much smaller than the anterior, and each having laterally a single strong, serrated spine, likewise representing the produced coxal plate. Caudal segment rather large, obovate, lateral edges considerably bulging in the middle and densely hairy in their outer part, tip acutely produced. The several appendages of the body resembling in structure those in the 2 preceding species, excepting that the female operculum is comparatively much broader and very acutely produced at the tip. Colour bright red. Length of adult female 3 mm.

Remarks.—This is a very distinct species, easily recognizable from the other known forms by the coarse armature of the body, which, indeed, has given rise to the specific name. It is also of considerably larger size.

Occurrence.—I have found this pretty species occasionally in several localities of the Norwegian coast, from the Christiania Fjord to Vardö, in depths ranging from 50 to 100 fathoms.

Distribution.—British Isles (Robertson), Kattegat (Meinert).

Gen. 4. **Dendrotion**, G. O. Sars, 1871.

Generic Characters.—Body resembling somewhat in shape that in *Pleurogonium*, being much depressed, with the anterior part of the mesosome rather broad, and flanked by strong spines, the posterior abruptly narrowed, with linguiform produced lateral parts. Cephalon comparatively small, and produced on each side to a remarkable ear-like projection carrying the antennæ. Caudal segment very narrow, lanceolate. Eyes absent. Antennæ long and slender, especially the inferior ones, the peduncle of which is 5-articulate. Mandibles normal, with well-developed palp and molar expansion. Legs extremely slender, and rapidly increasing in length posteriorly; 1st pair rather feeble in structure, though distinctly subcheliform. Uropoda issuing from the dorsal face of the caudal segment, rather elongated, biramous, outer ramus very small, inner long and narrow.

Remarks.—The present genus is founded upon a very peculiar deep-water Isopod, which, though in some points differing rather markedly from the other *Munnida*, yet undoubtedly is referable to that family. The most striking feature is the insertion of the antennæ to ear-like processes of the head, which character indeed has given rise to the generic name. Another very anomalous character, which was not fully recognized at first, is the great development and peculiar origin of the uropoda, in which respect this genus differs very materially from all other known *Munnida*.

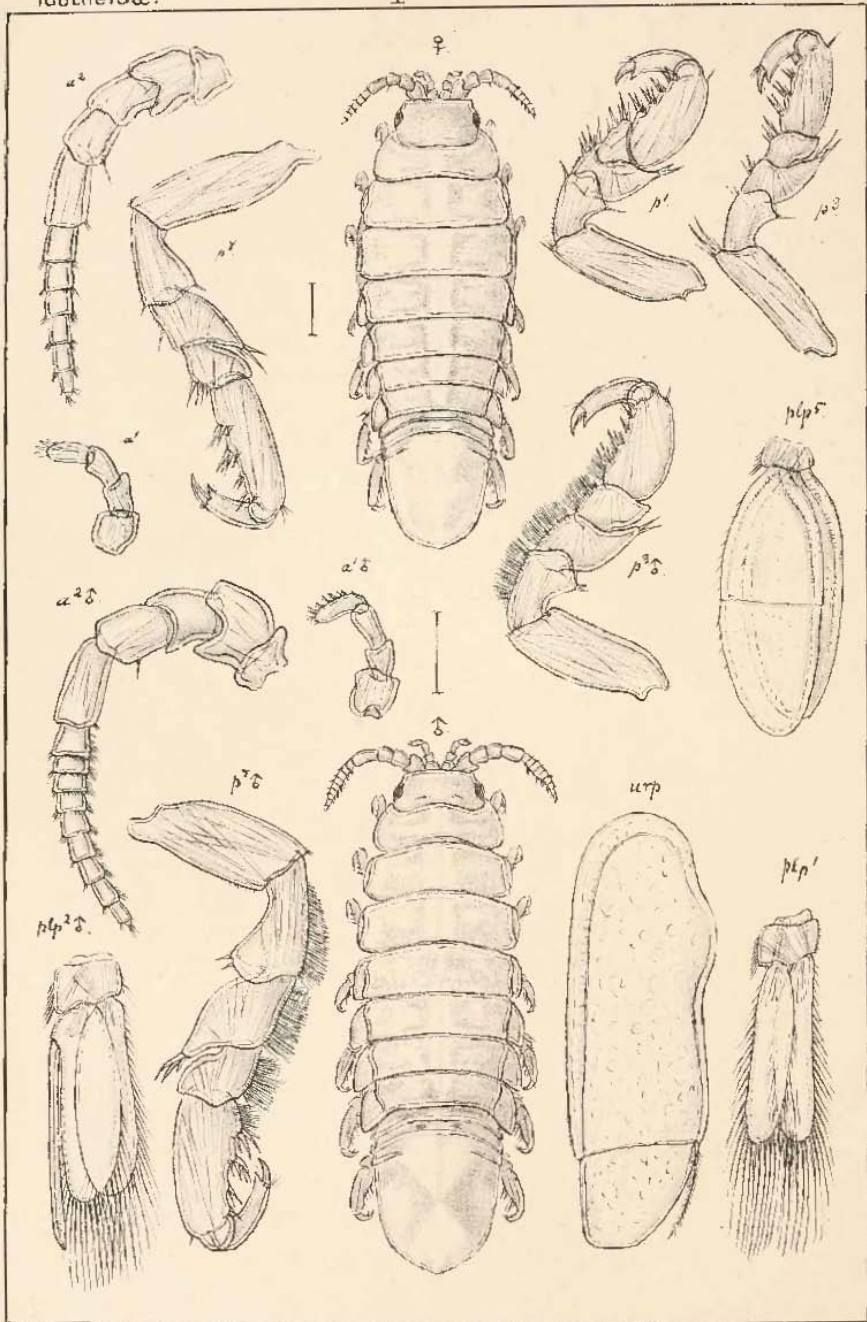
Dendrotion¹⁾ **spinosum**, G. O. Sars.

(Pl. XLIX.)

Dendrotion spinosum, G. O. Sars, Undersøgelser over Hardangerfjordens Fauna. I. Crustacea, pag. 30.

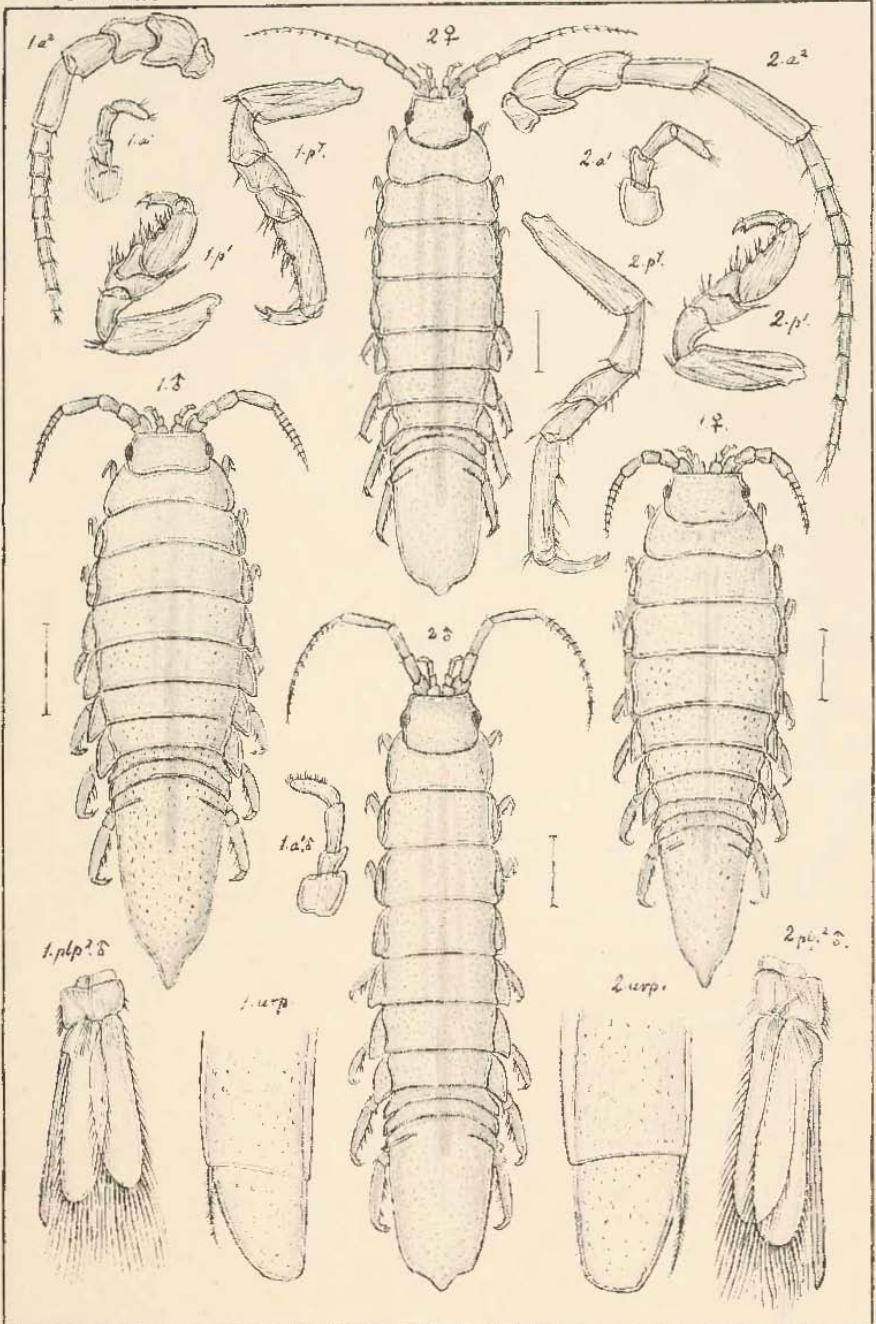
Specific Characters.—Body oblong fusiform in outline, more than twice as long as it is broad, with the segments very sharply marked off from each other. Cephalon comparatively small, sub-quadrangular, slightly widening distally, frontal edge evenly concave, antennal processes obliquely diverging and truncated at the tip. Anterior division of mesosome ob-ovate, gradually widening posteriorly, lateral parts of the segments angular, and each produced into a strong and very acute spine, pointing straight outwards and clothed at the base with scattered hairs. Posterior division of mesosome abruptly narrowed, with the lateral parts of the segments linguiformly produced, and decreasing in size posteriorly, each terminating in a sharp spiniform point, hairy at the base. Caudal segment

¹⁾ By a mistake, the generic name, in the plate, is spelt *Pleurotation* instead of *Dendrotion*.



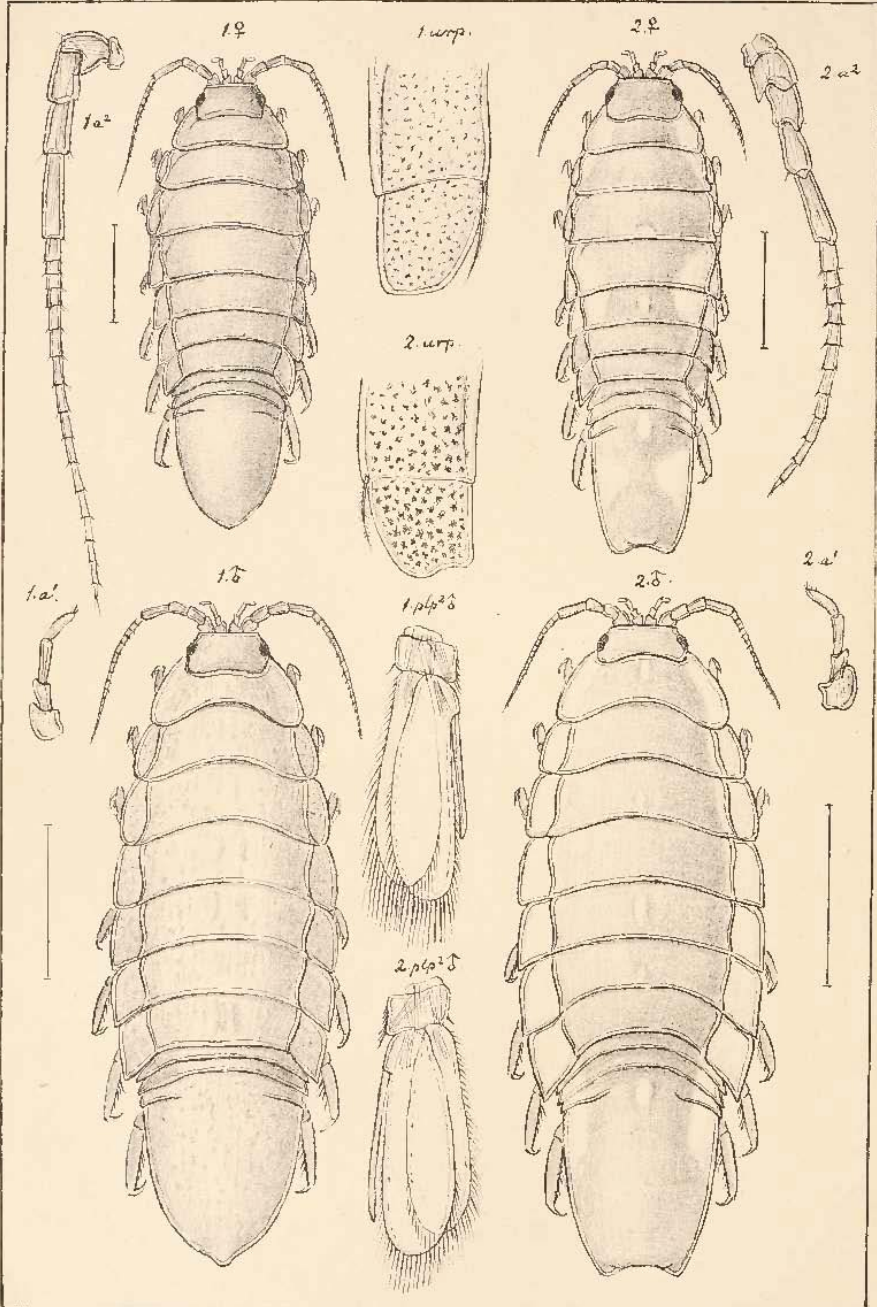
G.O. Sars, autogr.

Isothea pelagica, Leach.



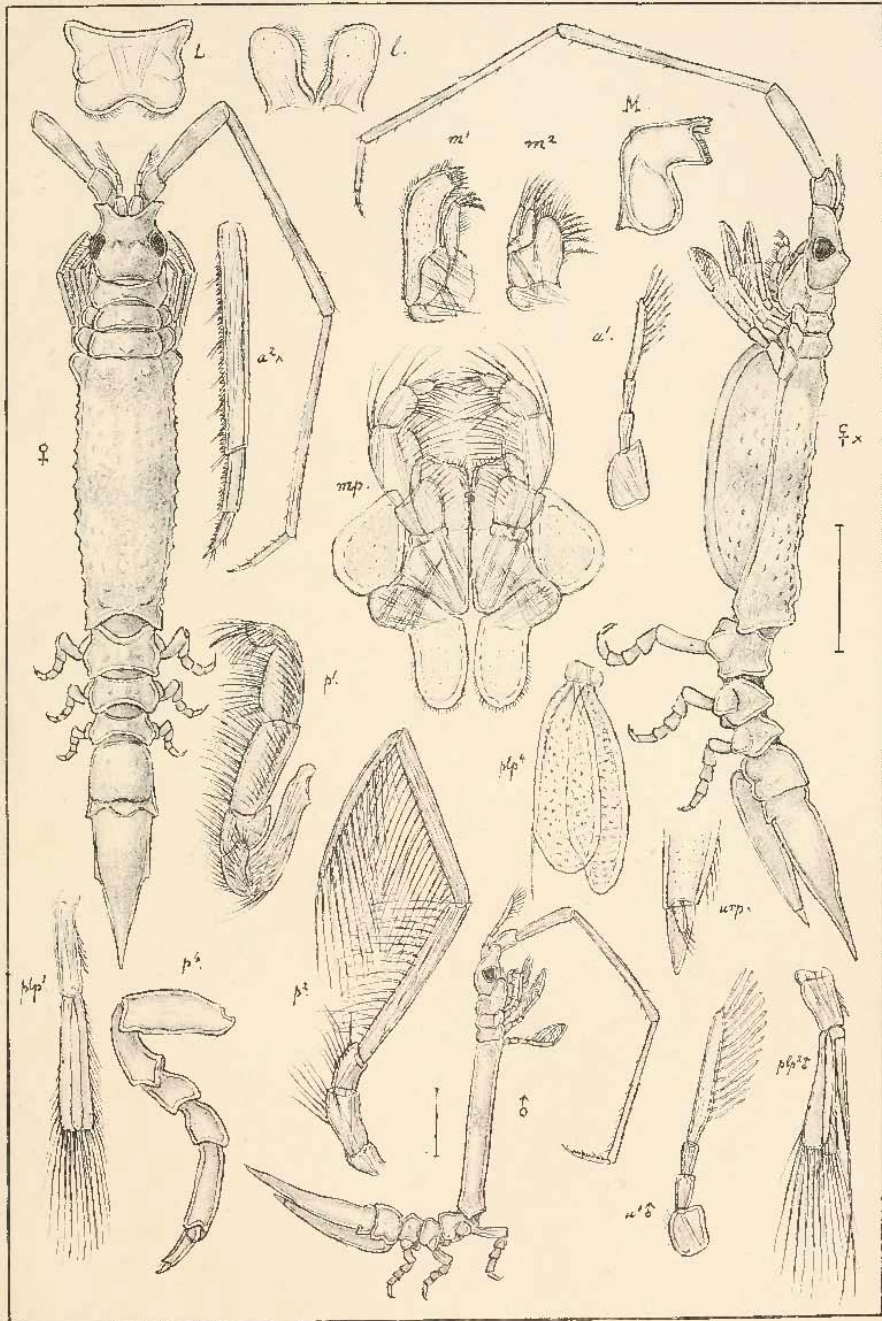
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1. *Idothea granulosa*, Rathke
 2. " *angusta*, n. sp.



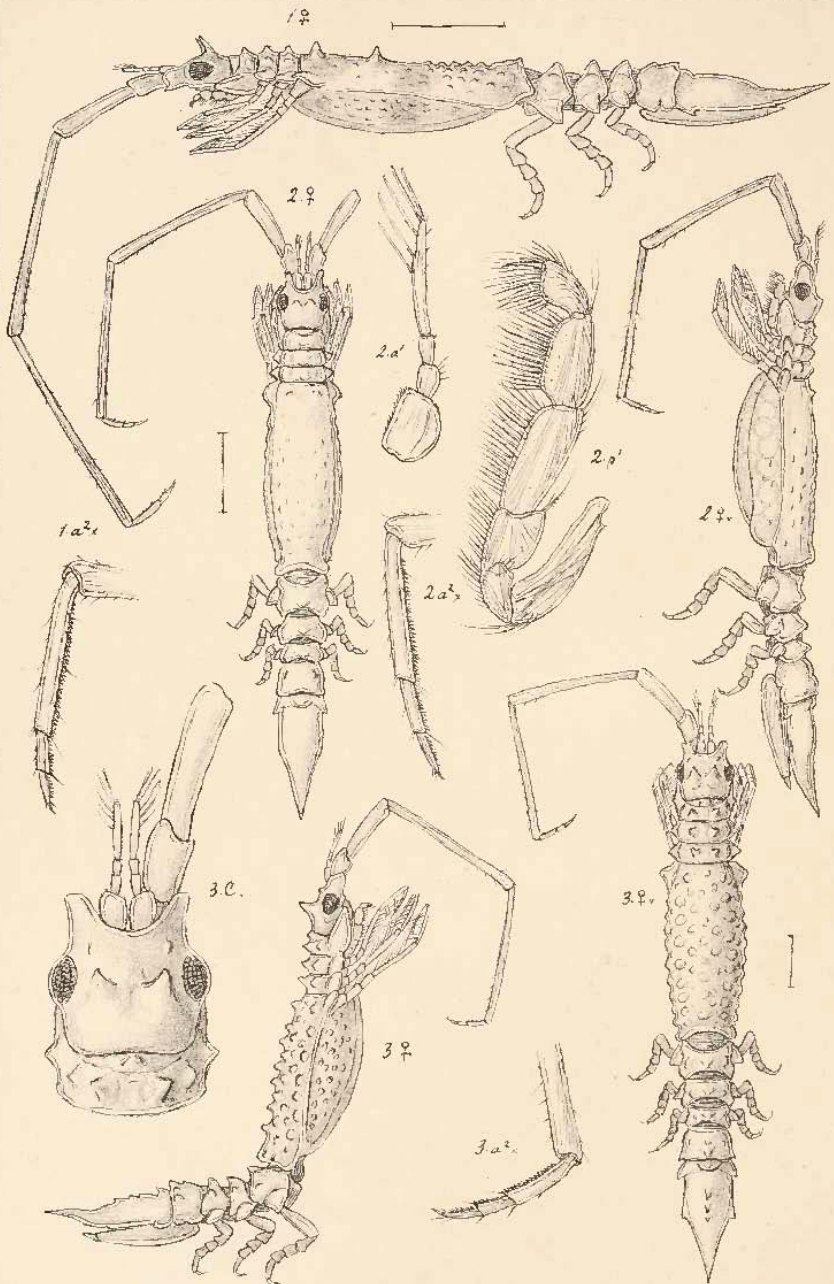
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1. *Idothea neglecta*, n. sp.
 2. " *emarginata*, Leach.



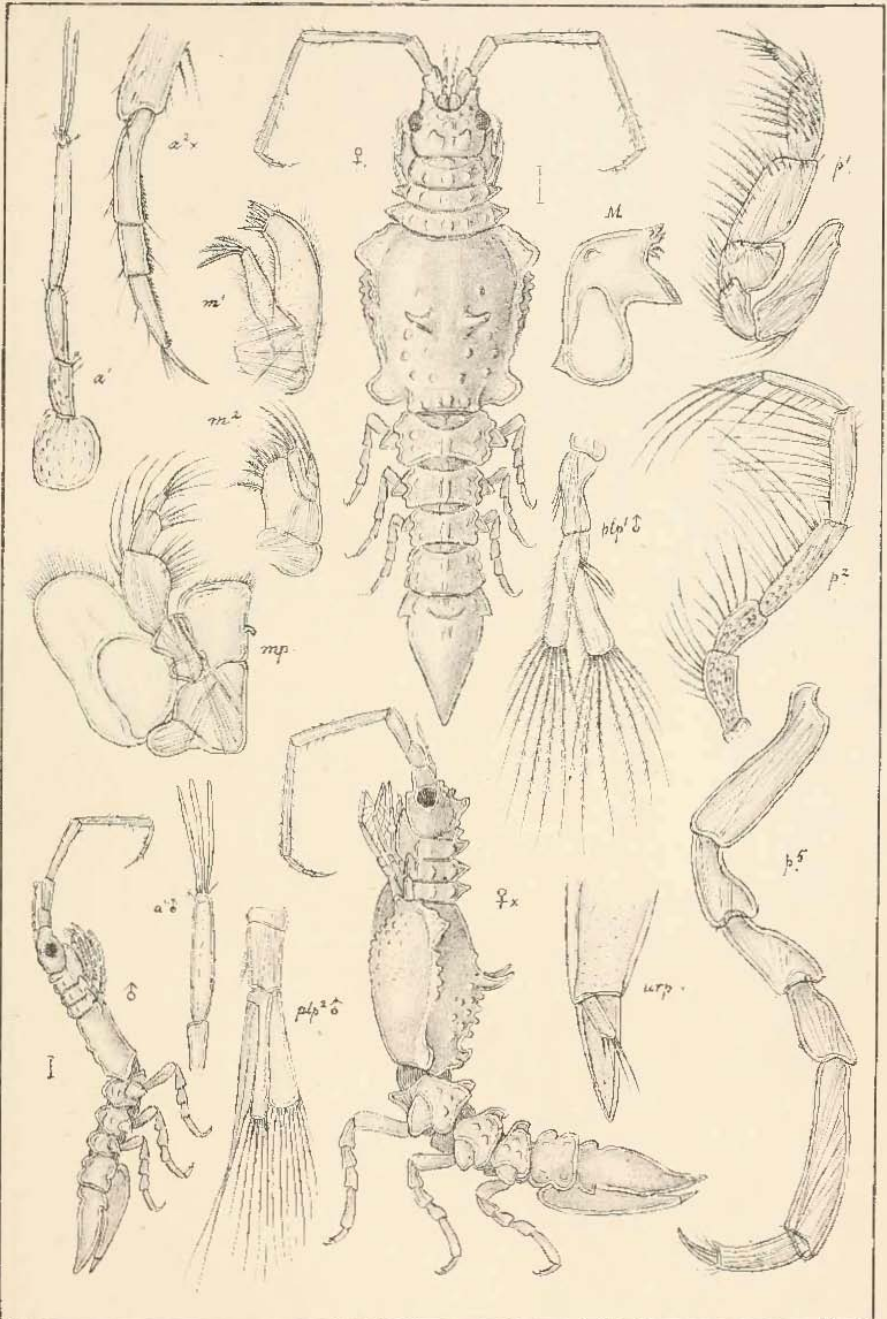
G.O. Sars, autogr

Astacilla longicornis, (Sowb.).



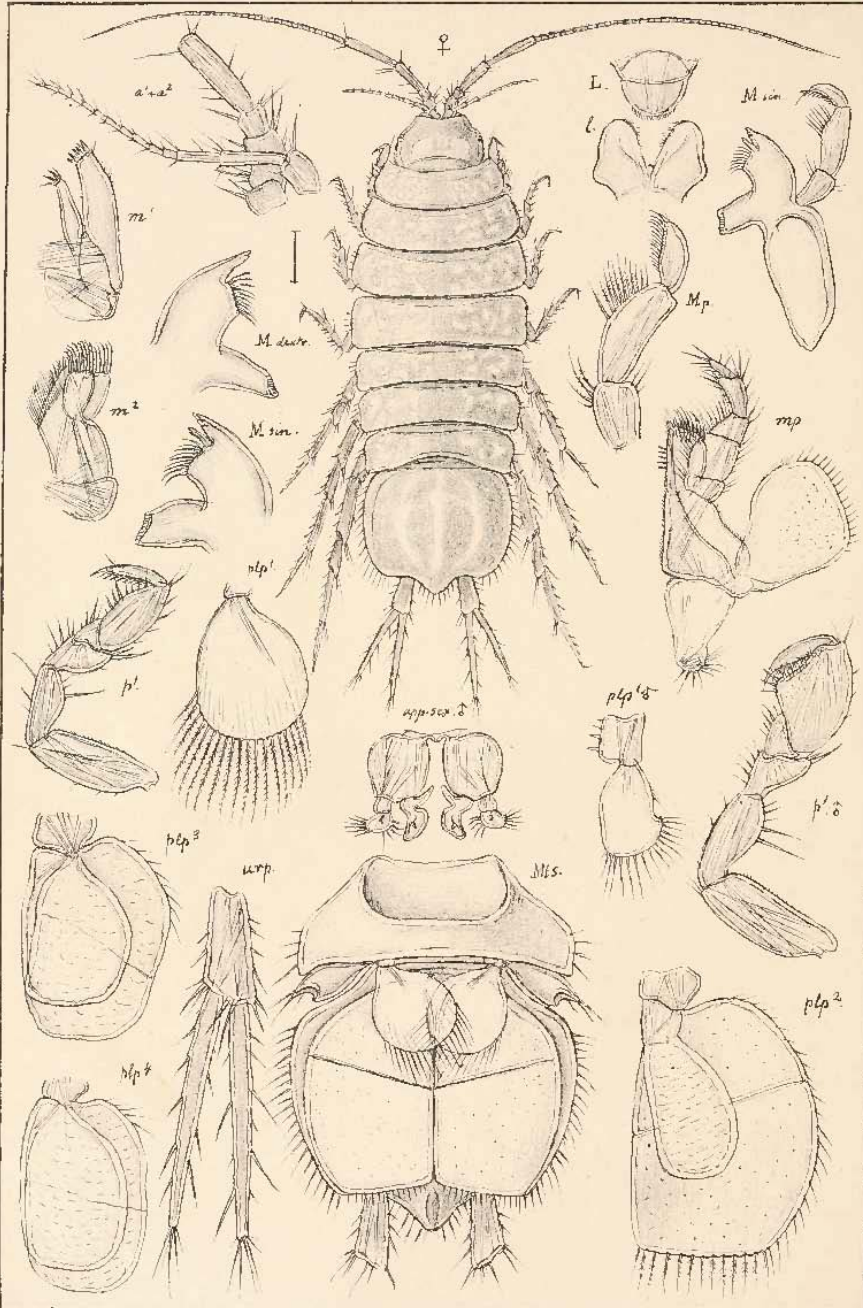
G.O. Sars, autogr.

- 1. *Astacilla arietina* G.O. Sars.
- 2. " *affinis*, G.O. Sars.
- 3. " *pusilla*, G.O. Sars.



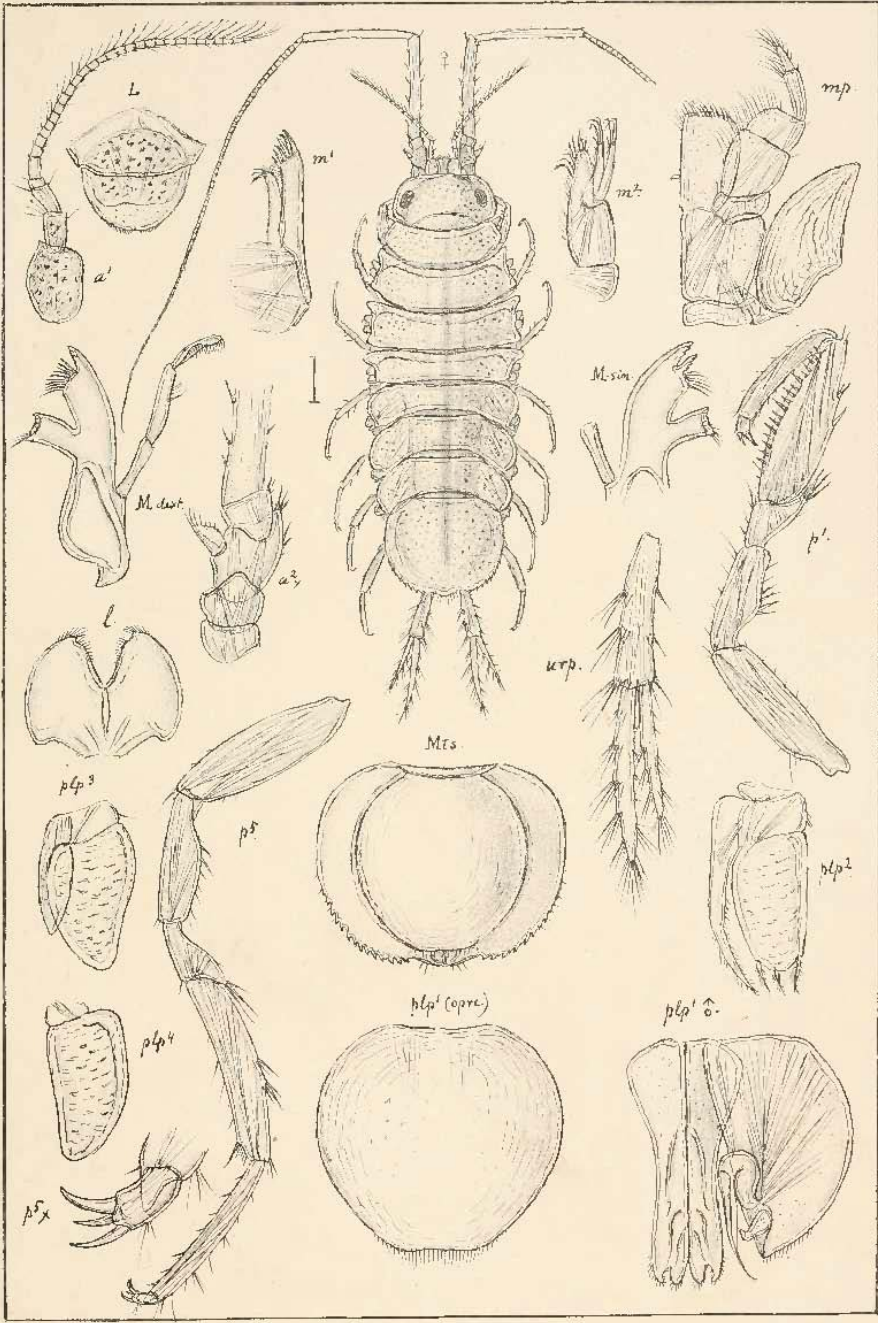
G.O. Sars, autogr.

Arcturella dilatata, G.O. Sars.



G.O. Sars, autogr.

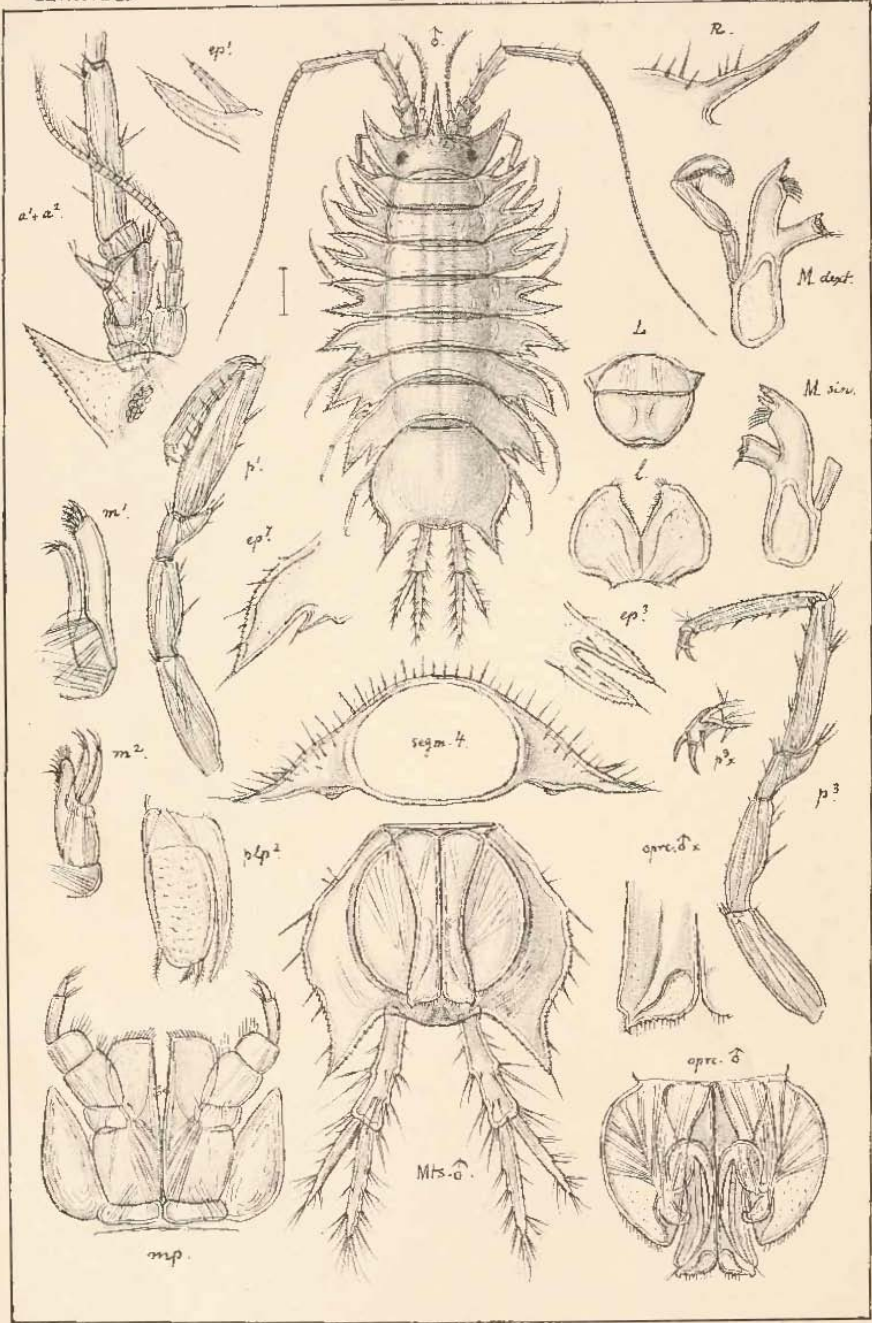
Asellus aquaticus, Lin.

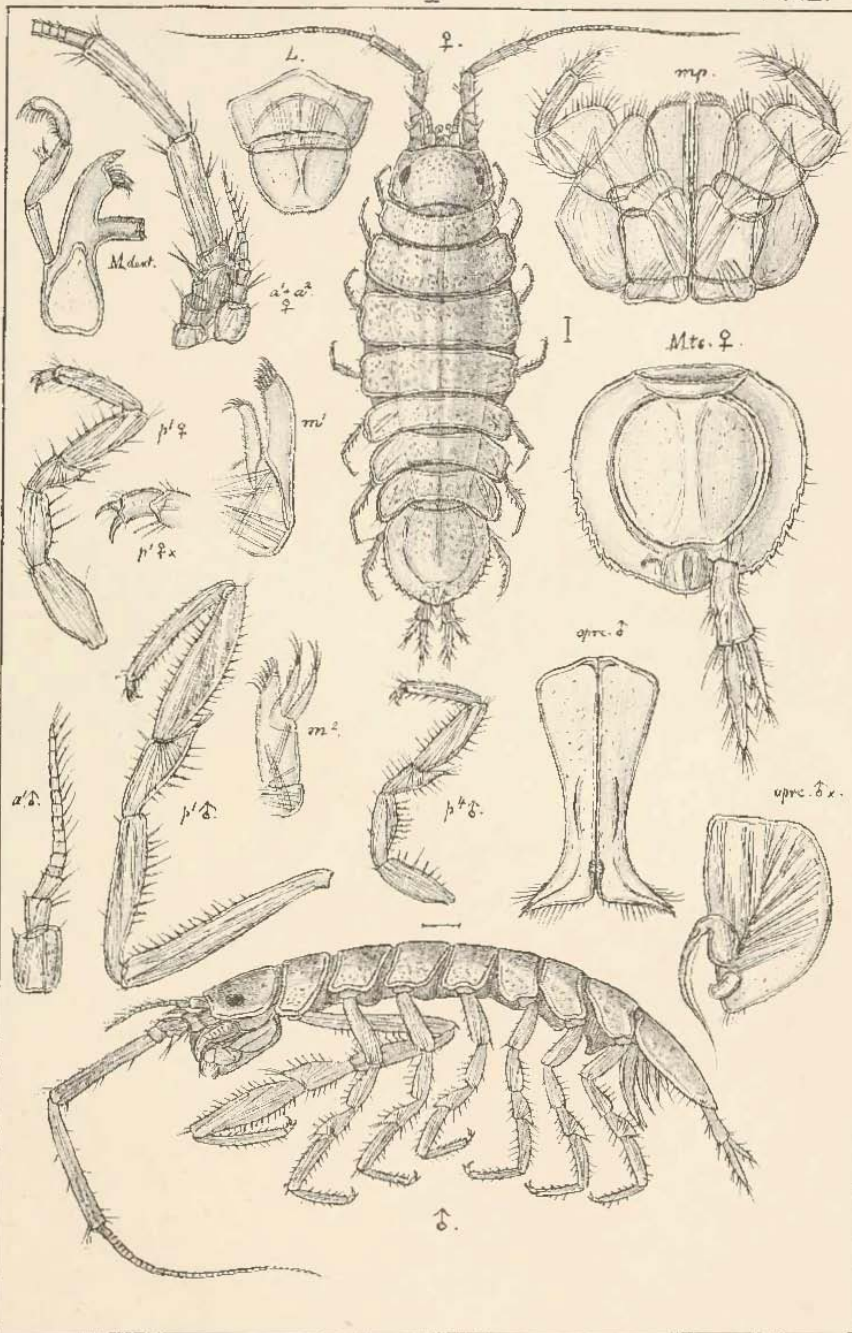


G.O. Sars, autogr.

Ianira maculosa, Leach.

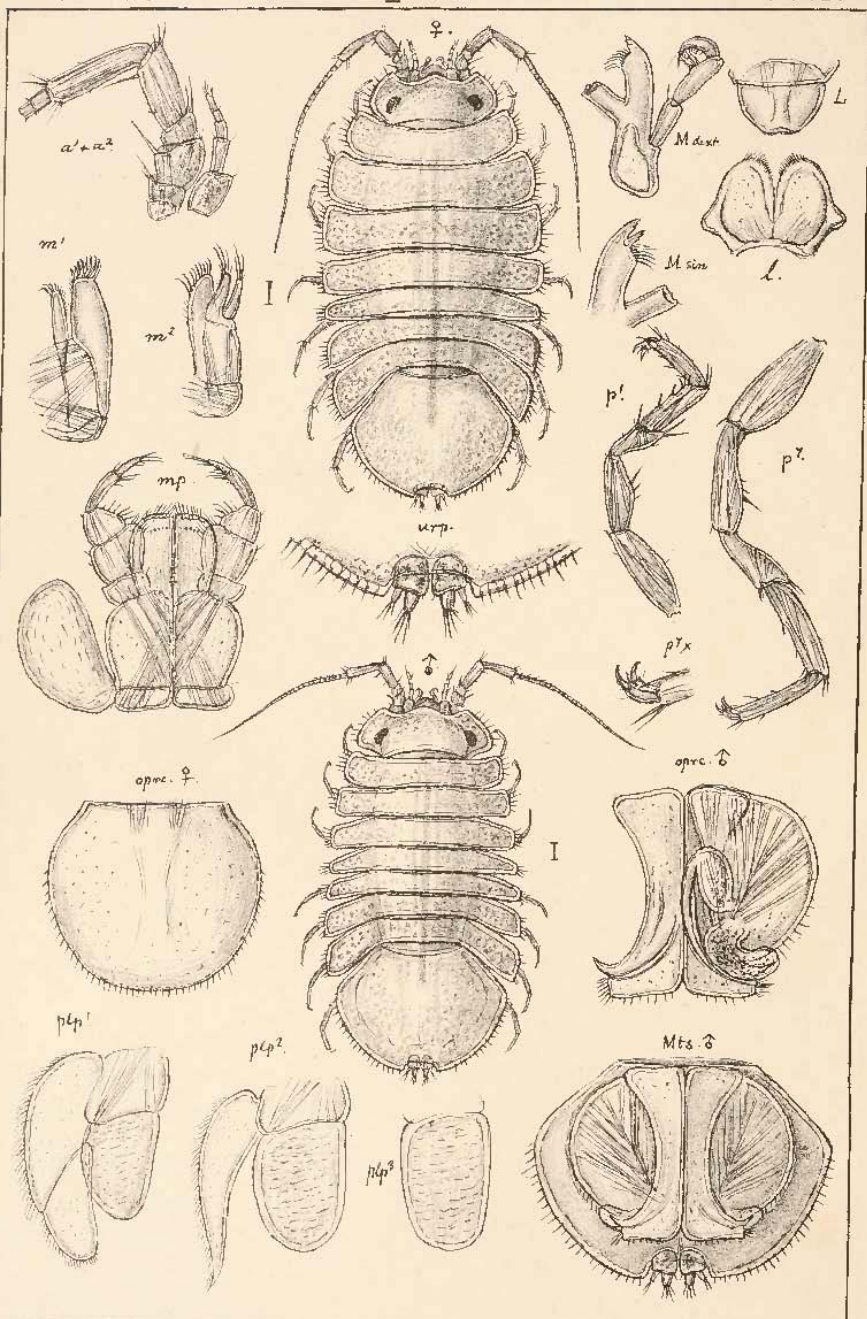






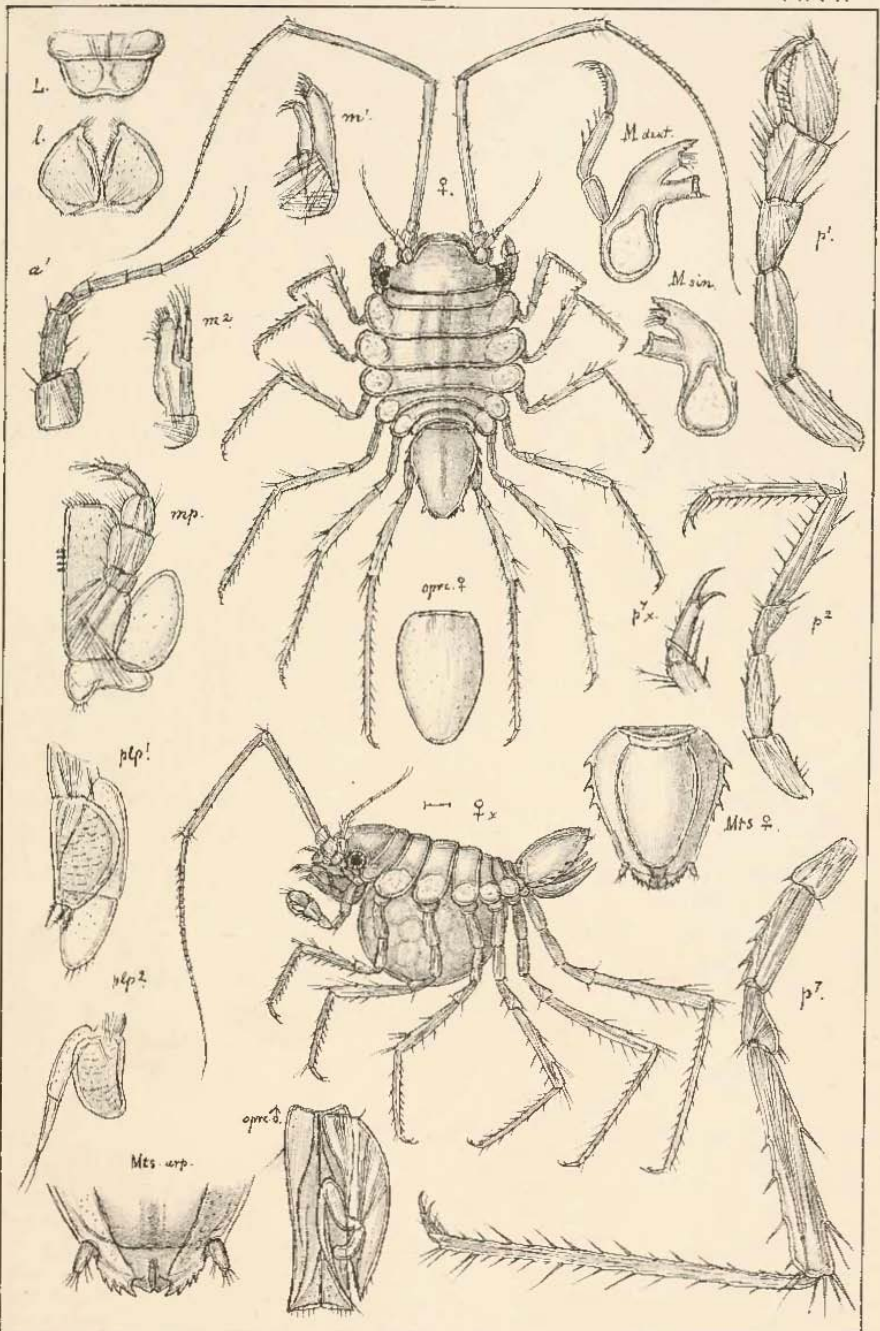
G.O. Sars, autogr.

Ianiropsis breviremis, G.O. Sars.



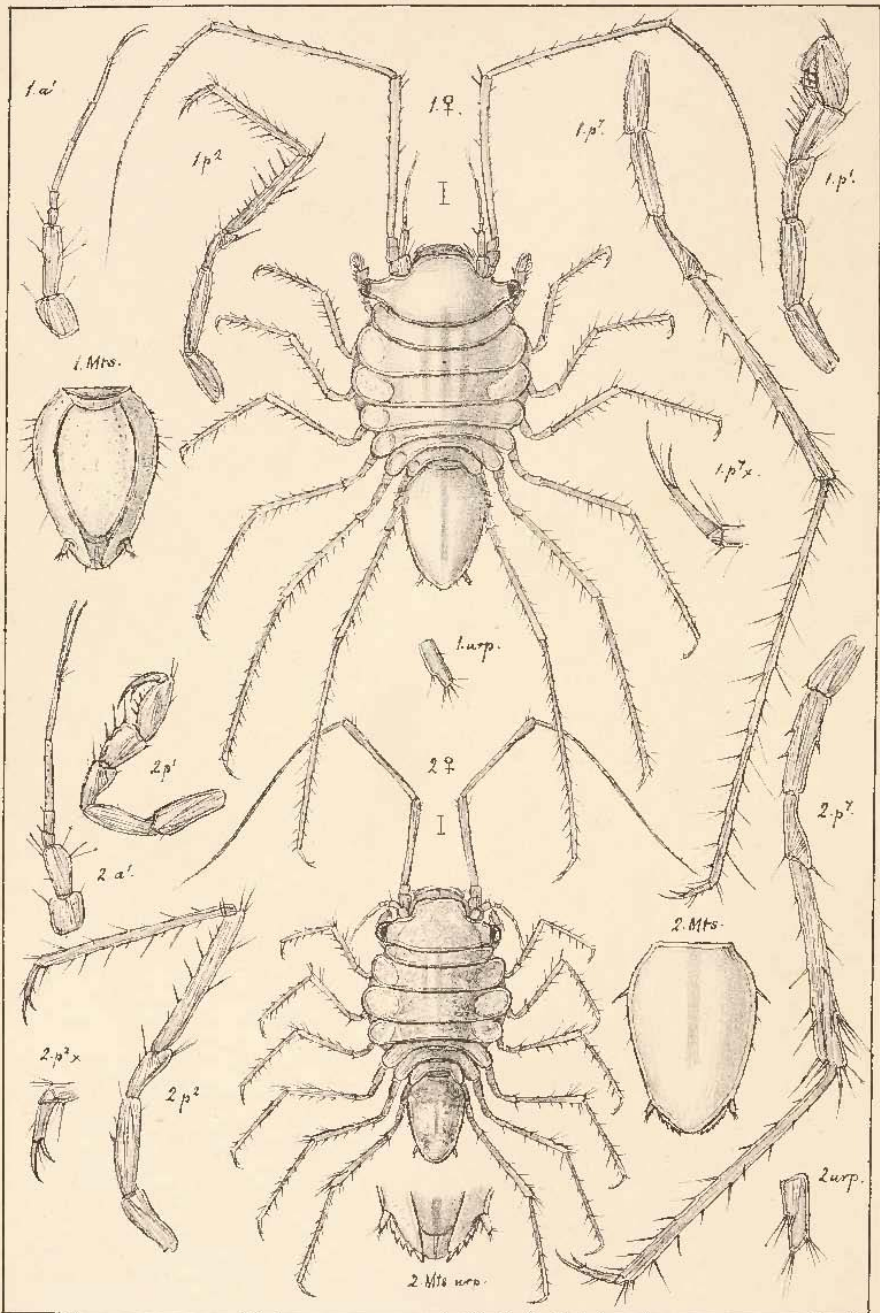
G. O. Sars, autogr.

Ianira marina (Lin.)



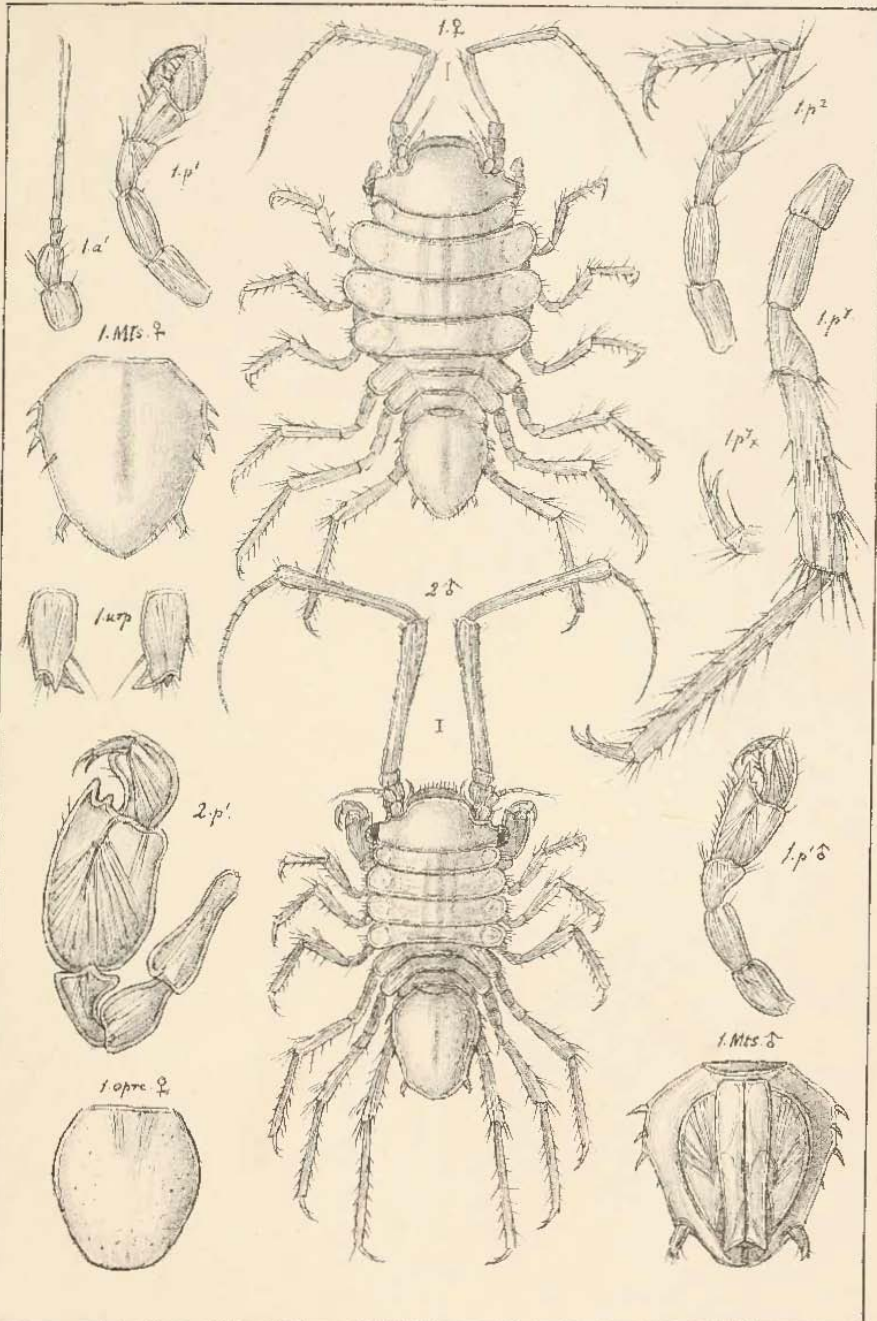
G.O. Sars, autogr.

Munnia Boeckii, Kröyer.



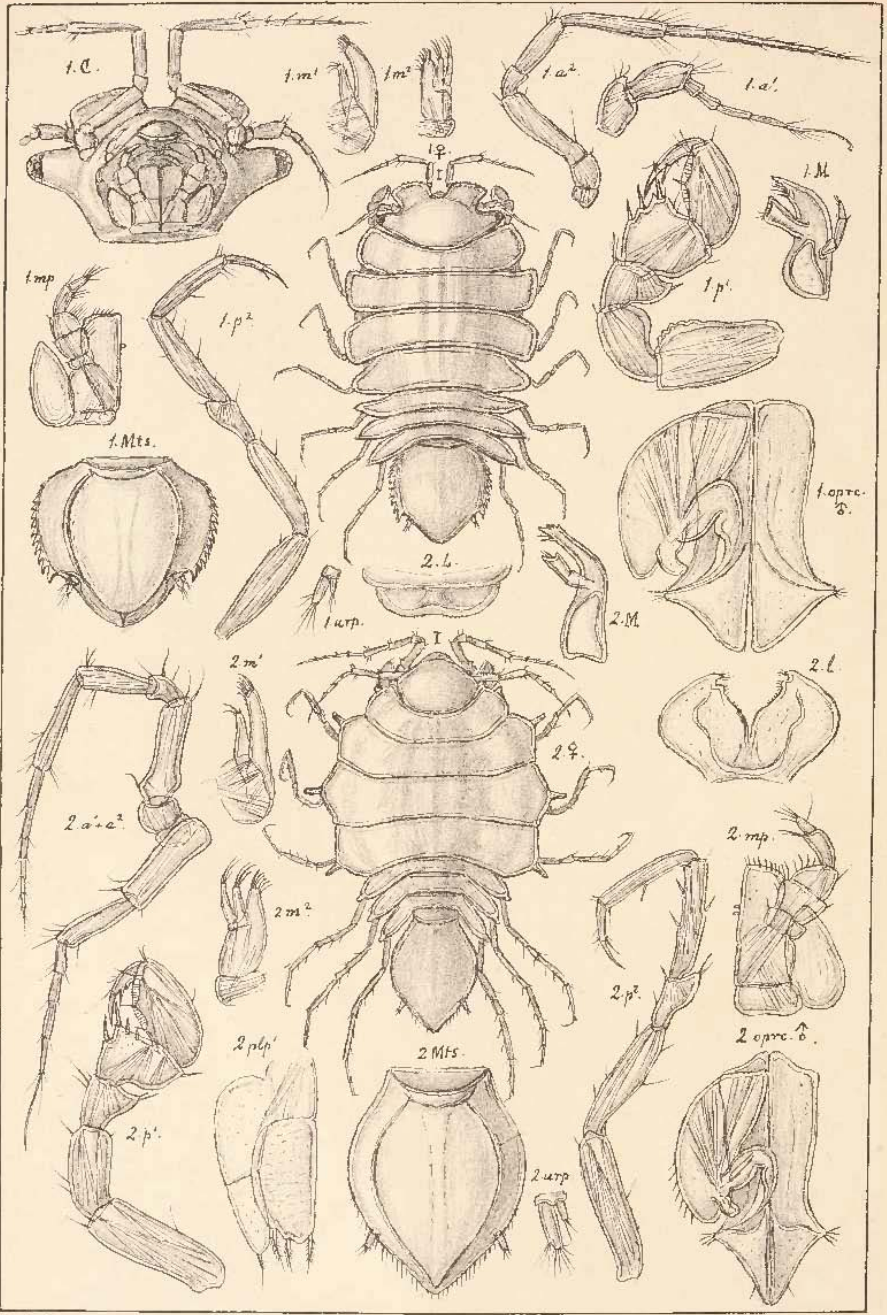
G.O. Sars, autogr.

1. *Munna limicola*, G.O. Sars.
 2. " *fabricii*, Kröyer.



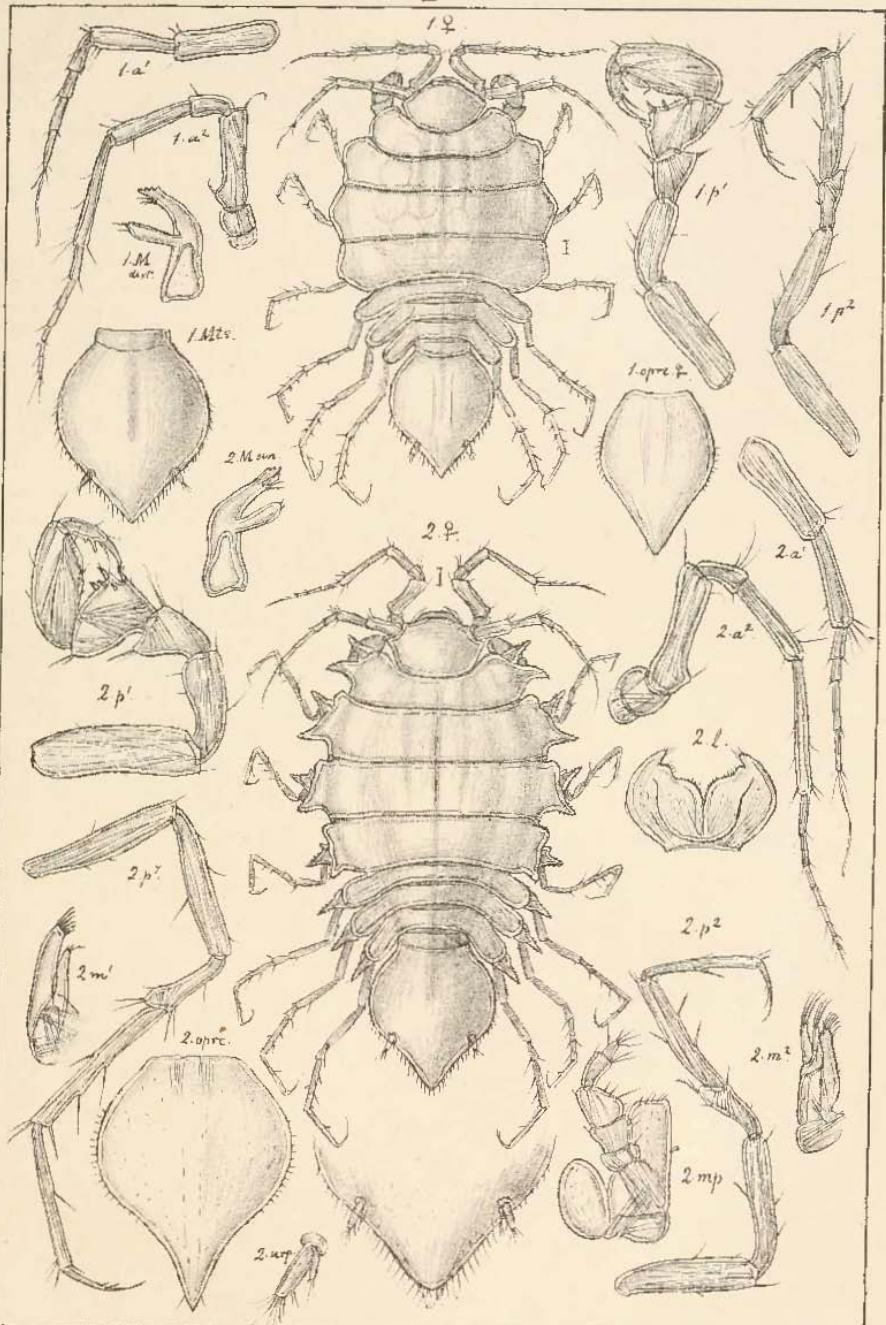
G.O. Sars, aulogr

1. Munna Kröyeri, Goodsir.
2. " Palmata, Lilljeb.



G.O. Sars, autogr.

1. *Paramunna bilobata*, G.O. Sars.
 2. *Pleurogonium rubicundum*, G.O. Sars.



G.O. Sars, autogr.

1. *Pleurogonium inerme*, G.O. Sars.

2. *Pleurogonium spinosissimum*, G.O. Sars.

slender and elongated, narrow lanceolate in form, and strongly constricted at the base, lateral edges slightly curved, and each armed in the middle with 4 short denticles, tip acutely produced. Superior antennæ not quite half the length of the body, 1st joint of the peduncle exceeding in length the other 2 combined, and clothed with very strong, scattered bristles, 2nd joint very small, 3rd linear, flagellum nearly as long as the peduncle, and composed of 10 articulations, the outermost of which carry delicate olfactory filaments. Inferior antennæ about twice the length of the superior, the 2 outer joints of the peduncle slender and elongated, flagellum shorter than the last peduncular joint, and composed of about 16 articulations. 1st pair of legs rather small, carpus scarcely at all dilated, propodos about as long as the carpus, and oblong fusiform, with a few spines inside. The other legs very slender, and clothed with scattered spiniform bristles; last pair nearly equalling the body in length, and having the propodal joint extremely slender and elongated; dactylus in all pairs simple, conically tapered. Female operculum narrow lanceolate, with 2 apical setæ; middle piece of male operculum not expanded distally. Uropoda issuing close together from 2 juxtaposed obtuse prominences of the dorsal face of the caudal segment, and considerably exceeding it in length, basal part long and narrow, outer ramus small and turned inwards, inner ramus very much elongated, linear, and, like the basal part, edged with scattered, slender bristles. Colour whitish grey. Length of adult female 2 mm.

Remarks.—This is as yet the only known species of the genus, and is easily recognizable from any of our other Isopoda, exhibiting, indeed, a very bizarre appearance. The exact length of the uropoda cannot be stated, as in the solitary specimen possessing them, the outer part of the inner ramus was broken off. On the whole, all the appendages are extremely brittle, and, indeed, in none of the specimens examined, were they preserved in an entire state.

Occurrence.—The only place where I have met with this peculiar form, is in the outer part of the Hardanger Fjord, at Mosterhavn, where a few specimens were detected on a close examination of a quantity of sandy clay taken up by the aid of the dredge from a depth of 150 fathoms. Out of Norway, this form has not yet been recorded.



Fam. 4. Desmosomidæ.

Characters.—Body more or less elongated, with the segments, as a rule, sharply marked off from each other, the 3 posterior segments of mesosome generally defined from the 4 anterior by a well-marked constriction. Cephalon emarginated on each side for the insertion of the antennæ, frontal part more or less produced. Caudal segment generally rounded at the tip. Eyes wholly absent. Superior antennæ, as a rule, small, and placed wide apart. Inferior antennæ not particularly elongated, sometimes different in the 2 sexes. Mandibles with or without palps. Maxillipeds always lamellar, with the joints of the palp more or less expanded. 1st pair of legs generally unlike the others, prehensile or very slender. The 3 posterior pairs of legs in some cases natatory, with the outer joints flattened, but never, as in the *Munnopsidæ*, edged with ciliated setæ. Uropoda generally small, bi- or uni-ramous.

Remarks.—The present family is somewhat intermediate in character between the *Luniridæ* and *Munnopsidæ*, some of the forms resembling the former, others the latter family. I have, however, thought it advisable to keep it apart from both of them. All the known forms are blind, and generally have the body narrow and elongated, with the segments, as a rule, very sharply marked off from each other, so as to exhibit a more or less moniliform shape. The family comprises as yet 6 genera, all of which are represented in the fauna of Norway.

Gen. 1. *Nannoniscus*, G. O. Sars, 1869.

Generic Characters. Body distinctly depressed, with the segments rather densely crowded together, and lamellarly expanded laterally. Cephalon comparatively large, with the frontal part considerably produced. Caudal segment likewise larger than usual, semi-oval. Superior antennæ extremely small, with the peduncle apparently only consisting of 2 joints, flagellum rudimentary, and carrying outside a single, enormously developed olfactory papilla. Inferior antennæ of moderate size, with the peduncle 6-articulate, its 3rd joint being produced outside to a strong, anteriorly pointing spine. Mandibles with the molar expansion rather slight, conical, and tipped by a fascicle of slender bristles; palp distinct, 3-articulate, though not very large. Maxillipeds pronouncedly lamellar, penultimate joint of the palp produced at the end inside to a digitiform process; epignath

lanceolate, pointing anteriorly. Legs, at least in female, of uniform structure, simple, ambulatory, but slightly increasing in length posteriorly, dactylus binnigulate. Uropoda issuing from the ventral face of the caudal segment, comparatively small, biramous, rami linear.

Remarks.—The systematic position of this genus is somewhat doubtful. In several characters, for instance the total absence of eyes, the structure of the oral parts, and partly also of the caudal appendages, it certainly agrees perfectly with the other *Desmosonida*; but the general form of the body is somewhat different, and the structure of the antennæ and legs resembles more that in the *Lanirida*, and perhaps therefore it should more properly be included in that family. Besides the type species described below, another nearly-allied species has recently been detected in the Caspian Sea (*N. caspius* G. O. Sars). On the other hand, the form described by the present author from the Norwegian North Atlantic Expedition as *N. bicuspis*, is scarcely congeneric, differing, as it does, considerably, in the structure of both the antennæ and the oral parts, and also in that of the caudal appendages.

Nannoniscus oblongus, G. O. Sars.

(Pl. I.)

Nannoniscus oblongus, G. O. Sars, Nyo Dybdandskrustaceer fra Lotöten. Chr. Vid. Selsk. Forb. 1869, p. 161.

Specific Characters.—Body of female rather regularly oblong oval, nearly 3 times as long as it is broad, and but very slightly narrowed behind; that of male with the posterior division, comprising the last 3 segments of mesosome and the caudal segment, much narrower than the anterior. Cephalon in both sexes very large, with the lateral parts projecting, outside the antennæ, to an acute, anteriorly pointing corner, frontal part very prominent, and minutely incised at the tip. Lateral parts of the 4 anterior segments of mesosome projecting in front as acute lappets; those of the 3 posterior segments subtruncate and quite contiguous. Caudal segment larger in female than in male, being in both sexes semi-oval in outline, with the tip evenly rounded. Superior antennæ scarcely extending beyond the tip of the frontal part, 1st joint rather thick, 2nd of about the same length, but much narrower, flagellum extremely small, its olfactory papilla very large, almost globular. Inferior antennæ of essentially same structure in the two sexes, scarcely attaining half the length of the body, spine of the 3rd peduncular joint of moderate length and pointing slightly outwards, flagellum slender 8—10-articulate. 1st pair of legs in female of the very same structure as the others, in male, how-

ever, rather different, and very strongly built, prehensile, carpus considerably expanded, and armed inside with 2 long spines, propodus oblong oval, with a strong spine inside, dactylus strong and curved. Female operculum with a spiniform projection near the base; that in male simple, not transformed as in other Asefota. Genital prominence in male very large, spiniform, recurved, issuing from the ventral face of last segment of mesosome, immediately in front of the operculum. Uropoda in both sexes of the same appearance, projecting but slightly beyond the edge of the caudal segment, outer ramus considerably smaller than the inner. Colour whitish, semipellucid. Length of adult female 2 mm., of male $1\frac{1}{2}$ mm.

Remarks.—This form was first described by the present author only from female specimens. The male, of which 2 specimens were found subsequently among the females, looks so very different, that at first I was in some doubt of its belonging to the same species. After having examined more closely the several appendages, I cannot, however, doubt that it is in reality the male of the present species. The 1st pair of legs are certainly very different; but this may be merely a sexual character; for in all the other appendages, the resemblance to the female is very close. It is a very remarkable fact, that the operculum in neither of the 2 specimens examined showed any trace of the usual transformation, though the male character of the specimens otherwise could easily be demonstrated, both by the greatly projecting sexual prominence, and by the presence of well-developed testes shining distinctly through the integuments in their usual place. In the Caspian species, on the other hand (of which as yet only a solitary male specimen is known), the sexual characters were quite normally displayed.

Occurrence. I have as yet only found this form off the Lofoten Islands, at Skruaven, in depths ranging from 120 to 250 fathoms. Out of Norway, it has not yet been recorded.

Gen. 2. *Macrostyliis*, G. O. Sars, 1863.

Syn: *Vana*, Meinert.

Generic Characters.—Body narrow, sublinear, with the 3 posterior segments of mesosome very sharply marked off from each other, the 4 anterior more densely crowded together. Cephalon rather large, subtriangular, frontal part considerably produced. Caudal segment oblong, obtusely produced at the tip. Superior antennae extremely small, with the flagellum rudimentary. Inferior antennae

slender, with the peduncle 5-articulate, and the flagellum well developed. Mandibles of a similar structure to that in the genus *Nannoniscus*, but without any trace of palp. Maxillipeds with the 2 outer joints of the palp rudimentary. Legs rather unequal; the 2 anterior pairs of essentially the same structure, not prehensile; 3rd pair much more strongly built, and apparently fossorial in character; the 4 posterior pairs very slender and rapidly increasing in length. Female operculum very narrow; male operculum transformed in the usual manner. Uropoda very slender, styliform, simple, bi-articulate and greatly divergent.

Remarks.—This genus was established by the present author as early as in the year 1863, to include a very peculiar, small Isopod from the Christiania Fjord. The genus *Vana* of Meinert is unquestionably identical with the present genus. In the structure of the legs and uropoda, this genus differs rather conspicuously from the other *Desmosomida*, though it evidently ought to be referred to that family. Only a single species is as yet known.

Macrostylis spinifera, G. O. Sars.

(Pl. LL.)

Macrostylis spinifera, G. O. Sars, Om en anomal Gruppe af Isopoder. Chr. Vid. Selsk. Forhandl. 1863, p. 15.

Syn: *Vana longiremis*, Meinert.

Specific Characters.—Body oblong, semicylindric in form, being more than 4 times as long as it is broad. Cephalon rather broad at the base, and very slightly sinuated on each side for the insertion of the antennæ, frontal part considerably produced, and obtusely rounded at the tip. The 4 anterior segments of mesosome with the lateral parts scarcely at all expanded; 3rd segment the largest; 4th segment terminating on each side in a posteriorly-pointing spine. The 3 posterior segments of mesosome much narrower than the anterior, and separated by deep constrictions, lateral parts obliquely expanded, and terminating in a short pointed projection. All the segments of mesosome, except the 1st, produced ventrally to strong spiniform processes. Caudal segment nearly as long as the 3 posterior segments of mesosome combined, oblong pyriform in shape, with a slight notch on each side, at some distance from the tip, the latter obtusely produced. Superior antennæ scarcely extending beyond the frontal part of the head, 4-articulate, the last articulation representing the rudimentary flagellum. Inferior antennæ, when reflexed, extending about to the end of the 4th segment of mesosome, penultimate peduncular joint the longest, flagellum shorter than the peduncle, and 7-articulate. 1st pair of legs of nearly exactly the same structure as the 2nd, though having the carpus comparatively shorter; 3rd pair much more strongly built, and generally extending laterally, ischial joint produced outside, beyond the

middle, to a strong, recurved, spiniform process, meral joint forming at the end, outside, a lamellar expansion clothed with a dense row of slender spines, carpal joint carrying in the distal part of the outer edge 4 similar spines, propodal joint, as in the 2 preceding pairs, short and simple, forming together with the dactylus an elongated claw. The 4 posterior pairs of legs much more slender than the anterior, and edged with scattered spines; the anterior pair very small; the last 2 pairs greatly elongated and nearly equal; dactylus in all of them small and simple, tipped with 2 bristles. Female operculum keeled along the middle, tip narrowly rounded, and, like the lateral edges, densely setous. Copulative appendages of male comparatively narrow, with the digitiform process very much elongated and almost straight. Uropoda fully as long as the caudal segment, narrow linear, distal joint scarcely more than half as long as the proximal one. Colour whitish. Length of adult female $2\frac{1}{2}$ mm., of male 2 mm.

Remarks.—This form is easily recognizable from any of our other Isopoda, both by its outward appearance, and by the structure of the several appendages. Though the description and figure given by Prof. Meinert of his *Vana longirostris* seem to differ in some few points, I cannot doubt that he has had before him the very same species.

Occurrence.—I first detected this peculiar form in the inner part of the Christiania Fjord, at a depth of 15—20 fathoms, and have subsequently found it, though rather sparingly, also in several other localities of the Norwegian coast up to the Lofoten Islands.

Distribution.—Kattegat (Meinert).

Gen. 3. *Ischnosoma*, G. O. Sars, 1866.

Generic Characters.—Body extremely narrow, with the 4th and 5th segments of mesosome firmly connected, and together forming a slender hourglass-shaped section, carrying at each end the corresponding legs. Cephalon comparatively small, and deeply immersed within the 1st segment of mesosome. Caudal segment not very large, constricted at the base. Superior antennæ more fully developed than in the other *Desmosonidae*, with the flagellum distinct. Inferior antennæ long and slender, and of same structure in the two sexes. Mandibles without palps, molar expansion well developed, cylindric. Penultimate joint of the palp of the maxillipeds not produced at the tip. First pair of legs in both sexes prehensile, with the carpus greatly expanded; the other pairs simple, am-

bulatory, and very much elongated, terminating in a slender claw. Uropoda of moderate length, simple, biarticulate.

Remarks.—This is a very distinct genus, exhibiting in some characters an approach to the genus *Desmosoma*, though being well distinguished, among other things, by the non-natatory character of the posterior pairs of legs, and by the peculiar appearance of the 4th and 5th segments of the mesosome. The genus comprises as yet 5 species, 3 of which (*I. spinosum*, *bacillus* and *bacilloides*) have been described by Mr. Fr. Beddard from the Challenger Expedition, the other 2 being northern forms. Of these the one (*I. quadrispinosum*, G. O. Sars) was procured during the Norwegian North Atlantic Expedition, the other belongs to the fauna of Norway, and will be described below.

Isechnosoma bispinosum, G. O. Sars.

(Pl. LII.)

Isechnosoma bispinosum, G. O. Sars, Beretning om en i Sommeren 1865 foretagen zool. Reise ved Kysterne af Christianias og Christiansunds Stifter, p. 34.

Specific Characters.—Body sublinear in form, more than 5 times as long as it is broad, the greatest width occurring far in front. Cephalon sub-quadrangular in outline, very slightly notched on each side for the insertion of the antennæ, frontal part obtusely truncated. 1st segment of mesosome deeply emarginated in front, lateral parts produced to obliquely anteriorly pointing spiniform projections more prominent in male than in female. Middle section, comprising the firmly connected 4th and 5th segments of mesosome, about half the length of the body, and pronouncedly hourglass-shaped, being in male extremely narrow in the middle. The last 2 segments of mesosome very short. Caudal segment oval in form, gradually widening somewhat distally, tip evenly rounded. Superior antennæ reaching beyond the middle of the penultimate peduncular joint of the inferior ones, 1st joint very short, 2nd long and slender, with 3 remarkably strong setæ inside, 3rd half the length of the former, flagellum 3-articulate. Inferior antennæ fully as long as the body, the outer 2 joints of the peduncle long and slender, edged with scattered bristles, flagellum about the length of the peduncle, and composed of numerous (about 20) articulations. 1st pair of legs much shorter than the others, and pronouncedly prehensile, carpus greatly expanded, exhibiting a well-defined palm armed with several short denticles, and, at the lower corner, a slender spine. The remaining legs of exactly the same structure and very slender, terminating in a long and narrow claw. Copulative appendages of male rather broad, with the digitiform process quite

short. Uropoda scarcely exceeding half the length of the caudal segment, proximal joint projecting at the end, outside, to a strong spine, distal joint somewhat shorter, and tipped with a dense fascicle of delicate bristles. Colour whitish, semi-pellucid. Length of adult female 3 mm., of male $2\frac{1}{2}$ mm.

Remarks.—This is the species first recorded, and ought accordingly to be regarded as the type of the genus. It is easily distinguished from the 2nd northern species, *J. quadrispinosum*, by the fact that only the 1st segment of the mesosome is produced on each side to spiniform projections, whereas in the latter species this is also the case with the 2nd segment.

Occurrence.—Besides in the Christiania Fjord, where this form was first detected, I have found it occasionally in several other localities of the Norwegian coast, as far north as the Lofoten Islands, the depth ranging from 50 to 250 fathoms. It is very brittle, the antennæ and legs especially being very liable to be broken off, so that it is very unusual to get a specimen with all its appendages uninjured.

Distribution.—Skagrac, off the Skagen Light House (Meinert).

Gen. 4. *Desmosoma*, G. O. Sars, 1863.

Generic Characters.—Body slender, sublinear, slightly depressed, with the 2 divisions of mesosome sharply marked off from each other. Cephalon of moderate size, slightly notched on each side for the insertion of the antennæ, frontal part obtusely produced. The 4 anterior segments of mesosome of nearly uniform size, and having the lateral parts more or less produced in front; the 3 posterior segments much flattened, with the lateral parts lamellarily expanded. Caudal segment not very large, semi-oval. Superior antennæ comparatively small, with the last peduncular joint not sharply defined from the flagellum. Inferior antennæ in female slender, though not particularly long, in male much more strongly built, with the 2 outer joints of the peduncle considerably tumefied, and the flagellum fusiform, being dilated in its proximal part, and densely clothed in front with delicate sensory hairs. Oral parts of almost exactly the same structure as in the genus *Nannouiscus*. 1st pair of legs more or less strongly built, though scarcely subcheliform; the 3 succeeding pairs subequal and densely clothed with spines. The 3 posterior pairs of legs of a rather different appearance, natatory, the outer joints being compressed and edged with flattened, unciolated spines,

dactylus styliform. Female operculum rounded, without any longitudinal keel; male operculum transformed in the usual manner. Uropoda not very large, simple, biarticulate, distal joint much larger than the proximal one.

Remarks.—This genus was established by the present author as early as in the year 1863, and was at that time included within the group "Isopoda remigantia", answering to the now generally accepted family *Munnopsida*. The reason for this was that the 3 posterior pairs of legs were proved to act as pulling implements, by which the animal is enabled to move freely through the water in a backward direction. In their structure, however, these legs differ rather prominently from those in the true *Munnopsida*, and in most other characters this genus resembles much more closely the 3 preceding genera, and may therefore more properly be associated with them in a separate family. In the restriction here adopted, the genus comprises as yet only 3 species, 2 of which will be described below, the 3rd having recently been recorded by M. Jules Bonnier from the Bay of Biscay under the name of *D. elongatum*.

1. *Desmosoma lineare*, G. O. Sars.

(Pl. LIII, Pl. LIV, fig. 1.)

Desmosoma lineare, G. O. Sars, Om en anomal Gruppe af Isopoder. Chr. Vid. Selsk. Forhandl. 1863, p. 11.

Specific Characters.—Body slender, linear in form, being in female almost 5 times as long as it is broad, in male somewhat shorter. Cephalon of moderate size, irregularly rounded, frontal part somewhat produced, and transversely truncated in female, slightly insinuated in male. The 4 anterior segments of mesosome differing but little in shape, lateral parts in all of them curving anteriorly, and terminating in an acute corner, which in male is produced to a strong spiniform projection. Posterior section of mesosome exceeding in length the preceding part of the body, and fully as broad, in male even somewhat broader, 1st segment large and expanded, with the antero-lateral corners acutely produced. Caudal segment in female semi-oval, in male broader, almost semicircular, edges evenly curved. Superior antennæ 6-articulate, 2nd joint the longest. Inferior antennæ in female scarcely longer than the anterior division of the body, last joint of the peduncle longer than the penultimate one, flagellum about the length of those joints combined, and composed of 12—14 articulations. Inferior antennæ in male considerably larger, attaining half the length of the body, 2nd joint of the peduncle armed outside with a strong spine, the 2 outer joints considerably tumefied, and each having 2 spines at the end outside, flagellum pronouncedly fusi-

form, with the proximal joints rather incrassated. 1st pair of legs moderately strong, slightly attenuated, carpus not dilated, and only clothed inside with scattered bristles, propodos narrow, sublinear. The 3 succeeding pairs very densely clothed with spines arranged on the outer joints in a double row, dactylus comparatively small. The 3 posterior pairs of legs successively somewhat diminishing in size, basal joint large and muscular, meral joint very small, triangular, carpal joint large, oblong, compressed and edged inside with a regular row of flattened spines successively increasing in length distally, and more numerous in male than in female, propodal joint oblong lamelliform, and likewise fringed with slender spines, dactylus slender, styliform, with 3 sub-apical bristles. Uropoda somewhat exceeding half the length of the caudal segment, distal joint sublinear, 4 times as long as the proximal one. Colour whitish, semi-pellucid. Length of adult female $3\frac{1}{2}$ mm., of male 2 mm.

Remarks.—The present species may be regarded as the type of the genus, and is easily distinguished from the succeeding one by the fuller development of the 3 posterior segments of the mesosome, as also by the structure of the 1st pair of legs, and the shape of the caudal segment.

Occurrence.—The species occurs along the whole south and west coasts of Norway, from the Christiania Fjord at least to the Lofoten Islands, and is found in depths ranging from 30 to 100 fathoms. The animal being extremely fragile, only imperfect specimens are generally procured by the aid of the ordinary dredge. To catch it in an uninjured state, very delicate dredging implements are required, and it is indeed by such means that I have succeeded in getting many Crustacean forms, which otherwise would have escaped my attention. The swimming motion of the animal has the character of a quite even run through the water in a backward direction. During this run, the 3 posterior pairs of legs are seen to be in a rapid vibrating motion, whereas the anterior pairs are extended in front. At other times the animal is seen creeping slowly along the bottom in the ordinary manner. Out of Norway, this form has not yet been recorded.

2. *Desmosoma armatum*, G. O. Sars.

(Pl. LIV, fig. 2.)

Desmosoma armatum, G. O. Sars, Om en anomal Gruppe af Isopoder. Chr. Vid. Selsk. Forh. 1863, p. 12.

Specific Characters.—Body comparatively less slender than in the preceding species, with the posterior division considerably narrower than the anterior

and scarcely exceeding it in length. Cephalon rather large, with the frontal part narrowly truncated. First segment of mesosome scarcely smaller than the succeeding ones, and produced on each side to an acute, anteriorly-pointing lappet; lateral parts of the 3 succeeding segments evenly rounded; 5th segment with the antero-lateral corners not produced. Caudal segment oblong oval in form, with a distinct notch on each side near the tip. Superior antennæ 5-articulate. Inferior antennæ about half the length of the body, flagellum not attaining the length of the 2 outer peduncular joints combined, and composed of 8 articulations. 1st pair of legs very strongly built, carpus large and broad, with 4 slender spines inside, propodos about the same length, but narrower, and oblong oval in form. The 3 succeeding pairs of legs narrower than in *D. lineare*, and less densely clothed with spines; the 3 posterior pairs likewise considerably narrower than in the type species, though otherwise of a very similar structure. Uropoda scarcely more than half the length of the caudal segment, distal joint about 3 times as long as the proximal one. Colour whitish, semi-pellucid. Length of adult female scarcely 2 mm.

Remarks.—The present species, of which only female specimens have hitherto come under my notice, is easily distinguishable from *D. lineare* by the less fully developed posterior section of the mesosome, the form of the 1st segment and of the caudal segment, and the very strongly built 1st pair of legs.

Occurrence.—I have met with this form occasionally in 2 widely distant localities of the Norwegian coast, viz., in the inner part of the Christiania Fjord and at Aalesund, the depth ranging from 30 to 50 fathoms. Out of Norway, it has not yet been recorded.

Gen. 5. **Eugerda**, Meinert, 1890.

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

Generic Characters.—Form of body much as in *Desmosoma*; 1st segment of mesosome, however, very small, and not produced laterally in any of the sexes. Antennæ and oral parts of almost exactly the same structure as in the said genus. 1st pair of legs in both sexes very slender and feeble, with the outer joints extremely narrow, almost filiform; the other legs of a similar structure to those in *Desmosoma*. Uropoda distinctly biramous, outer ramus smaller than the inner.

Remarks.—This genus was established in the year 1890 by Prof. Meinert, to include a supposed new Isopod from Kattegat, which, however, has turned out

to be identical with a form previously described by the present author as a species of the genus *Desmosoma*. Though this form on the whole agrees very closely with the 2 above-described species, yet there are at least 2 characters, in which it differs very markedly, viz., the structure of the 1st pair of legs and that of the uropoda, and for this reason I think it right to maintain the genus proposed by Prof. Meinert, the more so as I have found it advisable to raise another species, previously referred by me to the genus *Desmosoma*, to the rank of a distinct genus.

Eugerda tenuimana, G. O. Sars.

(Pl. LV.)

Desmosoma tenuimana, G. O. Sars, Beretning om en i Sommeren 1865 foretagen zool. Reise ved Kysterne af Christianias og Christiansands Stifter, p. 33.

Syn: *Eugerda globiceps*, Meinert.

Specific Characters.—Body slender and elongated, more than 4 times as long as it is broad, with a very conspicuous constriction between the 2 sections of mesosome. Cephalon of a similar form to that in *Desmosoma lineare*, though comparatively somewhat larger. Anterior section of mesosome about the length of the first 2 segments of the posterior combined, and, in female, somewhat broader than the latter; 1st segment in both sexes much smaller than the 3 succeeding ones, which are produced on each side to acute anteriorly-pointing lappets assuming in male a spiniform appearance. The 3 posterior segments of mesosome laminar, sub-quadrate in outline, and somewhat broader in male than in female; antero-lateral corner of 5th segment not produced. Caudal segment in female oval, narrowly rounded at the tip, in male almost quadrate in outline, tip blunted, lateral corners rectangular. Superior antennæ 6-articulate. Inferior antennæ in female very slender, considerably exceeding half the length of the body, flagellum about the length of the peduncle, and composed of about 16 articulations; those in male transformed in a manner similar to that in the male of *Desmosoma lineare*, though less strongly built: 2nd joint of the peduncle armed outside with a single spine, 4th joint with 2 successive spines, last joint unarmed and considerably larger than the penultimate, flagellum but slightly tumefied in its proximal part. 1st pair of legs very slender and elongated, carpus and propodus extremely narrow and perfectly smooth; the 3 succeeding pairs densely clothed with slender spines arranged in a double row; the 3 posterior pairs of nearly exactly the same structure as in *Desmosoma lineare*. Uropoda with the inner ramus linear, and about 3 times as long as the basal part, outer ramus not attaining half the length

of the inner. Colour whitish, semi-pellucid. Length of adult female 4 mm., of male 3 mm.

Remarks.—The present form was first described by the present author as *Desmosoma tenuimanum*, and at the same time the anomalous characters of this species were pointed out. The *Eugerda globiceps* of Meinert is unquestionably the same species, and accordingly only the generic name proposed by that author ought to be retained. In outward appearance, it bears a great resemblance to *Desmosoma lineare*, but may, on a closer examination, be easily distinguished by the more elongated inferior antennæ, the extremely slender 1st pair of legs, and the distinctly biramous uropoda.

Occurrence.—This species was first detected at Langesund, south coast of Norway, and I have subsequently found it, though rather sparingly, in the inner part of the Christiania Fjord, at Dröbak, as also in the Trondhjem Fjord.

Distribution. Skagerrak and Kattegat (Meinert).

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

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

Generic Characters.—Body slender, attenuated, and abruptly narrowed in the middle, 4th and 5th segments of mesosome forming together, as in the genus *Ischnosoma*, an hour-glass-shaped section. Caudal segment deeply constricted at the base. Lateral parts of all the segments coarsely denticulated. Antennæ of a similar structure to that in the 2 preceding genera. Mandibles without palps, cutting edge in the right mandible simple, in the left very slightly bifid, molar expansion extremely small, dentiform, tipped by a single bristle. 1st pair of legs but slightly differing from the 3 succeeding ones, all 4 pairs rather slender, and edged with scattered spiniform bristles; the 3 posterior pairs still more slender, imperfectly natatory, though approaching in structure those in the 2 preceding genera. Uropoda simple, biarticulate, distal joint the larger.

Remarks.—The present new genus is established, to include the rather anomalous form previously described by the present author as *Desmosoma aculeatum*. On a closer anatomical examination of this form, I have found it to differ in some points so materially from the 2 other species of *Desmosoma*, that it should more properly be regarded as the type of a separate genus, in some respects exhibiting some resemblance to the genus *Ischnosoma*. The structure of

the mandibles, in particular, is very different from that in the other *Desmosomidae*. The genus comprises as yet but a single species, to be described below.

Echinopleura aculeata, G. O. Sars.

(Pl. LVI.)

Desmosoma aculeation, G. O. Sars, Om en artnad Gruppe af Isopoder. Chr. Vid. Selsk. Forh. 1863, p. 13.

Specific Characters.—Body slender, moniliform, about 4 times as long as it is broad, anterior division much broader than the posterior, and oval in form. Cephalon comparatively large, and very distinctly notched on each side, frontal part in female broadly truncated, in male narrower and distinctly insinuated at the tip, edges of the lateral notches strongly denticulate. Lateral parts of the 4 anterior segments of mesosome with about 6 strong serrations, anterior edge, except in the 1st segment, with a dense row of minute denticles; 4th segment abruptly narrowed behind, and firmly connected with the 5th, both together forming an hour-glass-shaped section, about as long as the 3 anterior segments combined. The 2 posterior segments of mesosome deeply constricted at the base, and gradually widening behind, lateral edges, as in the preceding segment, coarsely and regularly serrated throughout. Caudal segment oval in form, deeply constricted at the base, lateral edges coarsely denticulate, tip narrowly rounded. Superior antennæ 4-articulate, and carrying a long apical sensory filament. Inferior antennæ in female scarcely exceeding $\frac{1}{3}$ of the length of the body, flagellum shorter than the peduncle, and composed of 8 articulations; those in male transformed in a similar manner to that in the male of *Desmosoma*, though not much tumefied, peduncle without any spines. 1st pair of legs rather slender, but scarcely at all attenuated, basal joint long and narrow, and finely serrated in front, ischial joint exhibiting outside a small spiniform projection, carpus with 4 slender spines inside, propodos about the same length, but much narrower, simple, cylindric, dactylus rather strong. The 3 succeeding pairs of legs scarcely longer than the 1st, and of a very similar structure, though having the dactylus narrower. The 3 posterior pairs of legs extremely slender, with the outer joints but slightly expanded, and only provided with a very restricted number of spines, dactylus slender, styliform. Uropoda comparatively small, distal joint 3 times as long as the proximal one, and carrying only 4 or 5 bristles. Colour greyish white. Length of adult female $2\frac{1}{2}$ mm., of male $1\frac{1}{2}$ mm.

Remarks.—This form was described by the present author as early as in the year 1863, as a species of the genus *Desmosoma*. Its outward appearance is

rather peculiar, and somewhat recalls the species of the genus *Ischnosoma*, but in the anatomical details it approaches more nearly to the genus *Desmosoma*. The coarse armature of the body will serve for at once distinguishing it from the species of either of the 2 above-mentioned genera.

Occurrence.—This species was first observed in the inner part of the Christiania Fjord, at a depth of 15—20 fathoms. Subsequently I have found it also in several other localities of the Norwegian coast, as far north as the Lofoten Islands, but it seems everywhere to be very rare. Out of Norway, it has not yet been recorded.

Fam. 5. Munnopsidæ.

Characters.—Body, as a rule, shorter and more compact than in the *Desmosomida*, with the 2 divisions of mesosome very sharply defined. Eyes absent. Superior antennæ with the basal joint remarkably large and broad, flagellum generally well developed. Inferior antennæ very much elongated, and of same structure in the two sexes. Oral parts on the whole normal, though the structure of the mandibles is rather different in the different genera. 1st pair of legs generally smaller than the others, but never subcheliform; the 3 succeeding ones, as a rule, very much elongated and ambulatory in character. The 3 posterior pairs of legs very unlike the preceding ones, and pronouncedly natatory, the outer joints being lamellarly expanded, and fringed with densely plumose setæ. Uropoda small, simple or biramous.

Remarks.—In the restriction here adopted, this family is prominently distinguished by the peculiar structure of the 3 posterior pairs of legs, which constitute very powerful natatory organs, by which the animal is enabled to move very rapidly through the water in a backward direction. This motion has not, as in certain *Desmosomida*, the character of an even run, but is effected by sudden jerks, and is, on the whole, much more energetic, a fact easily accounted for by the rather different structure of the natatory legs, and the densely plumose setæ with which the very much expanded outer joints are fringed. The family comprises at yet 7 genera, 6 of which are represented in the fauna of Norway, and will be treated of below, the 7th genus, *Acanthocope*, having been established by Mr. F. Beddard, to include 2¹ species from the Challenger Expedition.

As our knowledge of this peculiar group of Isopoda is of comparatively recent date, it is highly probable, that the number of genera will, in course of time, be considerably increased, and that it will even be found necessary to subdivide this group into several distinct families.

Gen. 1. **Munnopsis**, M. Sars, 1860.

Generic Characters.—Body less compact than in the other genera, with the anterior division much broader than the posterior. Cephalon of moderate size, deeply emarginated on each side for the insertion of the antennæ, frontal part narrowly produced. The 4 anterior segments of mesosome transversely excavated dorsally, with the lateral parts obtuse; the 3 posterior segments densely crowded together, and very convex above. Caudal segment comparatively large, oblong oval. Superior antennæ with the basal joint very large and massive, flagellum multiarticulate and much longer in male than in female. Inferior antennæ with the 2 outer joints of the peduncle greatly elongated. Mandibles without any molar expansion, cutting edge but slightly dentated, palp well developed, with the terminal joint lamellar, incurved. Maxillipeds pronouncedly laminar, with the antepenultimate joint of the palp acutely produced inside, the 2 outer joints narrow and simple. The first 2 pairs of legs of essentially the same structure, though somewhat different in size; the 2 succeeding pairs extremely slender and elongated, with the first 3 joints short and thick. Natatory legs of uniform structure, and rather slender, with the carpal and propodal joints foliaceous and densely edged with plumose setæ, dactylus wanting. Female operculum navicular, male operculum transformed in the usual manner, digitiform process of the copulative appendages terminating in a long and slender seta. Uropoda simple, filiform, biarticulate.

Remarks.—This genus was established in the year 1860 by my late father, to include a very remarkable Isopod, found by him at Christiaansund, west coast of Norway. The generic name refers to a certain resemblance, in outward appearance, to the genus *Munna* of Krøyer. It forms the type of the family *Munnopsidae*, being the first genus recorded, and it is distinguished pretty well from the other genera, both by its outward appearance, and by the structure of the several appendages. In addition to the type species, 4 other species have in recent times been adduced to this genus. Three of these were procured during the Challenger

Expedition, and are recorded by Mr. Fr. Beddard as *M. gracilis, australis* and *latifrons*; the 4th is described by Dr. Hansen as *M. longicornis*, from a specimen procured during the German Plankton-Expedition. It is, however, somewhat questionable, if all these species are actually referable to the present genus. Thus, in the species described by Dr. Hansen, the structure of the mandibles is very different from that in *Munnopsis typica*; and the Challenger species, to judge from the not very exhaustive description given by Mr. Fr. Beddard, seem also to differ very materially in several respects from the type species.

Munnopsis typica, M. Sars.

(Pl. LVII & LVIII.)

Munnopsis typica, M. Sars, Chr. Vid. Selsk. Forhandl. 1869, p. 84.

Specific Characters.—Anterior division of body in female very broad, rounded in outline, in male somewhat narrower, oval; posterior division very much narrower and longer than the anterior. Cephalon deeply sunk within the 1st segment of mesosome, and provided with 2 juxtaposed tubercles above at the base, frontal part narrowly produced between the bases of the superior antennæ, and transversely truncated at the tip. The 4 anterior segments of mesosome separated above by smooth, thin-skinned interspaces, and distinctly excavated transversally, with both the anterior and posterior edges somewhat elevated, lateral parts each with a transversely oval eminence above, those of the 2 posterior segments larger than those of the 2 anterior; coxal plates distinct, though very small. The 3 posterior segments of mesosome combined scarcely more than half as long as the anterior division of the body, and defined by very oblique, arched sutures, the last 2 each having 2 juxtaposed tubercles dorsally, lateral parts narrow, and extended obliquely behind. Caudal segment considerably exceeding in length the 3 preceding segments combined, and of narrow oblong oval form, with a single small tubercle above at the base, tip bluntly produced, lateral edges gently curved and perfectly smooth. Superior antennæ with the basal joint triangular in outline, inner corner considerably produced, flagellum very slender and composed of numerous short articulations carrying delicate sensory filaments. Inferior antennæ more than 4 times as long as the body, flagellum shorter than the peduncle. 1st pair of legs of same appearance in the two sexes, carpus slightly curved and exceeding the propodos in length, dactylus short; 2nd pair considerably stronger in male than in female, with the carpal joint slightly tumefied and densely armed with short spines inside, dactylus elongated. The 2 succeeding pairs of legs fully 3 times as long as the body, and terminating in a slender claw. Natatory legs

with the carpal joint oblong fusiform in outline, propodal joint oval, somewhat shorter, but scarcely narrower. Uropoda about half as long as the caudal segment, distal joint scarcely longer than the proximal one, both being clothed with scattered bristles. Colour pale reddish brown. Length of adult male 11 mm.

Remarks.—As above stated, this remarkable form was detected by my late father in the year 1860, and was briefly characterised in the above-mentioned journal. Subsequently a fuller description, accompanied by figures, was given in his paper on the fauna of the Christiania Fjord inserted in „Nyt Magazin for Naturvidenskaberne”. It is much the largest of the Norwegian *Munnopsida*.

Occurrence.—The species occurs along the whole Norwegian coast, from the Christiania Fjord to Vadsö, in depths ranging from 60 to 400 fathoms. In some places I have found it in great abundance, especially in the deeper parts of the Christiania and Trondhjem Fjords, as also off the Lofoten Islands. I have several times observed it in a living state, and watched its curious movements. It swims backwards in long, though not particularly rapid bounds, and during this movement the long inferior antennæ and the 3rd and 4th pairs of legs are extended straight in front. Immediately on reaching the bottom, the antennæ and legs are spread out laterally, and the animal now moves slowly about in the ordinary creeping manner. The appendages are extremely fragile and liable to be broken off from the body, for which reason it is rather difficult to get specimens in quite an uninjured state.

Distribution.—Skagerak (Meinert), Greenland (Hansen), Spitsbergen (Buchholtz), the Barents Sea (Hoek), Franz Josef Land (Heller), the Kara Sea (Hansen), Arctic America (Miers), Atlantic coast of North America (Harger).

Gen. 2. *Hyarachna*, G. O. Sars, 1863.

Syn: *Mesostenus*, G. O. Sars (olim).

Generic Characters.—Body rather compact, clavate in form, attenuated behind, with a very strongly marked median constriction. Cephalon very large and broad, transversely truncated in front, dorsal face evenly vaulted, lateral parts greatly expanded. The 4 anterior segments of mesosome closely crowded together, and slightly excavated transversally; the 3 posterior segments large and convex above, 5th segment scarcely narrower than the preceding segments, and deeply emarginated behind. Caudal segment narrow, triangular in form. Superior

antennae originating close together from the front, basal joint large, sub-quadrangular in form, inner corner somewhat more projecting than the outer, flagellum not much elongated. Inferior antennae exceeding the body in length. Mandibles very massive, with an oblique crest outside, cutting edge undivided, molar expansion narrow, tipped with scattered spines, palp distinct, though rather feeble. Maxillipeds with the 2nd joint of the palp very large and expanded, antepenultimate joint rounded at the inner corner, penultimate joint very slightly produced at the end inside, epignath exceedingly large. 1st pair of legs comparatively small, simple; 2nd pair considerably larger and densely edged with spines, dactylus long and slender. The 2 succeeding pairs of legs slender and elongated, with the ischial joint considerably exceeding in length both the preceding and succeeding joints, carpal and propodal joints slender, linear, and each having at the end outside, a very fully developed auditory seta, dactylus long and slender. The 2 anterior pairs of natatory legs of similar structure, with the carpal joint exceedingly large and expanded, cordiform in outline, propodal joint much narrower, oblong, dactylus well developed; last pair much narrower than the 2 preceding pairs, with the carpal joint but slightly expanded, propodal joint linear, dactylus much elongated. Female operculum narrow, carinated along the middle, and densely setous at the edges; male operculum transformed in the usual manner. Uropoda comparatively small, biarticulate, proximal joint lamelliform and edged with ciliated setae, distal joint very small.

Remarks.—This genus was established by the present author as early as in the year 1863; but the generic name *Mesostenus* proposed at that time being already appropriated, it was subsequently changed to *Hyarachna*. The genus is easily distinguishable from that of *Munnopsis*, both as regards its outward appearance, and the structure of the several appendages. On a closer anatomical examination of the several species previously referred to this genus, I have found it necessary to separate some of them as types of distinct, though nearly-allied genera. In the restriction here adopted, it comprises 3 Norwegian species, to be described below. Moreover, 2 exotic species have been recorded as belonging to this genus, viz., *I. quadrispinosa* Beddard from the Challenger Expedition, and *I. polita* Bonnier from the Gulf of Gascogne. Of these, the last-named is unquestionably a true *Hyarachna*, whereas the Challenger species seems to differ rather markedly, and should therefore more properly be regarded as the type of a separate genus.

1. *Ilyarachna longicornis*, G. O. Sars.

(Pl. LIX.)

Mesostenus longicornis, G. O. Sars, Om en anomal Gruppe af Isopoder. Chr. Vid. Selsk. Forh. 1863, p. 8.

Specific Characters.—Body about 3 times as long as it is broad, with the anterior division of uniform width throughout, and about as long as the 3 posterior segments of mesosome combined. Cephalon with the dorsal face perfectly smooth, lateral parts obliquely expanded. The 4 anterior segments of mesosome differing but little in size, being produced on each side to short anteriorly-pointing lappets, anterior edge distinctly elevated and very smooth. Fifth segment of mesosome rather large, being scarcely narrower than the preceding segments, and very deeply emarginated behind; last segment scarcely more than half as long as the penultimate one. Caudal segment longer than it is broad at the base, and gradually tapering behind, tip obtusely pointed. Superior antennæ scarcely reaching to the middle of the penultimate peduncular joint of the inferior ones, basal joint nearly smooth, flagellum composed in female of 6, in male of about 12 articulations. Inferior antennæ fully twice as long as the body and very slender, the 2 outer joints of the peduncle scarcely spinous, flagellum about the length of the peduncle. 1st pair of legs rather slender, with the carpal and propodal joints of about equal length; 2nd pair with the propodal joint almost as long as the carpal one; the 2 succeeding pairs exceeding the body in length. Natatory legs of the structure characteristic of the genus. Uropoda with the proximal joint oblong oval in form, and edged with about 14 plumose setæ, distal joint scarcely half as long, cylindrical, clothed with very delicate bristles. Colour whitish, semipellucid. Length of adult female about 3 mm.

Remarks.—The present species, being the first recorded, ought to be regarded as the type of the genus. It may be easily distinguished from the other 2 species by the smoothness of the cephalon and the anterior segments of the mesosome. It is also of far inferior size, and is less robust of form.

Occurrence.—I first detected this form in the inner part of the Christiania Fjord, at depths ranging from 30 to 50 fathoms, and have also subsequently found it in several other places on the Norwegian coast, as far north as Tjåtö, on the Nordland coast. Its natatory movements are extremely rapid, and are effected by abrupt jerks backwards. When slowly creeping upon the bottom, it somewhat recalls a spider, by its slender, laterally-extended legs, and the deep median constriction of the body.

Distribution.—Skagerak (Meinert).

2. *Ilyarachna hirticeps*, G. O. Sars.

(Pl. LX.)

Ilyarachna hirticeps, G. O. Sars, Nye Dybvandsernstaceer fra Lofoten. Chr. Vid. Selsk. Forhdl. 1869, p. 167.

Specific Characters.—Body of a similar appearance to that in the type species, but more than twice as large, and somewhat more robust. Cephalon very broad, with the dorsal face strongly vaulted, and densely clothed with short stout bristles. Anterior edge of the first 4 segments of mesosome very distinctly elevated, and minutely crenulated throughout; lateral parts of 1st segment imperfectly developed. The 3 posterior segments of mesosome combined about the length of the preceding part of the body; the anterior segment evenly emarginated behind. Caudal segment of a similar form to that in *I. longicornis*. Superior antennæ comparatively short, not nearly reaching to the middle of the penultimate peduncular joint of the inferior ones, basal joint armed along the inner edge with scattered denticles, flagellum, in female, not attaining the length of the last 2 peduncular joints combined. Inferior antennæ scarcely twice as long as the body, penultimate joint of the peduncle armed inside with 7 strong spines. Legs, on the whole, resembling in structure those in the type species, though the 3rd and 4th pairs are somewhat less elongated, and the natatory legs more densely fringed with setæ. Uropoda with the proximal joint rather large, and somewhat widening distally, marginal setæ about 20 in number, distal joint very narrow, linear. Colour whitish grey. Length of adult female $7\frac{1}{2}$ mm.

Remarks.—This species is nearly allied to the preceding one, but of very much larger size, and, moreover, easily distinguishable by the dense setous clothing of the dorsal face of the cephalon, and by the strongly elevated and finely crenulated anterior edges of the anterior segments. Several other minor differences may also be shown to exist, on a closer comparison of the several appendages in the two species.

Occurrence.—This species would seem to be a true arctic form, having not, as yet, been found south of the Lofoten Islands, whereas it is not infrequently met with on the Finmark coast as far as Vadsö.

Distribution.—Several stations of the Norwegian North Atlantic Expedition (the present author), Greenland (Hansen).

3. *Ilyarachna denticulata*, G. O. Sars, n. sp.

(Pl. LXI, fig. 1.)

Specific Characters.—Very like the preceding species, both in size and general appearance, but differing conspicuously in the armature of the body. Cephalon of a similar shape to that in *I. hirticeps*, dorsal face densely clothed with short spines. First segment of mesosome considerably smaller than the 3 succeeding ones, and with the lateral parts imperfectly developed; anterior edge of all 4 segments divided into a regular series of from 10 to 15 very conspicuous dentiform projections. The 3 posterior segments of mesosome smooth, and of a similar appearance to that in *I. hirticeps*. Caudal segment likewise scarcely differing in shape from that in the said species. Superior antennæ rather short, with the basal joint strongly denticulate inside, and the 2nd joint tipped with several diverging spines, flagellum 8-articulate. Inferior antennæ about twice as long as the body, and rather slender, penultimate joint of the peduncle without any spines inside. Legs and uropoda nearly exactly as in *I. hirticeps*. Colour whitish. Length of adult female 7 mm.

Remarks.—This form is so very like *I. hirticeps* both in size and general appearance, as to be easily confounded with it. On a closer examination, however, it is distinguished pretty well by the peculiar armature of the fore-body. The soft bristles clothing the dorsal face of the cephalon in the above-named species, are here replaced by rigid spines, and the anterior edges of the 4 first segments of the mesosome are not, as in that species, finely crenulated, but divided into coarse spiniform projections. On the other hand, there is no trace of the strong spines occurring in *I. hirticeps* on the penultimate peduncular joint of the inferior antennæ. In most other respects there is a very close resemblance between this species and *I. hirticeps*.

Occurrence.—I have found this species in several places on the west coast of Norway, from Stavanger up to the Trondhjem Fjord, in depths ranging from 100 to 400 fathoms. Off the Lofoten Islands and the Finnmark coast, this species does not seem to occur, and it thus appears to be a more southern form. I had previously confounded this species with *I. hirticeps*.

Gen. 3. **Echinozone**, G. O. Sars, n.Syn: *Hyarachna*, G. O. Sars (part).

Generic Characters.—Body somewhat resembling in shape that in the genus *Hyarachna*, but comparatively shorter and thicker, with the anterior segments of mesosome strongly spinous, the 3 posterior segments short and broad. Caudal segment distinctly notched on each side, at some distance from the tip. Antennæ about as in *Hyarachna*. Mandibles very large and without a trace of palps. Ambulatory legs resembling those in the genus *Hyarachna*; natatory legs, on the other hand, far less fully developed, with the outer joints but slightly expanded. Uropoda with 2 distinct rami issuing from the outer side of the large, lamellar basal part.

Remarks.—This new genus is founded upon the form previously described by the present author as *Hyarachna coronata*. On a closer anatomical examination of this form, I have found it to differ in some particulars rather markedly from the 3 above-described species, so that it ought more properly to be regarded as the type of a nearly-allied genus. Among these differences may be named the absolute absence of mandibular palps, and the biramous character of the uropoda. The genus comprises as yet but a single species.

Echinozone coronata, G. O. Sars.

(Pl. LXI, fig. 2.)

Hyarachna coronata, G. O. Sars, Nye Dybvandskræmmer fra Lofoten. Chr. Vid. Selsk. Forh. 1869, p. 168.

Specific Characters.—Body very short and compact, scarcely more than twice as long as it is broad. Cephalon with the dorsal face strongly vaulted and perfectly smooth, lateral parts obliquely expanded. Anterior edge of the first 1 segments of mesosome considerably raised, and divided into 6—8 coarse spiniform projections, between which are as many very small denticles, lateral parts of 1st segment simple, those of the 3 succeeding segments each produced into 2 acute lappets. The 3 posterior segments of mesosome comparatively short, and, combined, not nearly attaining the length of the anterior division, dorsal face somewhat uneven, anterior edge of 1st segment slightly denticulated. Caudal segment scarcely longer than it is broad at the base, lateral edges minutely setous, and exhibiting, at some distance from the tip, a very distinct notch defined in front by a dentiform projection, tip acutely produced. Superior antennæ not reaching to the middle of the antepenultimate peduncular joint of the inferior ones, basal joint of moderate size and without any denticles, flagellum 10-articulate. Inferior

antennæ not quite twice as long as the body, flagellum nearly attaining the length of the peduncle. 1st pair of legs comparatively short, with the 2 outer joints of about equal length; 2nd pair densely spinous, with the propodal joint longer than the carpal one. The 2 succeeding pairs of legs scarcely as long as the body. Natatory legs less strongly developed than in *Hyarachna*, carpal joint of the 2 anterior pairs narrow cordiform, and scarcely longer than the propodal joint, dactylus rather elongated. Uropoda with the basal part oblong oval, slightly narrowed distally, and carrying about 12 plumose setae, outer ramus much smaller than the inner, but well defined. Colour greyish white. Length of adult female 5 mm.

Remarks.—This species may be easily recognized from the allied forms by its short and compact body, and by the very conspicuous spinous whorls encircling the anterior segments of the mesosome.

Occurrence.—Besides off the Lofoten Islands, where the species was first discovered, I have met with it occasionally at Vadsø, as also in several localities on the west coast of Norway (Espevær, Florø, Aalesund, Trondhjem Fjord), the depth ranging from 100 to 300 fathoms. Out of Norway, it has not yet been recorded.

Gen. 4. **Aspidarachna**, G. O. Sars, n.

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

Generic Characters.—Body short and compact, with the 2 divisions of mesosome very sharply defined, the posterior one being very large, clypeiform, partly projecting in front over the anterior. Cephalon broad, transverse, evenly convex above, frontal margin slightly emarginated. Caudal segment triangular, rather broad at the base. Superior antennæ much more fully developed in male than in female. Inferior antennæ of moderate size. Mandibles very strong, cutting edge undivided, molar expansion very small, conic, tipped with slender bristles, palp distinct, though rather feeble. The 4 anterior pairs of legs constructed, on the whole, in a similar manner to that in the 2 preceding genera, though the 3rd and 4th pairs are not particularly elongated. Natatory legs very fully developed. Uropoda with 2 distinct rami, as in the genus *Echinozone*.

Remarks.—This genus also is founded upon a species previously referred by the present author to the genus *Hyarachna*. A closer anatomical examination has also in this instance revealed some peculiar features of apparently generic value. Thus, the uropoda, as in the genus *Echinozone*, are distinctly biramous;

but, unlike what is the case in that genus, the mandibles are provided with distinct, though rather small palps. The peculiar fornicate character of the posterior division of the body has given rise both to the generic and specific names.

*Aspidarachna clypeata*¹⁾, G. O. Sars.

(Pl. LXII.)

Thyarachna clypeata, G. O. Sars, Nye Dybvandsernstaecker fra Lofoten. Chr. Vid. Selsk. Forh. 1869, p. 168.

Specific Characters.—Body scarcely more than twice as long as it is broad, and generally much curved. Cephalon very broad in proportion to its length, frontal edge evenly concaved, lateral parts obliquely expanded. The first 4 segments of mesosome short and distinctly excavated transversally, with the anterior edge considerably elevated and perfectly smooth, lateral parts acutely produced. The 3 posterior segments of mesosome very large and evenly convex above, forming together a shield-like plate advancing in front over the adjoining part of the anterior division. Caudal segment triangular, scarcely as long as it is broad at the base, tip obtusely pointed. Superior antennae with the basal joint very large, inner corner considerably produced, and armed with 2 long spines; flagellum in female short, 3-articulate, in male very much elongated, and divided into numerous short articulations clothed with delicate sensory filaments. Inferior antennae nearly twice as long as the body, the 2 outer joints of the peduncle armed inside with slender spines, flagellum about the length of the peduncle. The 4 anterior pairs of legs scarcely different in their structure from those in the 2 preceding genera, except that the 3rd and 4th pairs are very much shorter, not nearly attaining the length of the body, and having the ischial joint the longest. Carpal joint of the 2 anterior pairs of natatory legs strongly expanded, broadly cordiform in outline, and densely fringed with plumose setae, propodal joint much shorter and oblong fusiform. Last pair of legs, as in the 2 preceding genera, much more slender than the 2 preceding ones. Uropoda with the basal part oblong oval and densely fringed with plumose setae, outer ramus very small, though well defined. Colour whitish. Length of adult female 4 mm.

Remarks.—This is the only as yet known species of the genus, and may easily be recognized by the short and compact body, and the peculiar fornicate character of the posterior segments of the mesosome.

¹⁾ The generic name *Aspidomatus* given in the plate has been changed in the above manner, because that name has been previously used in Zoology.

Occurrence. I first discovered this form off the Lofoten Islands, in depths ranging from 120 to 250 fathoms, and have subsequently found it in 2 other localities of the Finmark coast, viz., Hasvig and Vadsö. South of the Lofoten Island, I have not yet met with it, and it would therefore seem to be a northern form. Its swimming motions are exceedingly rapid, and, as in the allied forms, are effected by abrupt bounds backwards. Out of Norway, it has not yet been recorded.

Gen. 5. **Pseudarachna**, G. O. Sars, n.

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

Generic Characters.—Body clavate in form, with the anterior division considerably broader, and scarcely shorter than the posterior, being defined from it by a deep constriction. Cephalon large and broad, obtusely truncated in front. The 4 anterior segments of mesosome scarcely excavated transversally, 2nd segment much the largest; the 3 posterior segments but slightly expanded. Caudal segment comparatively large, oblong triangular. Superior antennæ very small, and placed far apart, basal joint lamellarly expanded on the outer side, flagellum poorly developed. Inferior antennæ strongly built, with the flagellum longer than the peduncle. Mandibles very large, with blunt, undivided cutting edge, molar expansion extremely minute, dentiform, palp absent. Maxillæ and maxillipeds about as in the preceding genera. 1st pair of legs very slender, nearly filiform; 2nd pair, on the other hand, rather strongly built, and considerably longer than the 2 succeeding pairs. Natatory legs rather poorly developed, 1st pair the largest, last pair extremely slender. Uropoda lamellar, with a single very small, nodiform ramus.

Remarks.—The present new genus is established to include the very anomalous form previously described by the present author as *Hyarachna hirsuta*. The differences which this form exhibits from the other *Munnopsidae*, are so numerous, and of such an essential nature, that it can hardly be included in any of the above-described genera, but must take its place in a separate genus. The structure of the legs in particular is rather peculiar, and that of the mandibles is also pronouncedly different from that found in the preceding genera.

Pseudarachna hirsuta, G. O. Sars.

(Pl. LXIII.)

Hyarachna hirsuta, G. O. Sars, Om en anomal Gruppe af Isopoder. Chr. Vid. Selsk. Forhandl. 1863, p. 9.

Specific Characters.—Body more than twice as long as it is broad, with the greatest width across the 2nd segment of mesosome, surface everywhere clothed with stiff bristles. Cephalon very broad and highly convex above, front obtusely rounded, lateral parts obliquely expanded. Each of the 4 anterior segments of mesosome armed dorsally with 2 juxtaposed denticles, and laterally with an up-turned spine. The 3 posterior segments of mesosome combined scarcely exceeding half the length of the anterior division, the anterior segment the largest, and but slightly emarginated behind; last segment rather small. Caudal segment somewhat longer than it is broad at the base, tip obtusely pointed. Superior antennæ with the basal joint produced outside to a linguiform lamellar expansion carrying at the tip 2 auditory setæ; flagellum scarcely longer than the 2nd peduncular joint, and composed of only 3 articulations. Inferior antennæ about one and a half times as long as the body, the 2 outer joints of the peduncle rather strongly built, and clothed with scattered spiniform bristles, flagellum very slender and composed of 14 narrow and elongated articulations. 1st pair of legs extremely slender, with the propodus long and narrow; 2nd pair very robust, with the ischial joint much expanded distally, and clothed inside with strong setæ. The 2 succeeding pairs shorter and much narrower than the 2nd pair, with the dactylar joint not unguiform, tipped with diverging bristles. 1st pair of natatory legs considerably larger than the other 2, though having the outer joints but slightly expanded and fringed with a very restricted number of ciliated setæ; last pair extremely slender, with the propodal joint very narrow, linear. Uropoda with the basal joint rather large, oblong oval, and edged with numerous short plumose setæ, terminal joint extremely minute, nodiform. Colour whitish grey. Length of adult female $2\frac{1}{2}$ mm.

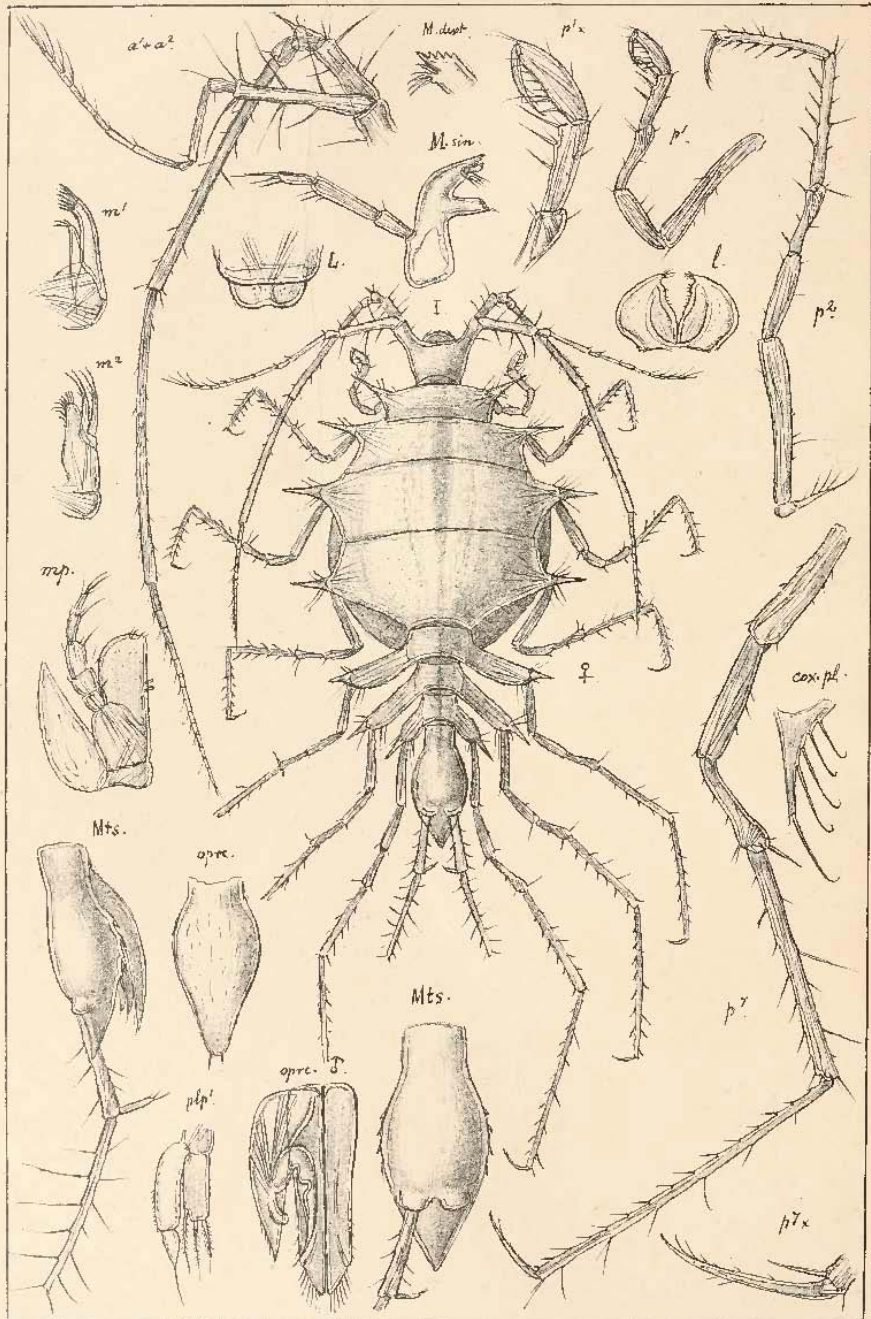
Remarks.—This form was described by the present author as early as in the year 1863, and at that time referred to the genus *Hyarachna*. It is easily recognizable by the densely hirsute body and the peculiar structure of the legs. More frequently, however, it is so closely obfuscated with muddy particles adhering to the stiff bristles, that its true form is rather difficult to observe.

Occurrence.—The only place where I have hitherto met with this peculiar form, is in the innermost part of the Christiania Fjord, where a few specimens were taken from a depth of about 30 fathoms, muddy bottom. Out of Norway, it has not yet been recorded.

Gen. 6. **Eurycope**, G. O. Sars, 1863.

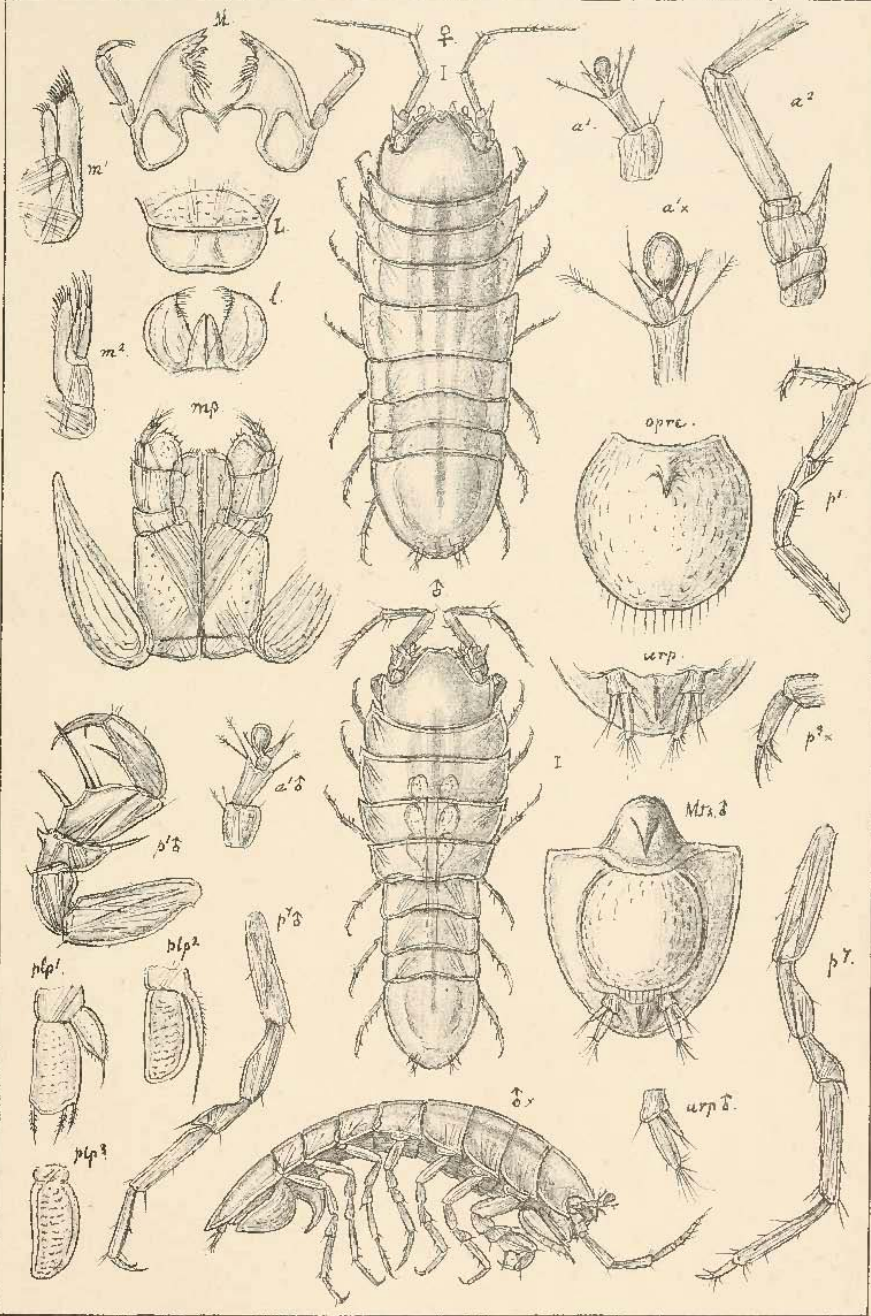
Generic Characters.—Body rather compact and distinctly depressed, more or less oval in outline, with the 2 divisions of mesosome less sharply marked off from each other than in the preceding genera. Cephalon of moderate size, deeply emarginated on each side for the insertion of the antennæ, frontal part more or less projecting. The 4 anterior segments of mesosome comparatively short, subequal, transversely excavated dorsally; the 3 posterior segments very large and broad, with the dorsal face smooth and convex. Caudal segment semi-oval, obtusely rounded at the tip. Superior antennæ with the basal joint large and massive, flagellum multiarticulate. Inferior antennæ very slender and elongated. Mandibles normally developed, with the cutting edge divided into strong teeth, and the molar expansion rather thick, palp comparatively large, with the terminal joint lamellar and much curved. Maxillæ normal. Maxillipeds pronouncedly lamellar, penultimate joint of the palp produced at the end inside to a digitiform lappet, epignath large, and of different form in the different species. 1st pair of legs slender, but shorter than the 3 succeeding pairs, which are subequal and generally very much elongated, terminating in a slender claw. Natatory legs very fully developed and all of same structure, carpal and propodal joints strongly expanded, foliaceous, and densely edged with plumose setæ, dactylus distinct. Uropoda comparatively small, biramous, basal part not lamellarly expanded, rami linear.

Remarks.—This genus, established by the present author in the year 1863, is perhaps the most typical of the *Munnopsida*, in so far as the natatory legs are more powerfully developed than in any of the other genera. The swimming motion of the animal is accordingly extremely rapid and of longer duration than in the other *Munnopsida*. The genus is chiefly characterised by the depressed oval body, the broad caudal segment, the uniform structure both of the ambulatory and natatory legs, and finally, by the structure of the uropoda. Rather a large number of species have been described in recent times, from different parts of the Oceans, amounting to 22 in all. From the Challenger Expedition alone, no less than 13 species have been recorded by Mr. Fr. Boddard; but some of these ought perhaps more properly to be separated as types of nearly-allied genera. To the fauna of Norway belong 8 species, to be described below.



G.O. Sars, autogr.

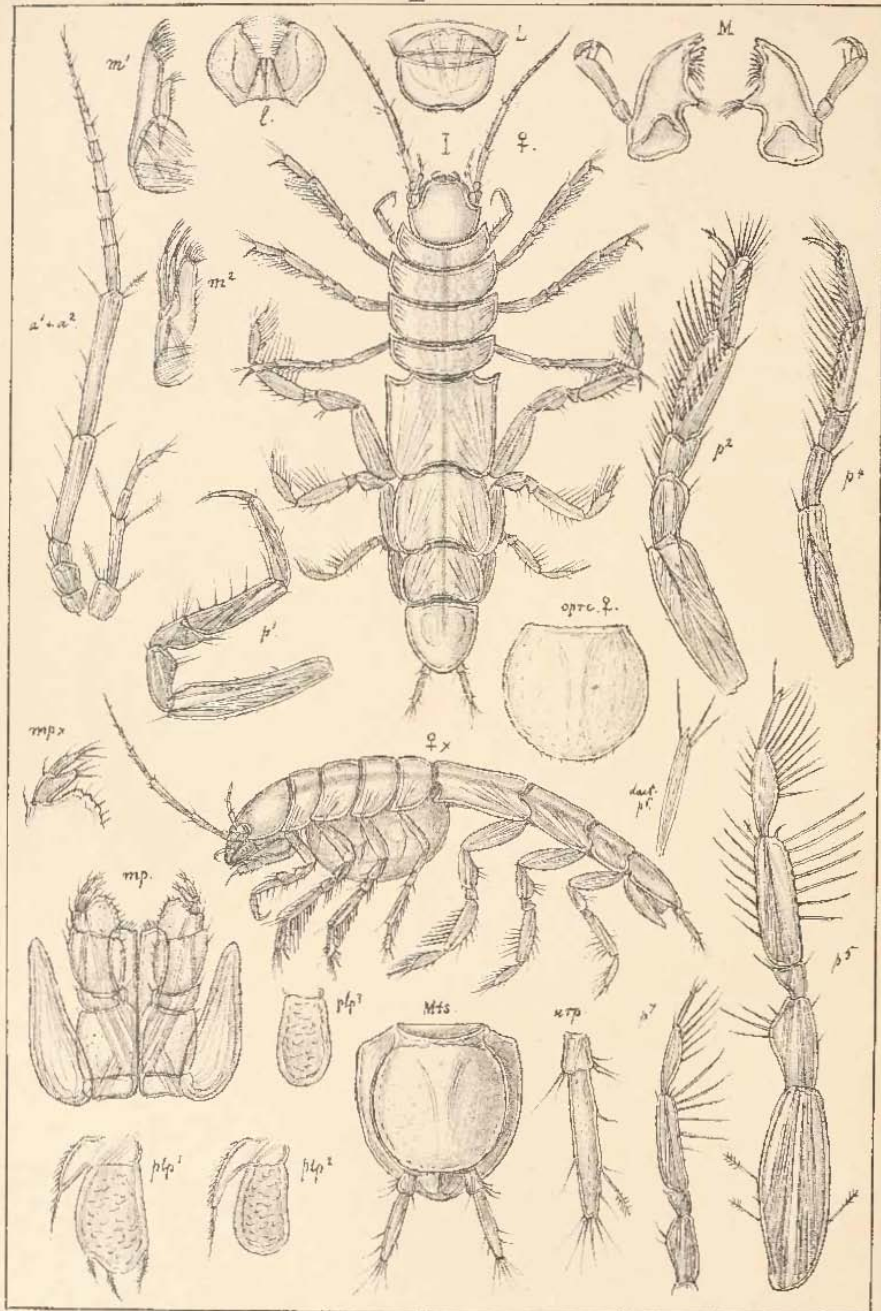
Pleurotion spinosum, G.O. Sars.



G.O. Sars, autogr.

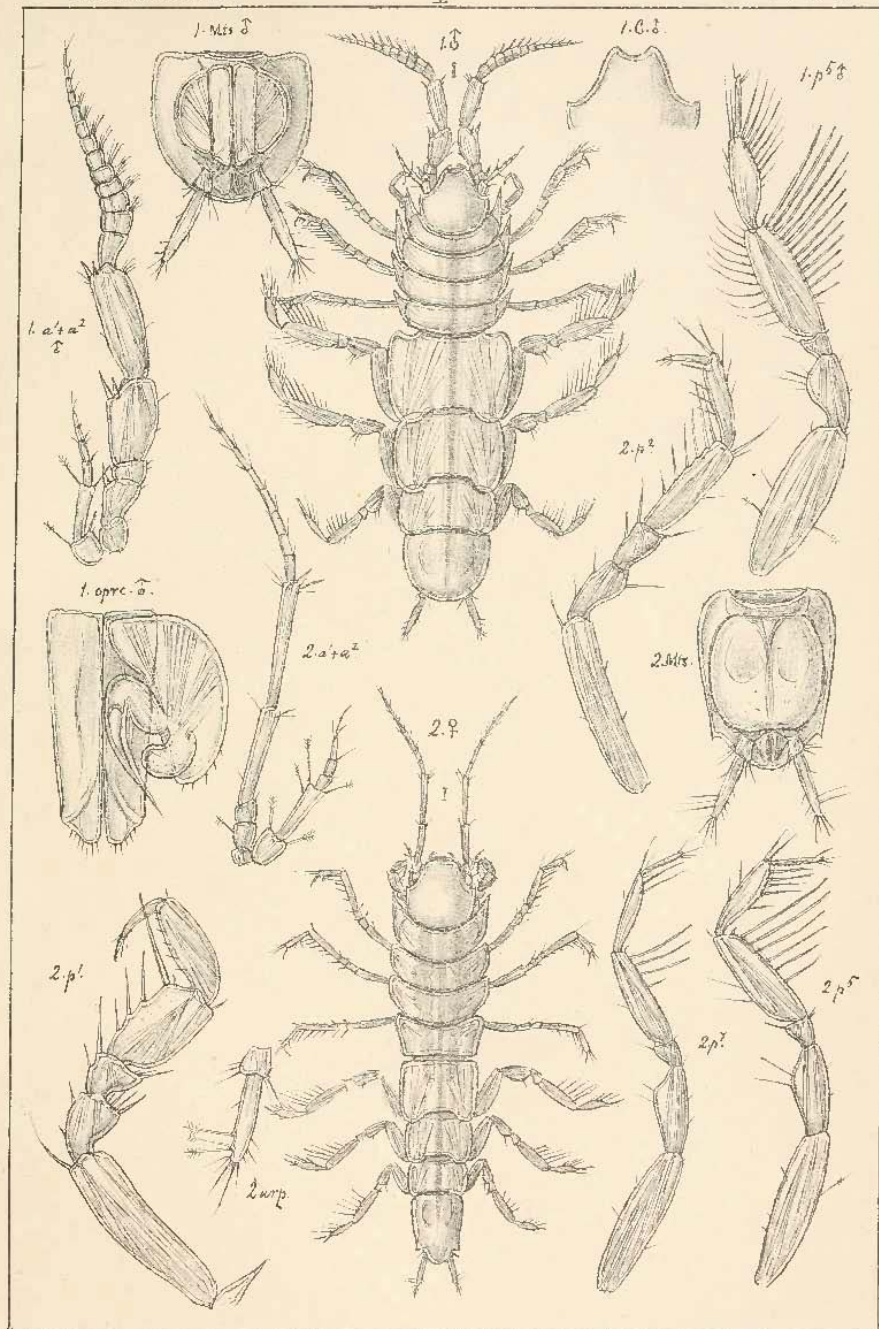
Nannoniscus oblongus, G.O. Sars.





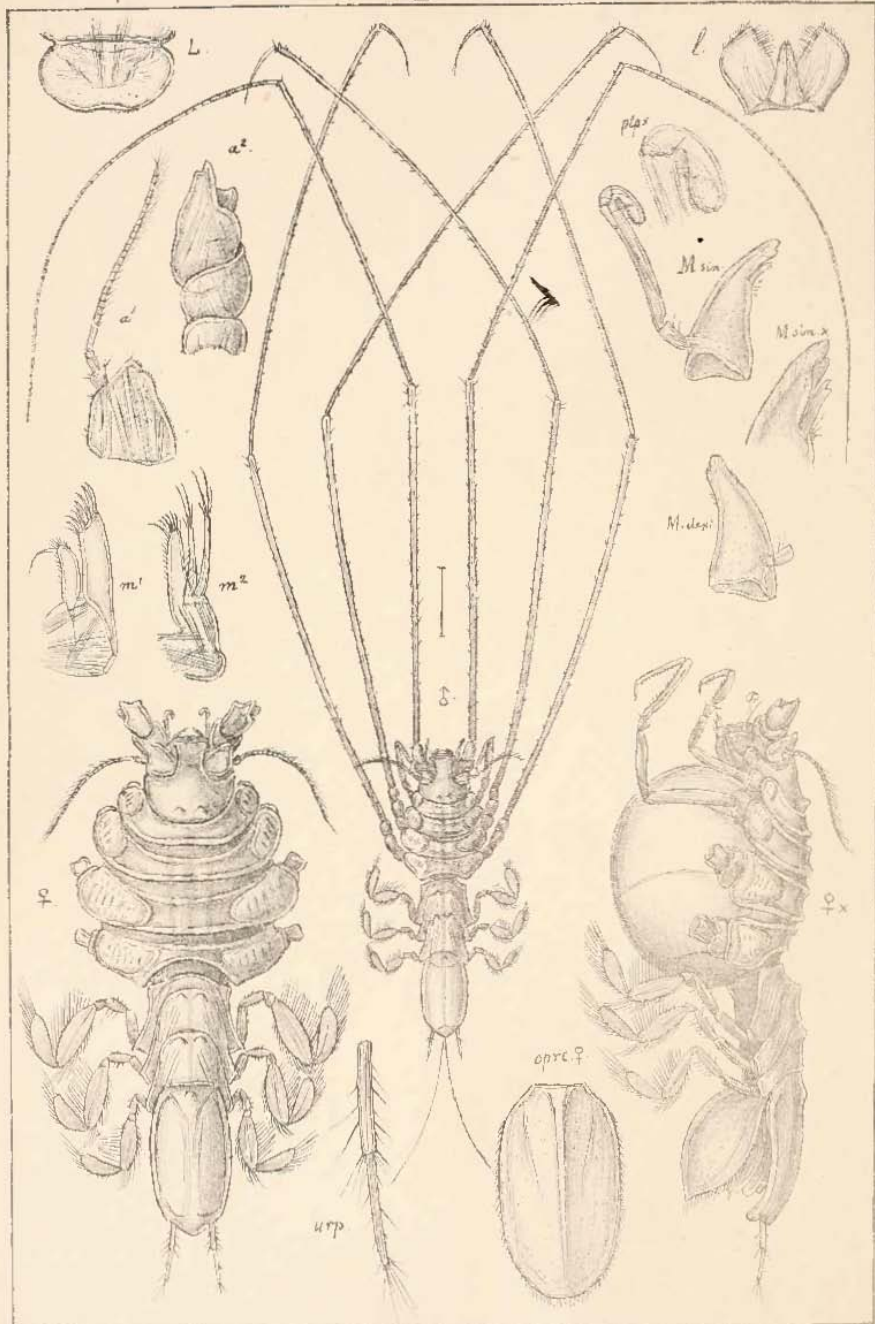
G.O. Sars, bulogr

Desmosoma lineare, G.O. Sars. ♀



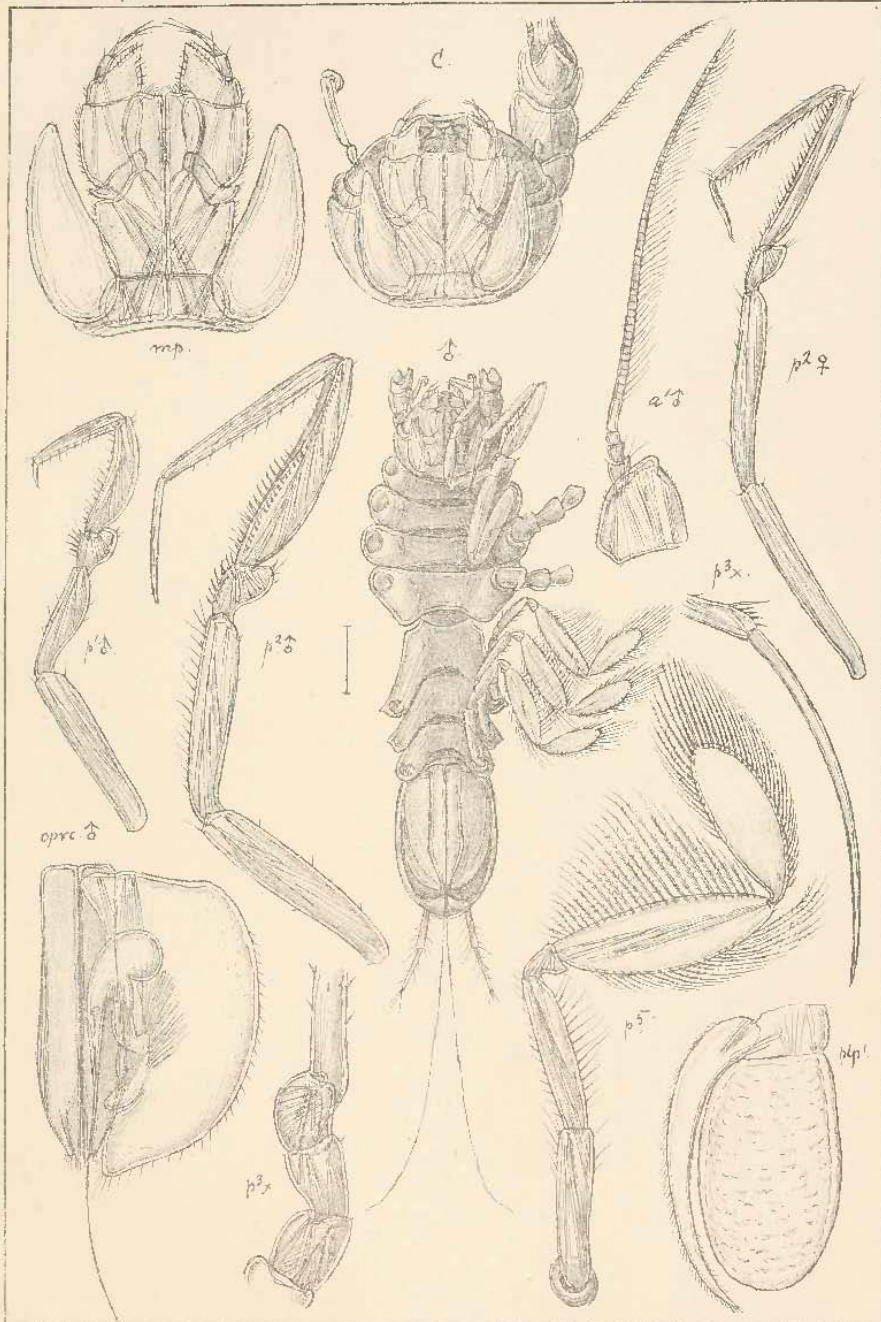
G.O. Sars, autogr.

1. *Desmosoma lineare*, G.O. Sars. ♂.
 2. " *armatum*, G.O. Sars.



G.C. Sars, auctour.

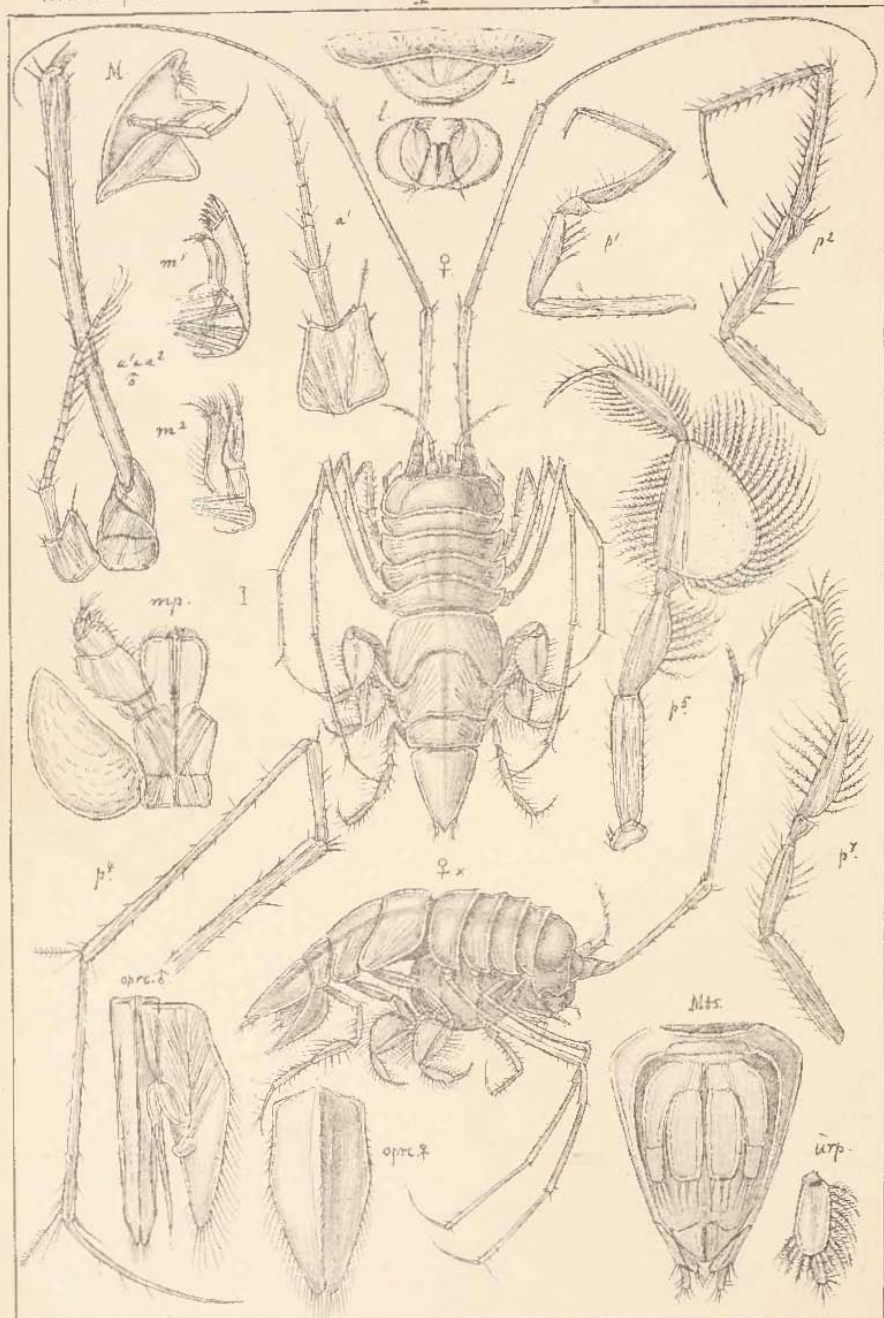
Munnopsis typica, M. Sars

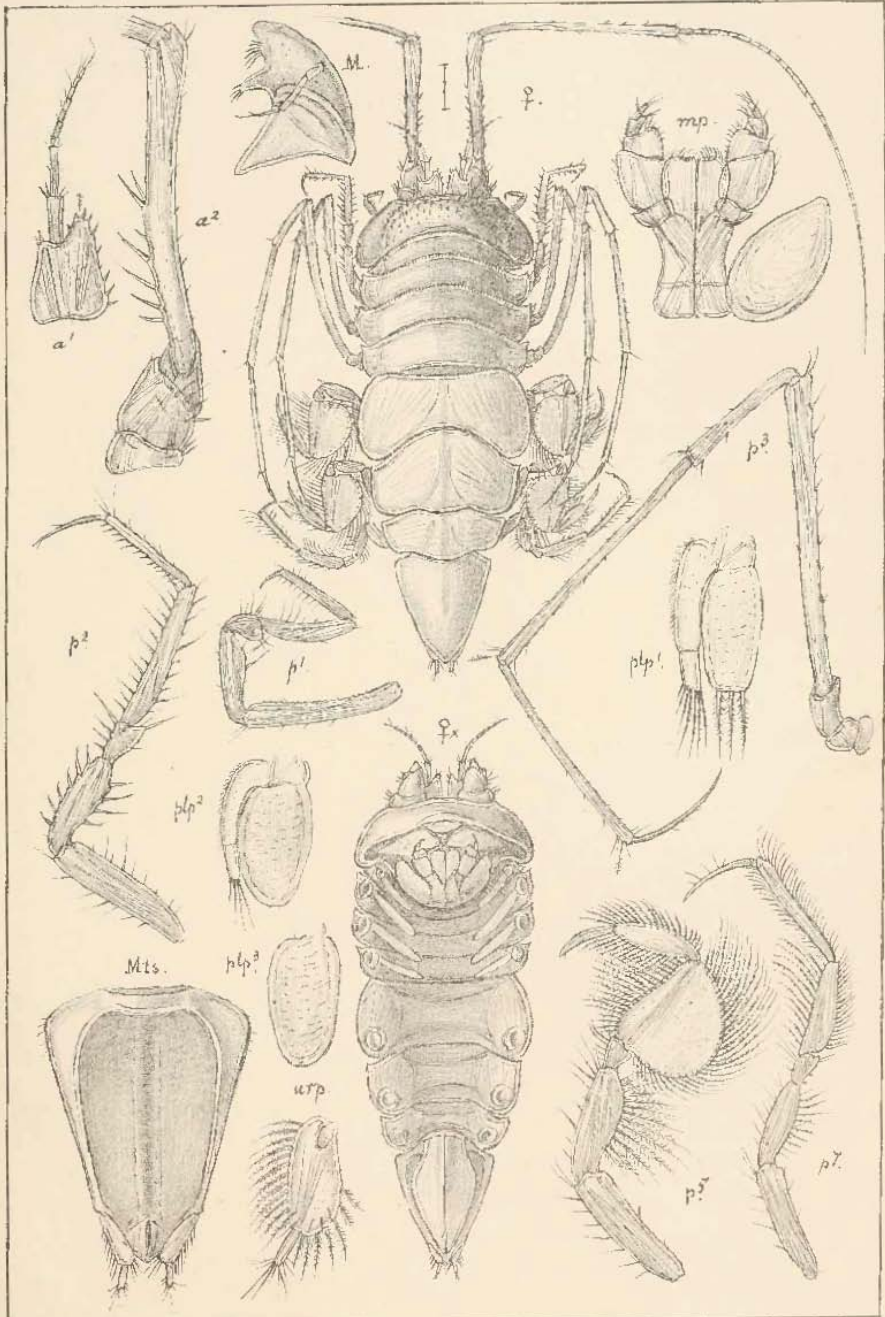


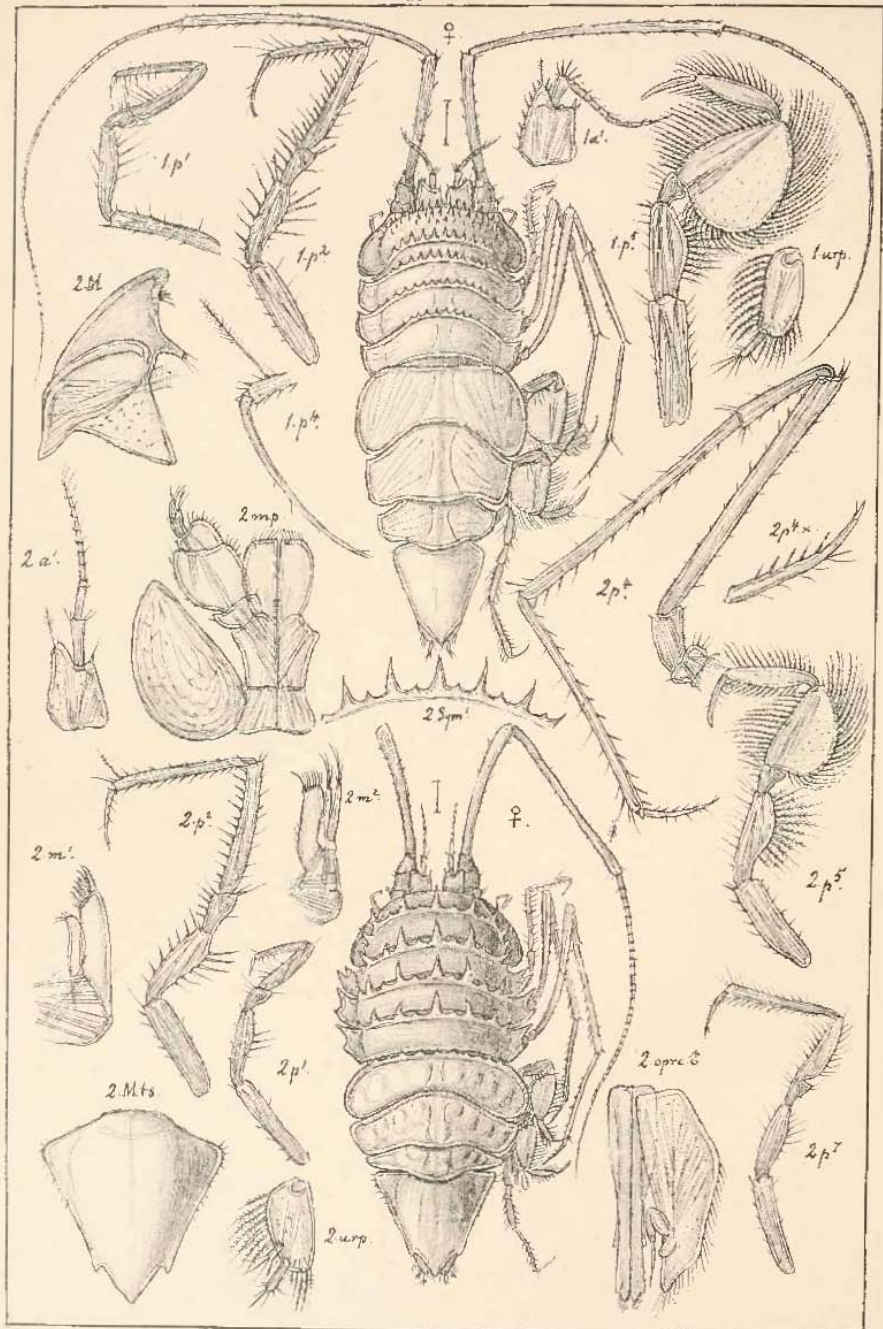
G. O. Sars, autogr.

Munnopsis typica, M. Sars.
(contin.)

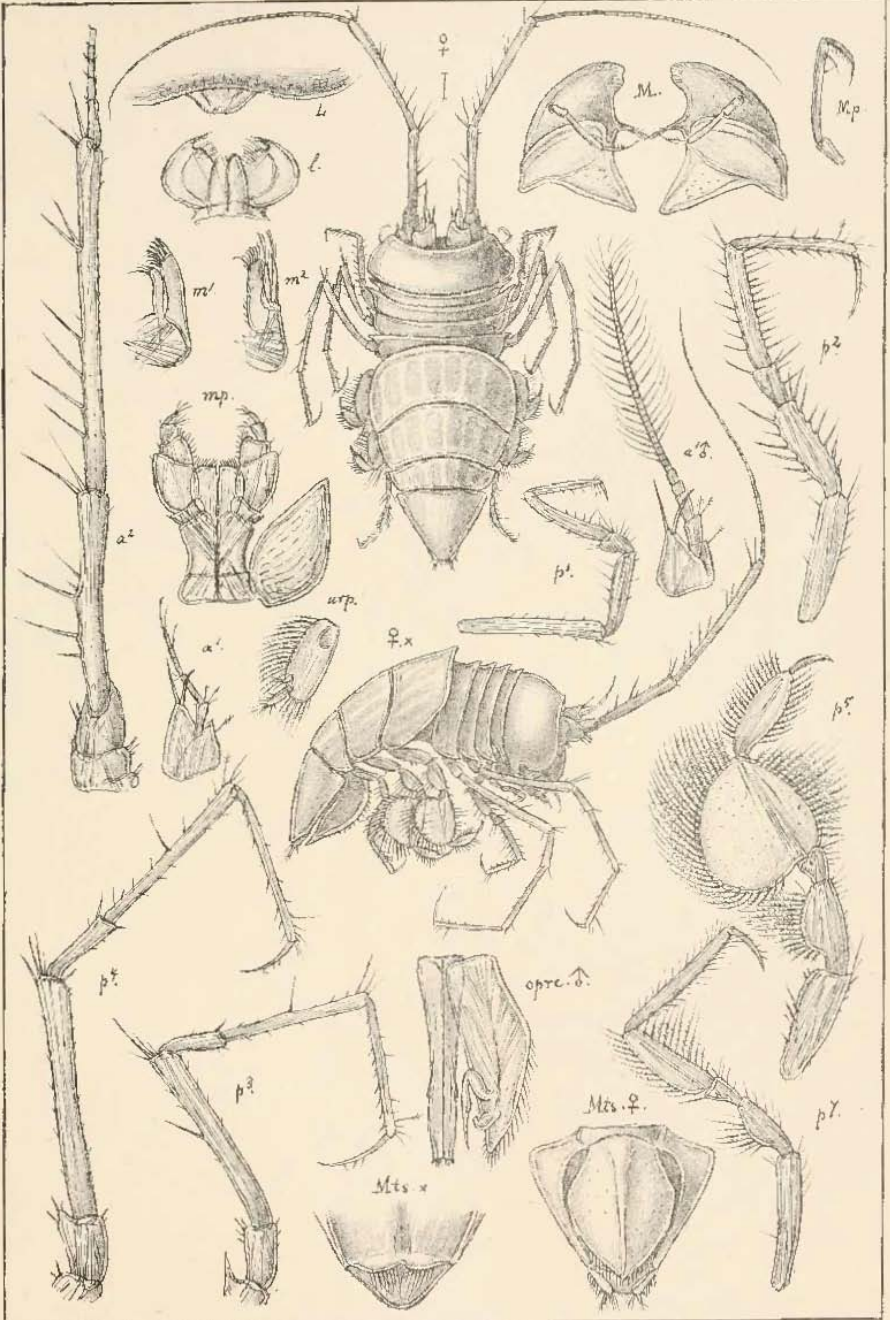








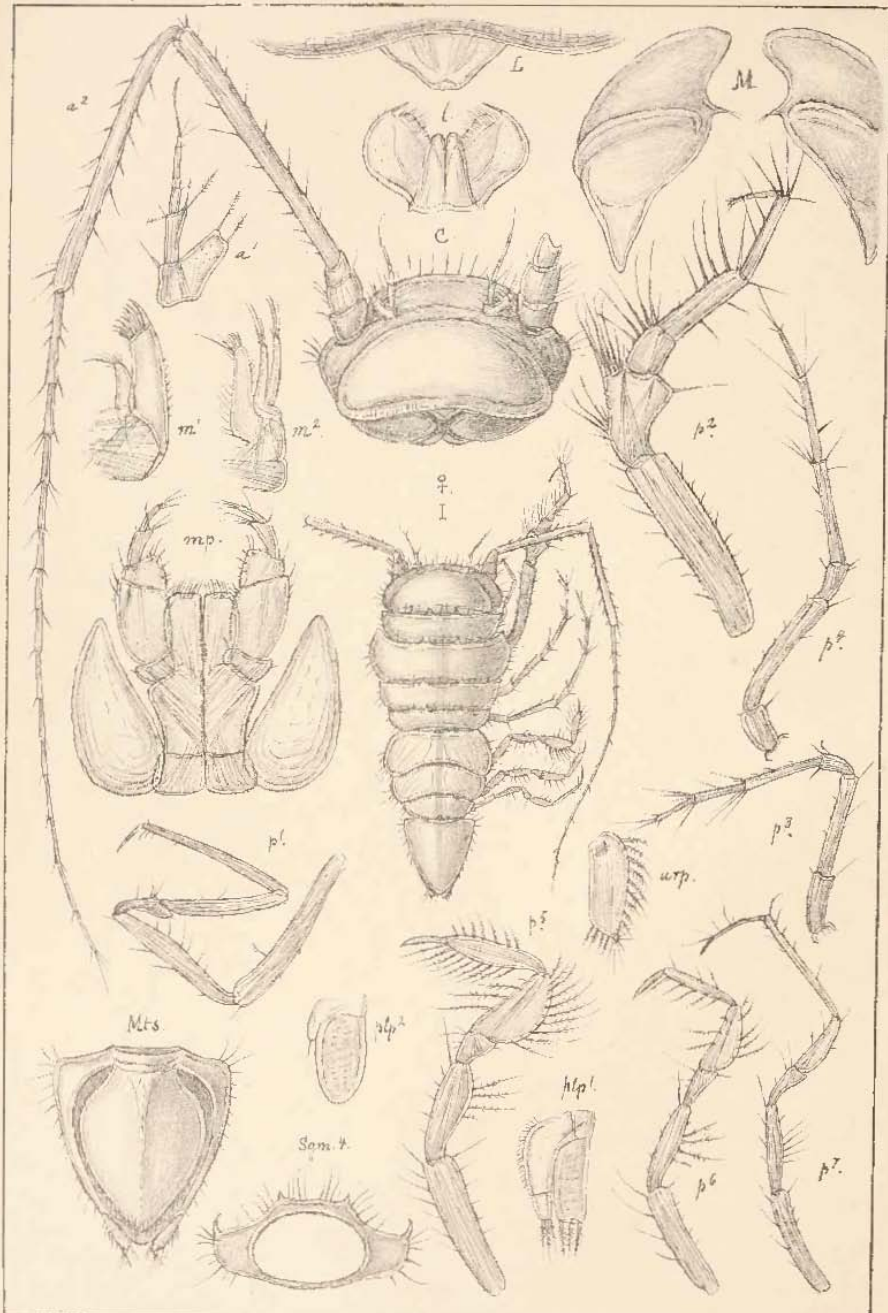
G.O. Sars autogr. 1 *Jlyarachna denticulata*, G.O. Sars. = *J. dentaticeps*.
 2. *Echinozone coronata*, G.O. Sars.



G. O. Sars, autogr.

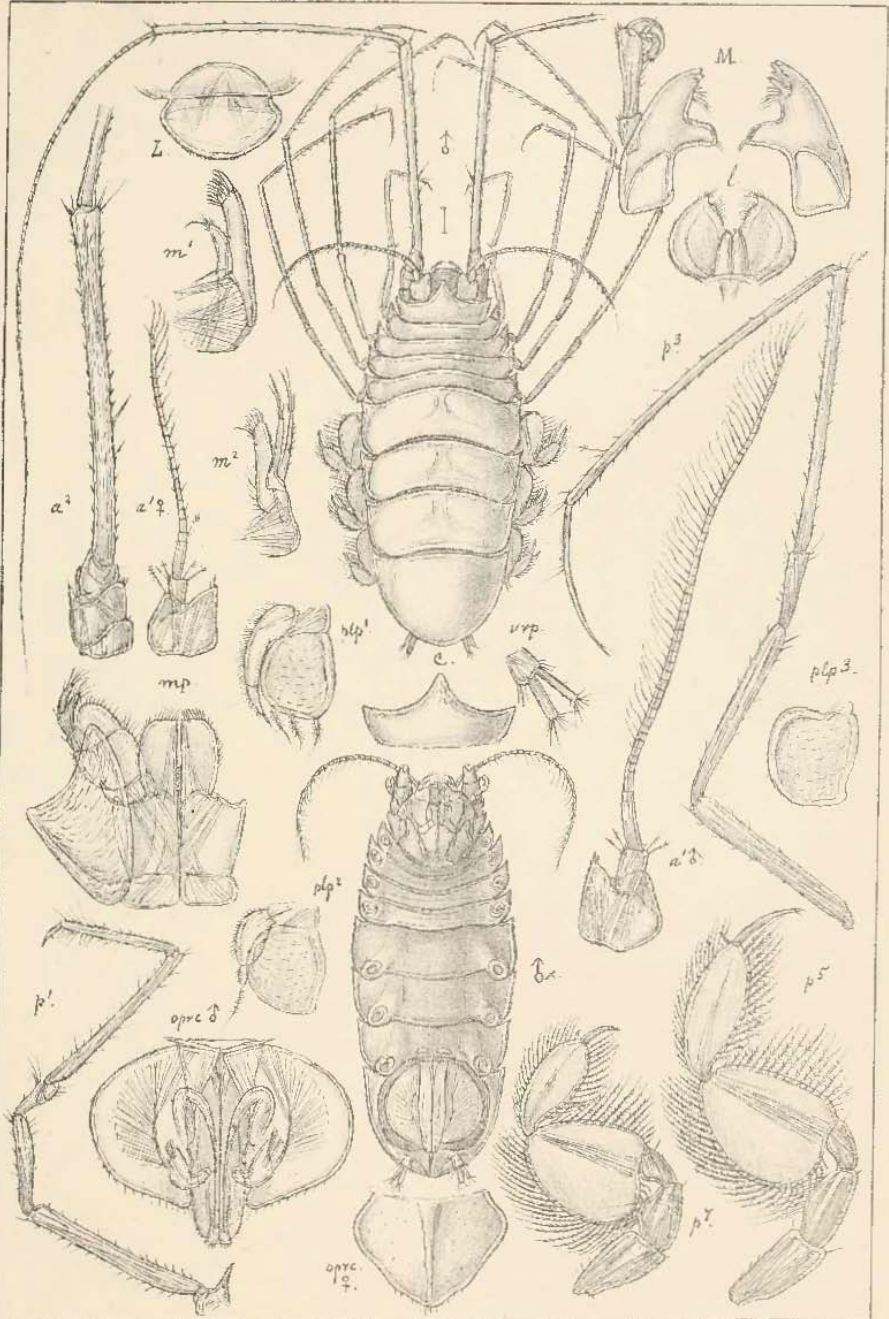
Aspidonotus clypeatus, G. O. Sars.

Aspidobranchus



G. O. Sars, auctogr.

Pseudarachna hirsuta, G. O. Sars.



G. O. Sars, autogr.

Eurycope cornuta, G. O. Sars.

1. *Eurycope cornuta*, G. O. Sars.

(Pl. LXIV.)

Eurycope cornuta, G. O. Sars, Om en anomal Gruppe af Isopoder. Chr. Vid. Selsk. Forhaandl. 1863, pag. 5.

Syn: *Eurycope robusta*, Harger.

Specific Characters.—Body oblong oval in outline, being more than twice as long as it is broad, and with the anterior division not attaining half the length of the posterior. Cephalon with the lateral corners pointed, front produced to an acute, rostriform projection, which, however, does not extend to the end of the basal joint of the superior antennæ. The 4 anterior segments of mesosome comparatively short, and produced on each side to acute, anteriorly-pointed lappets. The 3 posterior segments of mesosome of nearly equal size, and distinctly defined, antero-lateral corners acutely produced. Caudal segment very large, nearly as long as the 2 preceding segments combined, semi-oval in form, edges evenly curved and perfectly smooth, antero-lateral corners projecting. Superior antennæ in male fully half the length of the body, in female somewhat shorter, flagellum very slender and flexible, being composed of 20 in female, in male of about 50 articulations carrying delicate sensory filaments. Inferior antennæ more than 3 times as long as the body, penultimate joint of the peduncle clothed everywhere with adpressed spines, some of which, attached to the inner edge and tip, are stronger than the others. Epignath of maxillipeds securiform, outer edge angularly produced. 1st pair of legs with the propodos much shorter than the carpus, both simple, linear, and clothed with short bristles, dactylus very small; the succeeding pairs very slender, somewhat exceeding the body in length. Natatory legs with the carpal joint cordiform, propodal one of about the same length, but somewhat narrower, oblong oval, dactylus scarcely exceeding half the length of the former. Female operculum subpentagonal in form, and distinctly carinated along the middle; male operculum transformed in the usual manner. Uropoda with the rami subequal in length, the outer one narrower than the inner. Colour of the whole dorsal face, light reddish brown. Length of adult male 4 mm.

Remarks.—This is much the largest and finest of the Norwegian species, and may be regarded as the type of the genus. It is, however, considerably surpassed by some of the exotic species, especially the huge arctic form *E. gigantea* G. O. Sars, which reaches to a length of 34 mm. The *E. robusta* of Harger is unquestionably identical with the present species.

Occurrence.—This species occurs along the whole coast of Norway, from the Christiania Fjord to Vadsö, in depths ranging from 50 to 400 fathoms. In some places, for instance in the Hardanger Fjord and Troughjem Fjord, I have

taken it very plentifully on a muddy bottom; but as the appendages are extremely brittle, it is rarely secured in a perfect condition.

Distribution.—Several Stations of the Norwegian North Atlantic Expedition (the present author), Skagerak (Meinert), Atlantic coast of North America (Harger).

2. *Eurycope producta*, G. O. Sars.

(Pl. LXX.)

Eurycope producta, G. O. Sars, Beretning om en i Sommeren 1865 foretagen Reise ved Kysterne af Christianius og Christiansands Stifter, pag. 32.

Specific Characters.—Body oval, about twice as long as it is broad, and slightly tapering both in front and behind. Cephalon with the frontal part considerably produced, forming a narrow linguiform projection slightly bilobed at the tip, outer edges of the lobes minutely denticulate. Anterior segments of mesosome distinctly excavated above, lateral parts acutely produced in front; the 3 posterior segments all well defined and of about equal length, antero-lateral corners produced. Caudal segment rather large, nearly twice as broad as it is long, and evenly rounded at the tip, edges perfectly smooth. Superior antennæ rather elongated, with the flagellum composed of about 20 articulations. Inferior antennæ about 3 times as long as the body, penultimate joint of the peduncle edged inside with slender spines, flagellum about the length of the peduncle. Epignath of maxillipeds slightly angular outside. 1st pair of legs slender, with the propodal joint scarcely more than half as long as the carpal one; the 3 succeeding pairs somewhat exceeding the length of the body, and very slender; 2nd pair comparatively stronger in male than in female, with the carpal joint slightly dilated and spinous inside. Natatory legs of a similar structure to that in *E. cornuta*, though having the dactylus comparatively smaller. Uropoda with the outer ramus much narrower, but scarcely shorter than the inner. Colour of dorsal face light yellow, all the segments bordered behind with light chestnut. Length of adult female 3 mm.

Remarks.—This species is nearly allied to *E. cornuta*, but of smaller size, and is moreover easily distinguished by the less oblong body, the greatly produced frontal part, and the different colouring of the dorsal face.

Occurrence.—I have met with this species not rarely in several localities of the Norwegian coast, from the Christiania Fjord to Vadsö, in depths ranging from 60 to 400 fathoms. Out of Norway it has not yet been recorded.

3. *Eurycope phallangium*, G. O. Sars.

(Pl. LXVI.)

Eurycope phallangium, G. O. Sars, Om en anomal Gruppe af Isopoder (Christiania Vid. Selsk. Forh. 1863), p. 6.

Specific Characters. Body broadly oval, not nearly twice as long as it is broad, greatest width in the middle. Cephalon with the frontal part conically produced. Fifth and 6th segments of mesosome confluent in the middle, forming together a large vaulted plate, deeply emarginated behind. Caudal segment comparatively small, subpentagonal in form, tip obtusely rounded, lateral edges fringed with stiff bristles. Superior antennæ not much elongated, flagellum composed of about 10 articulation. Inferior antennæ exceedingly slender and elongated, 4 to 5 times as long as the body, the 2 outer joints of the peduncle very narrow and but sparsely setiferous, flagellum longer than the peduncle. Molar expansion of the mandibles rather narrow, attenuated distally. Epignath of maxillipeds lanceolate, without any angle outside. 1st pair of legs comparatively short and rather strongly built, propodal joint fully as long as the carpal one, the latter slightly dilated and curved, with a setiferous ridge inside. The 3 succeeding pairs of legs extremely slender and elongated, more than twice as long as the body, and having the ischial joint produced to an unusual degree. Natatory legs with the carpal joint rather large, obcordate, propodal joint much smaller and narrow oblong in form, dactylus very much produced, considerably exceeding the propodal joint in length, and distinctly biarticulate, proximal joint lanceolate, distal one spiniform. Uropoda with the outer ramus a little longer, but much narrower than the inner. Colour of dorsal face light yellowish grey, with a slight reddish tinge. Length of adult female scarcely exceeding 2 mm.

Remarks.—In several respects this species differs rather markedly from the 2 preceding ones, whereas it exhibits a close relationship to some of the succeeding species. It is therefore most probable that it will be found advisable to establish for these species a separate genus. The specific name refers to the excessively elongated inferior antennæ and ambulatory legs.

Occurrence.—This species is very common along our whole south and west coasts, and extends northwards to Hasvig in Finmark. It occurs in depths ranging from 50 to 300 fathoms, on a bottom consisting of muddy clay. In spite of its small size and inconspicuous colouring, the animal may be easily detected on placing a portion of the mud taken up by the dredge in a shallow vessel, when, like several other small crustacea, it will float up to the surface, without being able to immerge itself again. As, however, the several appendages of the body are extremely fragile, it is rather a rare occurrence to get a specimen with all of them uninjured. Though there cannot be any doubt that this form

must also occur off the coasts of other countries, it has not yet been recorded out of Norway.

4. *Eurycope latirostris*, G. O. Sars.

(Pl. LXVII, fig. 1.)

Eurycope latirostris, G. O. Sars, Oversigt of Norges Crustaceer, I. p. 67, Pl. 2, fig. 6.

Specific Characters.—Very like *E. phallangium* as to its external appearance. Frontal part of cephalon, however, very different, forming a broad linguiform plate slightly emarginated at the tip, and minutely denticulated outside. Fifth and 6th segments of mesosome, as in *E. phallangium*, confluent in the middle. Caudal segment comparatively larger than in that species, but of a similar shape and armament. Inferior antennæ scarcely more than twice the length of the body, with the flagellum much longer than the peduncle. Ambulatory legs of a similar structure to those in *E. phallangium*, though not nearly so much elongated. Natatory legs with the dactylus scarcely attaining the length of the propodal joint. Uropoda with the outer ramus shorter and narrower than the inner. Colour about as in *E. phallangium*. Length of adult female 2 mm.

Remarks.—This species is very nearly allied to *E. phallangium*, and may indeed easily be confounded with it. On a closer examination, however, some well-marked differences are to be found, showing it to be in reality a well-defined species. Thus the frontal part exhibits a totally different appearance, being rather broad, linguiform, and slightly emarginated at the tip, whereas in *E. phallangium* this part tapers to a point. Moreover the inferior antennæ and the ambulatory legs are less elongated, though of a similar slender form to those in *E. phallangium*; finally, the dactylus of the natatory legs is much shorter, and the rami of the uropoda are shorter and thicker.

Occurrence.—Only a few specimens of this form have hitherto come under my notice. That first described was found in the outer part of the Hardanger Fjord. Some other specimens were subsequently detected on looking over a great number of *E. phallangium* taken in the inner part of the Stavanger Fjord from a depth of 150 to 200 fathoms.

5. *Eurycope fureata*, G. O. Sars.

(Pl. LXVII, fig. 2.)

Eurycope fureata, G. O. Sars, Nye Dybvandscrustaceer fra Lofoten. Chr. Vid. Selsk. Forh. 1869, p. 165.

Specific Characters.—Body oval, greatest width exceeding half the length, and occurring somewhat behind the middle. Frontal part of cephalon greatly produced, forming a narrow, conical plate, minutely bifurcate at the tip, and ex-

tending as far as the 3rd peduncular joint of the inferior antennæ. Anterior segments of mesosome short, and transversely excavated, with the lateral parts acutely produced in front. Fifth and 6th segments confluent dorsally, and forming a large vaulted plate deeply emarginated behind. Caudal segment semioval, edges evenly curved and perfectly smooth. Inferior antennæ not very elongated, scarcely exceeding by more than $\frac{1}{4}$ of their length that of the body, the 2 outer joints of the peduncle edged with slender spines, flagellum much shorter than the peduncle. Epignath of maxillipeds oblong lanceolate, coarsely striolate. 1st pair of legs but little different from the 3 succeeding ones, which are rather short, scarcely exceeding half the length of the body. Natatory legs with the propodal joint rather broad, oval, constricted at the base, dactylus narrow lanceolate, and about half the length of the former joint; last pair considerably smaller than the 2 preceding ones, and having the carpal joint lamellarily expanded outside. Uropoda with the outer ramus much shorter and narrower than the inner. Colour whitish, semipellucid. Length of adult female scarcely attaining 2 mm.

Remarks.—In the coalesced 5th and 6th segments of the mesosome, this species agrees with the 2 preceding ones, but otherwise it is rather different, and easily recognisable by the conically produced, and minutely bifurcate frontal part, the unusually short inferior antennæ and ambulatory legs, and the whitish colour.

Occurrence.—I first detected this form off the Lofoten islands, at Skraaven, where it is not uncommon in 100–120 fathoms, on a bottom consisting of sandy clay. Subsequently I have also met with it in a widely distant locality, viz., in the inner part of the Stavanger Fjord, at Jelsø. Out of Norway this form has not yet been recorded.

6. *Eurycope mutica*, G. O. Sars.

(Pl. LXVIII, fig. 1.)

Eurycope mutica, G. O. Sars, Om en anoual Gruppe af Isopoder. Chr. Vid. Selsk. Forh. 1863, p. 6.

Specific Characters.—Body broadly oval, greatest width exceeding half the length and occurring in the middle. Frontal part of cephalon rather broad and obtusely rounded at the tip. Anterior segments of mesosome with the lateral parts not acutely produced in front; 5th and 6th segments imperfectly defined dorsally. Caudal segment not very large, slightly coarctated towards the tip, which is narrowly rounded, lateral edges setiferous. Superior antennæ comparatively small, flagellum composed of only 5 or 6 articulations. Inferior antennæ very slender, fully twice as long as the body, flagellum more than twice the length of the peduncle. Epignath of maxillipeds short and broad, obtusely truncated at the tip. 1st pair of legs with the propodal joint much shorter than

the carpal one, dactylus minute; the 3 succeeding pairs rather slender, though scarcely exceeding the body in length, dactylus very long and slender; 2nd pair somewhat more strongly built in male than in female, with the carpal joint slightly dilated. Natatory legs with the propodal joint broadly oval, much constricted at the base, dactylus narrow, styloform. Uropoda extremely small, outer ramus scarcely half as large as the inner. Colour of dorsal face very dark fuscous, towards the edges of the segments almost black. Length of adult female $1\frac{1}{2}$ mm.

Remarks.—This species may be easily distinguished from the preceding ones by the broad, obtusely rounded frontal part of the cephalon, and by the very dark colour of the dorsal face. It is also rather inferior in size.

Occurrence.—I first found this form in the inner part on the Christiania Fjord, and have subsequently met with it in many other places of the Norwegian coast, and as far north as Bodö. It is not strictly a deep-water species, being often found in only a few fathoms' depth among algæ. Its swimming motions are extremely rapid, and are effected by long abrupt bounds backwards. Out of Norway this form has not yet been recorded.

7. *Eurycope pygmæa*, G. O. Sars.

(Pl. LXVIII, fig. 2.)

Eurycope pygmæa, G. O. Sars, Nye Dybvandsrustaeer fra Lofoten, Chr. Vid. Selsk. Forh. 1869, p. 166.

Specific Characters.—Body ovate, greatest width equalling about half the length, and occurring in the middle. Frontal part of cephalon very broad, slightly widening distally, and transversely truncated at the tip, with the lateral corners acute. 1st segment of mesosome very small, with the lateral parts concealed; lateral parts of the 3 succeeding ones slightly produced in front; 5th and 6th segments imperfectly defined dorsally. Caudal segment of moderate size, narrowly rounded at the tip, lateral edges setiferous. Superior antennæ about as in *E. mutica*. Inferior antennæ not nearly attaining twice the length of the body, flagellum but little longer than the peduncle. Maxillipeds with the penultimate and antepenultimate joints greatly expanded, laminar, epignath short and broad, resembling that in *E. mutica*. 1st pair of legs with the propodal joint scarcely more than half the length of the carpal one; the 3 succeeding pairs of a similar structure to those in *E. mutica*. Natatory legs with the propodal joint considerably expanded, rounded oval in form, dactylus unusually broad, fusiform in outline, with the edges serrate. Uropoda very small, and resembling those in *E. mutica*. Colour of dorsal face

light fuscous, tinged towards the edges of the segments with chestnut. Length of adult female scarcely exceeding 1 mm.

Remarks.—This dwarf species is evidently closely allied to *E. mutica*, but is of still smaller size, and is moreover distinguished by the somewhat different form of the frontal part of the cephalon, the comparatively shorter inferior antennæ, the peculiar shape of the dactylus of the natatory legs, and finally by the much paler colour of the dorsal face.

Occurrence.—The only place where I have met with this form, is off the Lofoten Islands, at Skraaven. It occurred here rather sparingly in a depth of about 120 fathoms, sandy clay. Out of Norway this species has not yet been recorded.

8. *Eurycope megalura*, G. O. Sars.

(Pl. LXIX.)

Eurycope megalura, G. O. Sars, Undersøgelser over Hordangerfjordens Fauna, Crustacea, p. 31.

Specific Characters.—Body oblong oval, greatest width not attaining half the length, and occurring about in the middle. Frontal part of cephalon rather produced, linguiform, slightly excavated, and distinctly emarginated at the tip, lateral edges minutely serrate. Anterior segments of mesosome of normal appearance, with the lateral parts slightly denticulate at the distal edges; 5th and 6th segments distinctly defined above, and rather large, with the lateral edges denticulate; 7th segment very short, almost band-shaped. Caudal segment of considerable size, fully equalling in length the 3 preceding segments combined, and subtriangular in form, with the tip narrowly rounded. Superior antennæ in female of normal appearance, in male very largely developed, extending to the end of the penultimate joint of the inferior antennæ, flagellum composed of about 16 articulations clothed with long, band-like sensory appendages. Inferior antennæ scarcely attaining twice the length of the body, the 2 outer joints of the peduncle rather strong, and edged with numerous slender spines, flagellum about the length of the peduncle, and very narrow. Molar expansion of mandibles conically tapering. Maxillipeds very strongly built, with the penultimate and antepenultimate joints greatly expanded, the former terminating outside in an acute projection, the latter having the inner expansion angularly produced at the tip, epignath large, lanceolate, with the outer edge sharply curved in the middle. 1st pair of legs with the 2 outer joints very narrow, the carpal one being much the longer; the 3 succeeding pairs unusually robust, and not nearly attaining the length of the body. Natatory legs with the propodal joint considerably expanded, almost

orbicular in form, dactylus comparatively short, lanceolate; last pair much smaller than the 2 preceding pairs. Uropoda exceedingly small, resembling in structure those in the 2 preceding species. Colour of dorsal face light yellowish, with the edges of the segments somewhat darker, caudal segment yellowish brown. Length of adult female $2\frac{1}{2}$ mm.

Remarks.—This is a very distinct species, and ought perhaps to be regarded as the type of a separate genus, differing, as it does, in several points rather essentially from the other species.

Occurrence.—Only a few specimens of this form have hitherto come under my notice. They were taken, some in the outer part of the Hardanger Fjord, at Mosterhavn, some in the Stavanger Fjord, the depth ranging from 150 to 200 fathoms. Out of Norway it has not yet been recorded.

Tribe 5.

ONISCOIDA.

Remarks.—This tribe comprises the air-breathing or terrestrial Isopoda, to which the name of the order may be found to be more properly applicable. Indeed, in all the known forms of this tribe the legs exhibit a very uniform appearance, being all ambulatory in character; and in the general appearance a much greater uniformity also prevails in this tribe than in other tribes of the Isopoda. The body is more or less depressed, oval or oblong in form, and may in some cases admit of being rolled into a ball. The cephalon is generally small, and more or less sunk into the 1st segment of the mesosome, exhibiting no true rostral projection, whereas the lateral parts may be more or less expanded. The mesosome is composed of 7 well-defined and rather uniform segments, the lateral parts of which are generally expanded to thin fornicate plates. The metasome, in by far the greater number of the forms, is divided into 6 well-defined segments, the lateral plates (epimeræ) of which may also be expanded in a similar manner to those of the mesosome. More generally, however, this is not the case with the last, and the 2 anterior segments, which, as a rule, are smaller than the 3 middle ones. The 1st pair of antennæ are always very small, and are placed inside the 2nd pair, for which reason they cannot properly be termed "superior antennæ", but may more conveniently be named "antennulæ", on account of their small size. They are never composed of more than 3 joints, the last of these being often rudimentary. The 2nd pair of antennæ, or true antennæ, are of normal structure, being composed of a 5-articulated peduncle and a flagellum generally divided into a restricted number of articulations. They are of moderate length, seldom exceeding half the length of the body. The buccal mass is more or less prominent, and the oral parts are adapted to biting and triturating the food.

The mandibles are strong, and always without palps. The anterior maxillæ are normal, with 2 masticatory lobes, the inner of which carries on the tip 2 or 3 brush-like setæ. The posterior maxillæ, on the other hand, exhibit a rather different appearance from those in most other Isopoda, being laminar, with only a very slight indication of a subdivision into lobes. The maxillipeds do not completely cover the other oral parts, and they have the terminal part more or less reduced. The marsupial pouch in the female is composed of 4 pairs of broad lamellæ issuing from the bases of the 2nd to 5th pairs of legs. The appendages of the metasome are 6 pairs, the 5 anterior of which are respiratory in character, the inner plate being of a very delicate spongy structure, whereas the outer is more strongly chitinized and covers the inner like an operculum. In some cases this opercular plate contains on the 2 anterior pairs, more rarely on all the pairs, air-cavities or pseudo-tracheæ. In the male, the inner plate of the 2nd, and often also of the 1st pair, is peculiarly modified, to serve for copulative purposes. The last pair of appendages represent the uropoda. They are, as a rule, biramose, with the rami unarticulate, and they project more or less behind.

The forms belonging to this tribe are generally found in damp situations, beneath leaves, stones or timber, often in great numbers, and feeding, it would seem, on both animal and vegetable matter. They all seem to avoid the full light of day, and some forms even lead a true subterranean existence, in which case the eyes are often found to be rudimentary or wholly absent. As to the respiration, it cannot properly be said to be an exclusive air-breathing in the same sense as in insects. It is in fact to some extent branchial, and therefore a certain amount of atmospheric moisture is indispensable to their existence. It is for this reason, that in very dry weather these animals seem almost wholly to disappear, retiring more or less deeply into crevices and hollows, where some moisture still remains.

The tribe has been divided into 2 sections, viz., the *Ligiæ* and the *Onisci*. Both of these sections may conveniently be subdivided into several families. Of such families 4 are represented in the fauna of Norway, and will be treated of below.

Among the several authors, who have made the present tribe their special study, must be named the Danish zoologist, Mr. Budde-Land, who in his admirable work, "Crustacea isopoda terrestria", has treated of all species at that time known, both indigenous and foreign, amounting in all to several hundreds. It is to be regretted that this valuable work is accompanied by no figures.

Fam. 1. Ligiidæ.

Characters.—Body oval, more or less convex above, with the lateral parts of the segments lamellar. Cephalon without any lateral lobes, frontal part rounded and not distinctly defined from the epistome. Eyes well developed or wanting. Antennule with the last joint very small and without distinctly developed sensory filaments. Antennæ well developed, with multiarticulate flagellum. Buccal mass rather prominent. Mandibles with the molar expansion large and broad, exhibiting a finely-fluted, triturating surface. Inner masticatory lobe of the anterior maxilla with 3 thick, hairy bristles. Posterior maxilla with 2 similar bristles inside. Maxillipeds with the terminal part distinctly 5-articulate, masticatory lobe truncate at the tip, epignath rather short. External sexual appendages in male double. Inner ramus of 1st pair of pleopoda of a similar structure in the 2 sexes, that of 2nd pair in male terminating in a long stylet, slightly dilated at the tip; opercular plate of pleopoda without air-chambers. Uropoda freely projecting behind, both rami styliiform.

Remarks.—In the restriction here adopted, this family comprises as yet 5 genera, viz., *Ligia*, *Ligidium*, *Tithanetes*, *Styloniscus* and *Stymphalus*, all of which are distinguished from the other Oniscoida, among other things, by the multiarticulate antennal flagellum, by the double external sexual appendages of the male, and by the inner ramus of the 1st pair of pleopoda in male not being transformed into copulative organs. Moreover the wholly exposed uropoda may serve as an easily recognisable distinguishing character. Of the above-named genera, the first 2 will be treated of below.

Gen. *Ligia*, Fabricius, 1798.

Generic Characters.—Body regularly oval, or oblong oval, moderately convex above, with the metasome not abruptly contracted; last segment rather broad with distinct epimeral plates. Eyes large and convex. Antennule very small, with the last joint rudimentary, nodiform. Antennæ rather strong and elongated. Mandibles with a ciliated lappet and numerous penicils behind the cutting part. Maxillipeds comparatively short and stout, with the terminal part rather expanded, epignath rounded. Legs gradually increasing in length posteriorly, dactylus distinctly bi-unguiculate. Opercular plate of uropoda sub-branchial. Uropoda more

or less elongated, basal part not produced inside, rami narrow, styliform, sub-equal, each with a single apical spine.

Remarks.—This genus was established by Fabricius as early as in the year 1798, to include the *Oniscus oceanicus* of Linné. It is chiefly characterised by the form of the metasome, and the structure of the antennulæ and uropoda. Mr. Biddle-Lund enumerates no less than 17 different species, 12 of which have been examined by himself. Of these only a single species belongs to the North European fauna; it will be described below.

Ligia oceanica, (Lin.).

(Pl. LXX.)

Oniscus oceanicus, Linné, Syst. nat. ed. 12, 1. 2, p. 1061.

Syn: *Cymothoa oceanica*, Fabr.

" *Ligia scopulorum*, Leach,

" — *belgica*, Bosc.

Specific Characters.—Body oval in form, scarcely more than twice as long as it is broad, dorsal face moderately convex and slightly granulated. Cephalon, when seen from above, semi-oval, with the front evenly rounded, and with a slight transversal depression dorsally. Lateral parts of mesosome lamellarly expanded, and defined from the corresponding segments by a slight groove, posterior corners obtusely acuminate. Metasome exceeding $\frac{1}{4}$ of the length of the body, and rounded in form, with the epimeral plates of the 2 anterior segments concealed; those of the 3 succeeding segments well developed, recurved. Last segment rather broad, semilunar, evenly arched at the tip, lateral parts forming a similar recurved expansion to those of the preceding segments. Eyes large and convex, consisting of numerous densely crowded visual elements. Antennulæ extremely small, scarcely projecting in front, the first 2 joints of about equal length, last one exceedingly minute, nodiform. Antennæ rather strongly built and exceeding half the length of the body, flagellum about the length of the peduncle, and composed of about 12 short articulations. Legs moderately strong, spinous. Opercular plates of pleopoda exhibiting a very delicate, branchial structure. Uropoda about the length of the metasome, basal part somewhat flattened, and slightly produced at the end outside, rami twice the length of the basal part, and narrow styliform, each terminating in a slender spine. Colour of dorsal face grey, with a bluish or greenish tinge, and more or less distinctly variegated with irregular lighter patches, legs minutely spotted. Length of adult female 20 mm., of male up to 28 mm.

Remarks. This form was described as early as in the year 1767 by Linnæus as *Oniscus oceanicus*, and has subsequently been recorded by Leach and Bosc under different specific names. It is the largest of our indigenous Oniscoida, and is moreover easily recognizable by the strongly built antennæ and the structure of the uropoda.

Occurrence.—Along the western coast of Norway this form occurs rather plentifully, and extends northwards at least to the Trondhjem Fjord. In the inner part of the Christiania Fjord, on the other hand, I have never met with it, and it would seem therefore that it deserves its specific name, being apparently restricted to those coasts that are open to the oceans. It is always found close to the shore, just above high-water-mark, beneath decaying algæ and stones, feeding, it would seem, both on animal and vegetable matter. When alarmed, it runs away with great agility, to conceal itself in the crevices of the rocks, and beneath stones.

Distribution.—Coasts of Denmark, Prussia, Belgium, France, Spain, Britain, Farø Islands.

Gen. 2. *Ligidium*, Brandt, 1833.

Syn: *Zia*, Koch.

Generic Characters.—Body oblong, rather convex, attenuated behind. Cephalon evenly rounded in front. Lateral parts of mesosome less prominent than in *Ligia*, and not defined from the corresponding segments by any distinct groove. Metasome comparatively small and abruptly contracted, with the last segment of inconsiderable size and without any epimeral plates. Eyes large and convex. Antennule less rudimentary than in *Ligia*, and distinctly projecting in front. Antennæ less strongly built than in that genus, though of a very similar structure. Mandibles with a restricted number of penicils, and without any ciliated lappet behind the cutting part. Maxillipeds more slender than in *Ligia*, with the terminal part less expanded, epignath narrow linguiform. Legs very slender, and greatly increasing in length posteriorly. Opercular plates of pleopoda very thin, without any obvious branchial structure. Uropoda not very large, basal part produced at the end inside to a conical process carrying the inner ramus, the latter, as a rule, smaller than the outer, and provided with 2 long and slender apical bristles.

Remarks.—This genus, established by Brandt, is chiefly distinguished from *Ligia*, by the abruptly contracted metasome, the less rudimentary state of the antennule, and the peculiar structure of the uropoda. The genus *Zia* of Koch is identical with the present genus. Several species have been described, amounting, according to Mr. Budde-Land, to 8 in all. Only one species belongs to the Scandinavian fauna, and it will be described below.

Ligidium hypnorum (Cuv.).

(Pl. LXXI.)

Oniscus hypnorum, Cuvier, Journ. d'hist. nat. Vol. II, p. 19, pl. 26, figs. 3-5.

- Syn: *Oniscus agilis*, Persoon
 " *Ligia hypnorum*, Bosc.
 " *Zia agilis*, Koch
 " *Ligidium Personii*, Zaddach
 " *Zia Soundersii*, Stobbing
 " *Ligidium agile*, Norman.

Specific Characters. Body oblong oval, greatest width not attaining half the length, dorsal face rather convex, and perfectly smooth and shining. Cephalon of moderate size, and evenly rounded in front, dorsal face transversely grooved behind the eyes. Lateral parts of the 3 anterior segments of mesosome but slightly prominent; those of the 4 posterior segments somewhat larger, and terminating behind in obtuse points. Metasome scarcely exceeding in length $\frac{1}{3}$ of the mesosome, and much narrower, with the epimeral plates small and appressed; last segment obtusely rounded at the tip, with a slight angle on each side. Eyes very large, oval, extending down the sides of the cephalon. Antennule with the 1st joint rather thick, 2nd longer but much narrower, both armed at the tip inside with 3 rather long diverging spines, last joint very small, narrow cylindrical. Antennæ rather slender, though not nearly attaining half the length of the body, flagellum somewhat shorter than the peduncle, and composed of about 11 articulations, the last tipped with a dense bunch of delicate hair-like bristles. Legs armed with scattered slender spines, propodal joint very narrow and elongated, dactylus simple. Inner plate of 1st pair of pleopoda in male slightly produced at the tip, and provided with 4 apical bristles. Uropoda scarcely exceeding half the length of the metasome, inner projection of the basal part occupying about half its length, outer ramus gradually tapering distally and carrying on the tip 3 short bristles, inner ramus very narrow, linear, not extending to the tip of the outer, apical bristles nearly as long as the ramus. Colour of dorsal face light fuscous, variegated with irregular dark patches, which on each side, at the base of the lateral plates of mesosome, form a nearly continuous longitudinal band. Length of adult female 9 mm.

Remarks.—This form was first described by Cuvier in the year 1792 as *Oniscus hypnorum*, and by subsequent authors was referred to the genus *Ligia*, until Brandt established for it a distinct genus; but the original specific name was changed by that author, as also by most subsequent zoologists, excepting Mr. Budde-Lund, who again restored the Cuvierian name. It is an easily recognizable form, being particularly distinguished by the peculiar structure of the uropoda. From its nearest ally among the northern Oniscoida, *Ligia oceanica*, it is moreover easily distinguishable by the abruptly contracted metasome and the feebler development of the antennæ.

Occurrence.—In Norway this form has not yet been met with; but I regard it as highly probable, that, on a closer investigation, it will in reality be found to occur somewhere in the country, since it is not uncommon either in Sweden or Denmark. The figures here given are from Danish specimens kindly sent to me from the Museum of Copenhagen. According to Mr. Budde-Lund, it is found in very moist situations.

Distribution.—Sweden, Denmark, Germany, France, Britain, Turkey.

Fam. 2. Trichoniscidæ.

Characters.—Body more or less elongated, with the lateral parts of the segments, as a rule, not much expanded. Cephalon with distinct, though not very large lateral lobes, front more or less produced, but scarcely marginate. Metasome generally much narrower than the mesosome, last segment forming at the end a thin projecting plate. Eyes small or wholly wanting. Antennulæ minute, but having the terminal joint well developed and tipped with a number of delicate sensory filaments. Antennæ not much elongated, and minutely spinulose throughout, flagellum composed of only a restricted number of articulations, which are less distinctly defined than in the *Ligiidæ*, the last one terminating in a bunch of delicate hair-like bristles. Buccal mass very prominent below. Mandibles with the molar expansion well developed, penicils very few in number. Anterior maxillæ with the masticatory lobes narrow and produced, the inner one with 3 hairy bristles at the tip. Posterior maxillæ without any penicils inside. Maxillipeds with the terminal part generally imperfectly articulated, masticatory lobe terminating in a thin lash, epignath narrow linguiform. Legs not much elongated, coarsely spinous, dactylus simple. Opercular plates of pleopoda very

thin, without air-chambers or any branchial structure, inner plate lobular, except on the 2 anterior pairs. Sexual appendage of male simple, conic; inner ramus of both 1st and 2nd pairs of pleopoda transformed for copulative purposes. Uropoda with the basal part broadly expanded inside, and partly covered by the last caudal segment, rami conically tapered, and, as a rule, terminating each in a bunch of delicate hair-like bristles.

Remarks.—I have found it advisable to establish this new family, to comprise a number of genera, which have hitherto been referred to the family *Ligiidae*, but which exhibit in common several characteristic features not found in the true *Ligiidae*. The following 5 genera ought to be referred to the present family: *Trichoniscus*, *Trichoniscoides*, *Haplophthalmus*, *Scyphacella*, and *Actoniscus*. Of these the first 3 are represented in the fauna of Norway, and will be treated of below.

Gen. 1. *Trichoniscus*, Brandt, 1833.

Syn: *Tera*, Koch.

" *Philougria*, Kinahan.

Generic Characters.—Body more or less oblong, attenuated behind. Cephalon rounded in front, with small, though distinct lateral lobes. Side-plates of the 3 posterior segments of mesosome more prominent than those of the 4 preceding segments. Metasome abruptly contracted, with the epimeral plates of the 2 anterior segments not concealed, last segment narrowly truncated at the tip, and slightly emarginated on each side. Eyes small, but distinct, consisting of only 3 visual elements imbedded in a dark pigment. Antennule with the 1st joint rather large and curved, last joint generally longer than the 2nd. Antennae everywhere clothed with small appressed spikes, flagellum much shorter than the peduncle, and gradually tapering distally. Oral parts considerably prolonged, giving the buccal mass a pronouncedly conical form. Left mandible with 2, right with only a single pencil behind the cutting part. Maxillipeds with the distal joint of the basal part rather large and forming at the end outside a broad, lamellar expansion finely ciliated at the edge, terminal part lanceolate, with the outer 4 joints confluent, masticatory lobe nearly as large as the terminal part, and terminating in a narrow, finely ciliated lash, epignath oblong linguiform, with a rounded expansion at the base. Legs of moderate size, slightly increasing in length posteriorly, outer joints extremely spinous. Inner plate of first pair of

pleopoda in male greatly produced, biarticulate; that of 2nd pair of different structure in the different species. Uropoda with the basal part rather broad and flattened, both rami terminating in a pencil of delicate hairs.

Remarks.—This genus, established by J. F. Brandt, forms the type of the family *Trichoniscidae*, and may chiefly be distinguished from the other genera by the distinctly developed, though small eyes, the narrow metasome, and the delicate hair pencils in which the antennae and both rami of the uropoda terminate. The genus comprises as yet 5 or 6 species, 3 of which will be described below.

1. *Trichoniscus pusillus*, Brandt.

(Pl. LXXII, fig. 1.)

Trichoniscus pusillus, Brandt, *Conspectus monogr. Crust. Oniscodorum* p. 12, Pl. 4, fig. 9.

Syn: *Itea riparia*, Koch.

" *Itea laevis*, Zaddach.

" *Philoungria riparia*, Kimbau.

Specific Characters.—Body oblong oval in form, nearly 3 times as long as it is broad, dorsal face rather convex and quite smooth and polished. Cephalon with the lateral corners very small, though distinct, front obtusely rounded. Lateral parts of the 4 anterior segments scarcely at all expanded; those of the 3 posterior segments more prominent and recurved, terminating in acuminate corners. Metasome occupying about $\frac{1}{4}$ of the length of the body, and rather narrow, with the epimeral plates small and appressed; last segment with the terminal expansion rather broad, and slightly emarginate at the tip. Antennulae with the last joint longer than the 2nd, and carrying 6 sensory filaments, one of which is smaller than the others and somewhat remote from the tip. Antennae attaining to about $\frac{1}{3}$ of the length of the body, joints of the peduncle very distinctly defined, and each carrying at the end inside one or 2 slender spines, flagellum a little longer than the last peduncular joint, and composed of 4 articulations. Uropoda with the outer ramus fully twice as long as the basal part, inner ramus somewhat shorter and much narrower. Colour of dorsal face dark reddish brown, with numerous irregular lighter specks. Length of adult female 4 mm.

Remarks.—This is the first described species, and may accordingly be regarded as the type of the genus. It is easily recognized from the 2 other northern species by its dark reddish brown colour, and the smoothness of the dorsal face. The *Itea riparia* of Koch, as also the *Itea laevis* of Zaddach, are undoubtedly identical with this species. Mr. Max Weber describes a small variety from Holland as var. *batava*, which may be a distinct species.

Occurrence.—According to Mr. Budde-Land, this form was many years ago observed here in Norway by Prof. Lilljeborg, who found it at Molde. Some few specimens are, moreover, preserved in our University Museum from earlier times, having been collected by the late Dr. A. Boeck in the neighbourhood of Christiania, and I have also recently received this form from Trondhjem through the kindness of Conservator Storm. I have myself found it very frequently in many places around Christiania, as also at Dröbak and Laurvig, beneath moist leaves, stones and pieces of wood, especially in very shady places. A certain degree of moisture seems to be indispensable to its existence, and therefore in dry places fully exposed to the sunshine, it is never met with. When disturbed, it runs about with great agility to conceal itself, and is thus only with difficulty got hold of, and being very fragile, it is easily damaged when caught. It is very curious that among the numerous specimens collected, I have failed to detect any male specimen. Perhaps the male sexual characters in this species are so very inconspicuous as to escape attention.

Distribution.—Sweden, Denmark, Germany, France, Britain, Spain, Algeria, North America.

2. *Trichoniscus pygmæus*, G. O. Sars, n. sp.

(Pl. LXXII, fig. 2.)

Specific Characters.—Body rather narrow, oblong, fully 3 times as long as it is broad, dorsal face rather convex and rough, the roughness arising from numerous small tubercles arranged in transversal rows. Cephalon rounded, with the lateral lobes extremely minute, front rather arcuate. Lateral parts of the segments of mesosome edged with small appressed spikes; those of the 3 posterior segments, as in *T. pusillus*, more prominent than the preceding ones, and terminating in recurved conical points. Metasome rather narrow, and of a similar structure to that in *T. pusillus*; last segment with the terminal expansion gradually tapering, and narrowly truncated at the tip, carrying 2 rather long apical hairs. Antennule with the last joint scarcely longer than the 2nd, and only provided with 3 sensory filaments. Antennæ comparatively less slender than in *T. pusillus*, flagellum scarcely attaining the length of the last peduncular joint, and composed of only 3 articulations. Legs comparatively shorter than in the type species, but otherwise of a similar structure. Inner ramus of 1st pair of pleopoda in male greatly produced, with the terminal joint narrow knife-shaped; that of 2nd pair biarticulate, proximal joint very short, distal joint long and slender, styliform. Uropoda rather short, with the rami nearly equal, and but little longer than the

basal part. Colour of dorsal face whitish, semipellucid, with a few light brown pigmentary ramifications across the segments, and a double row of irregularly lobular, opaque white patches along the middle of the back, probably caused by some internal matter (renal excretions). Length of adult female scarcely exceeding 2 mm.

Remarks.—I have not been enabled to identify this form with any of the earlier described species. At first I thought that it might perhaps be the form mentioned by Dr. M. Weber as *T. pusillus* var. *batava*; but there are several things which forbid such an identification. For instance, Dr. Weber says that the dorsal face in his form is perfectly smooth and of a similar dark brown colour to that in the type species, and the flagellum of the antennæ is stated to be 4-articulate, not, as in the present species, 3-articulate.

Occurrence.—I have only met with this form in a single locality in the immediate vicinity of Christiania, but there rather abundantly. It occurred on an open plain, close to the railway, beneath stones and pieces of wood, in company with *Trichoniscoides albidus*, to be described below. It is far less agile than *T. pusillus*, through not nearly so slow in its motions as the just-named form.

3. *Trichoniscus roseus* (Koch).

(Pl. LXXIII, fig. L)

Itea rosea, Koch, Deutschlands Crust. p. 22, fig. 16.

Syn: *Philouggia rosea*, Kinahan.

Specific Characters.—Body oblong oval, greatest width almost attaining half the length, dorsal face but slightly convex, and rough, owing to numerous densely crowded tubercles arranged in transversal rows. Cephalon transversely oval, with the lateral lobes well-marked, denticulate, front nearly straight. Lateral parts of mesosome more expanded than in the other species. 1st pair rather broad and partly flanking the cephalon, the 3 posterior pairs recurved and acuminate. Metasome (in male) exceeding half the length of the mesosome, and but little more than half as broad; terminal expansion of last segment transversely truncate, with 4 small apical spinules. Antennulæ with the last joint much longer than the 2nd, and carrying 6 sensory filaments, 5 apical and 1 lateral. Antennæ comparatively slender, attaining $\frac{1}{3}$ of the length of the body, flagellum composed of 4 articulations. Last pair of legs in male peculiarly modified, having the meral joint strongly dilated, and produced inside to a large conical prominence, in against which the succeeding joint admits of being bent. Inner ramus of 1st pair of pleopoda in male, with the terminal joint dilated at the end in the form

of a little bowl of a spoon; that of 2nd pair rather strong and distinctly 3-articulate, terminal joint knife-shaped and denticulate inside. Uropoda with the outer ramus about twice the length of the basal part, inner ramus somewhat narrower, but scarcely shorter. Colour of dorsal face in life of a clear minimum-rose. Length of adult male 5 mm.

Remarks.—This species, first described by Koch, is easily distinguished by its comparatively broad and flattened body, the dorsal face of which is densely granular, and by its beautiful colour, which, however, is only seen in fresh specimens. The structure, in the male, of the last pair of legs, and of the inner ramus of the 2 anterior pairs of pleopoda is rather peculiar, and has been well described by Dr. M. Weber.

Occurrence.—The occurrence of this species in Norway has, it is true, not yet been demonstrated; but, as it is not uncommonly found in Denmark, I am much disposed to believe, that, on a closer investigation, it will also prove to belong to the fauna of Norway. The figures here given are from specimens kindly sent to me from the Museum of Copenhagen. According to Mr. Budde-Land, it is chiefly found in garden hot-houses.

Distribution.—Denmark, Germany, Holland, Britain, France, Spain, Italy, Dalmatia, Algeria.

Gen. 2. *Trichoniscoides*, G. O. Sars, n.

Generic Characters.—Body narrow, oblong, rather convex, with very soft integuments, and the lateral parts of the segments but slightly expanded. Metasome abruptly contracted, with the last segment about as in *Trichoniscus*. Eyes simple or wholly wanting. Antennulae and antennae of a similar structure to that in *Trichoniscus*. Left mandible with 3, right with 2 penicils behind the cutting part. Maxillipeds resembling in structure those in *Trichoniscus*, but comparatively less produced, with the masticatory lobe much shorter than the terminal part and having the apical lash smaller. Legs comparatively short and thick, but very slightly increasing in length posteriorly. 1st pair of pleopoda in male with both plates peculiarly modified, the inner one being the smaller; 2nd pair with the inner ramus strongly produced, biarticulate, terminal joint subfoliaceous, contorted. Uropoda with the inner ramus terminating in a single slender spine.

Remarks.—I have felt justified in established this new genus to include some species formerly referred to the genus *Trichoniscus*, but differing in certain

points rather materially from the type of that genus. Thus, the eyes, when present, are not aggregate, but simple, each consisting, as in the genus *Haplophthalmeus*, of but a single visual element. Moreover, the number of penicils attached behind the cutting part of the mandibles is different, and the maxillipeds are less produced. Finally, the legs are of more uniform length, and the structure of the 2 anterior pairs of pleopoda in the male is rather peculiar. In addition to the species described below, the *Trichoniscus Leydigii* of Weber undoubtedly belongs to this genus, and perhaps also the *Trichoniscus cavernicola* of Budde-Lund.

Trichoniscoides albidus, (B.-Lund).

(Pl. LXXIII, fig. 2.)

Trichoniscus albidus, Budde-Lund, Prosp. gen. spec. Crust. terrestr., p. 9.

Specific Characters.—Body narrow oblong, 3 times as long as it is broad, and strongly convex, almost semicylindric, dorsal face rough owing to minute tubercles arranged, on each of the segments of mesosome, in 2 or 3 transversal rows, each of the tubercles being tipped by a small hair. Cephalon transversely oval, with the lateral lobes minute, rounded and slightly denticulate, front evenly arcuate. Lateral parts of mesosome edged with small appressed spikes, the 4 anterior pairs but very slightly prominent, the 3 posterior pairs produced to recurved acute points. Metasome occupying about $\frac{1}{4}$ of the length of the body, and much narrower than the mesosome, with the epimeral plates small and appressed; terminal expansion of last segment narrowly truncated. Eyes distinct, but extremely small, circular, consisting each of a single corneal body with underlying reddish pigment. Antennulæ with the terminal joint but little longer than the 2nd, and carrying 4 sensory filaments, basal joint rather large, exceeding in length the other 2 combined. Antennæ scarcely exceeding $\frac{1}{4}$ of the length of the body, flagellum composed of 4 articulations. Last pair of legs in male with the meral joint produced at the base to a comparatively small dentiform prominence, last joint in both sexes densely ciliated outside. First pair of pleopoda in male with the opercular plate large, quadrangular, abruptly contracted at the tip, and prolonged to a setiform ciliated lash curved outwards and accompanied inside by another much smaller seta; inner plate comparatively small, with a long, posteriorly pointing ciliated seta springing from the inner corner. Inner ramus of 2nd pair distinctly biarticulate, terminal joint forming a narrow folded plate terminating in an acute point. Uropoda with the inner ramus a little shorter and much narrower than the outer, apical spine exceeding half the length of the ramus. Body, in the living state of the animal, semipellucid, of a

clear golden yellow colour, with a diffuse minium-red pigment on the back, forming slight ramifications on each side of the segments. Length of adult female 4 mm.

Remarks.—This species was established in the year 1879 by Mr. Budde-Lund from some specimens found in a collection of *Trichoniscus pusillus* from the neighbourhood of Copenhagen. The specific name is somewhat inappropriate, since it is only specimens that have been preserved in alcohol for some time that exhibit a white colour, whereas the animal in a fresh state is distinguished by a very pronounced golden yellow hue, changing to reddish orange. Mr. Budde-Lund has identified the *Trichoniscus Leydigii* of Weber with the present species; but this seems to me inadmissible, since Dr. Weber expressly indicates the colour of the living animal to be a pure white, and, moreover, absolutely denies the existence of eyes, which in the present species are easily observable both in fresh and preserved specimens. Nor does the habitus figure he gives of his form agree exactly with the present species, and the detail-figures subsequently given by that author also exhibit some well-marked differences, while yet showing the 2 species to be very nearly allied.

Occurrence.—I have met with this form in 3 different places in the neighbourhood of Christiania, but in none of them in any abundance. In all 3 localities it was found on the lower side of stones deeply imbedded in the soft ground. Its motions are very slow, and it is thereby markedly distinguished from the species of the genus *Trichoniscus*, which are rather active animals. During its slow creeping it winds its flexible body about in a most peculiar manner, and may thus at first sight easily be mistaken for a little worm.

Distribution.—Denmark.

Gen. 3. **Haplophthalmus**, Schöbl, 1860.

Generic Characters.—Body oblong, moderately convex, sculptured dorsally with more or less distinct longitudinal ribs. Cephalon with the front triangularly produced, though scarcely defined from the epistome, lateral lobes rather large. Side-plates of mesosome lamellarly expanded, discontinuous. Metasome not abruptly contracted epimeral plates of the 2 anterior segments small, those of the 3 succeeding ones well developed, laminae; last segment of a similar shape to that in the 2 preceding genera. Eyes very small, simple, subdorsal. Antennule and antennæ much as

in *Trichoniscus*. Oral parts likewise rather similar, except that the terminal part of the maxillipeds is obscurely 5-articulate, and the epignath simple, lanceolate. Legs short and thick, scarcely at all increasing in length posteriorly. First pair of pleopoda in female very small and rudimentary; those in male well developed, with the inner ramus strongly produced, biarticulate, terminal joint spiniform; inner ramus of 2nd pair in male likewise much produced, triarticulate, last joint narrow styliform. Uropoda with the inner ramus originating inside a broad expansion of the basal part, and terminating, as in the genus *Trichoniscoides*, in a single slender spine.

Remarks.—This genus, established in the year 1860 by Schöbl, approaches, in the anatomical details, very near to *Trichoniscus*, or perhaps still nearer to *Trichoniscoides*, with which it agrees in the simple structure of the eyes. It is, however, distinguished from both these genera by the peculiar sculpturing of the dorsal face, and by the lamellarly expanded lateral parts of the segments, causing the metasome to be less abruptly contracted than in the above-named genera. In the latter character it agrees with the genus *Scyphacella* of Smith, which may perhaps turn out to be identical with it. We know of 2 distinct European species, both of which belong to the fauna of Norway, and will be described below.

1. *Haplophthalmus Mengii*, (Zaddach).

(Pl. LXXIV, fig. 1.)

Ita Mengii, Zaddach, Synops. Crust. Pruss. p. 16.

Syn: *Haplophthalmus elegans*, Schöbl.

Specific Characters.—Body oblong oval, somewhat attenuated behind, with the dorsal face moderately convex. Cephalon rather large, with the front triangularly produced and tipped with several small denticles, lateral lobes comparatively broad, rounded quadrangular, dorsal face divided in the middle by a transversal groove, its posterior part rather convex, and provided with several curved longitudinal ribs. Dorsal face of mesosome sculptured with 6 very distinct equidistant longitudinal ribs finely crenulated on the edge, the outermost rib, however, on the 1st and last segments, being irregularly interrupted; lateral plates subtruncate at the end, and having at their base a less conspicuous rib, 1st and last pairs somewhat broader than the others. Metasome scarcely attaining $\frac{1}{4}$ of the length of the body, 3rd segment with 2 very prominent juxtaposed ribs dorsally; last segment narrowly truncate at the tip. Antennulae with the basal joint rather broad and curved, terminal joint with only 4 sensory filaments. Antennae scarcely attaining $\frac{1}{4}$ of the length of the body, flagellum shorter than

the last peduncular joint, and composed of 3 articulations, the last terminating in a dense bunch of delicate hair-like bristles. Last pair of legs in male comparatively more strongly built than in female, but otherwise of a very similar structure. Uropoda with the rami nearly equal and somewhat longer than the basal part. Colour pure white, semipellucid. Length of adult female 3 mm.

Remarks.—This form was first described by Zaddach in the year 1844 as *Itea Mengii*, being referred to the Kochian genus, which is identical with *Trichoniscus* of Brandt. In the year 1860 Mr. Schöhl examined the same form, and regarded it as new to science, describing it as the type of a new genus under the name of *Haplophthalmus elegans*. It is easily distinguished from the 2nd species by the very distinct and regular longitudinal ribs on the dorsal face of the mesosome, and by the rather conspicuous dorsal prominences of the 3rd segment of the metasome.

Occurrence.—I first met with this pretty form, hitherto not recorded from any of the Scandinavian countries, early in the spring of this year (1897) on the steep banks of a little river at some distance from Christiania, where it occurred rather plentifully, deeply concealed in the crevices of mouldering argillaceous slate. The females at that time were laden with eggs and young, and male specimens occurred almost as abundantly as females. Subsequently I found it in 2 other places, likewise in the neighbourhood of Christiania, beneath stones and pieces of old wood. It moves very slowly, and, in spite of its small size, is easily detected by the pure white colour of the body.

Distribution.—Prussia, Germany, Bohemia, France.

2. *Haplophthalmus danicus*, Buddé-Lund.

(Pl. LXXIV, fig. 2.)

Haplophthalmus danicus, Buddé-Lund, Prosp. gener. spec. crust. Isop. terrest., p. 9.

Syn: *Haplophthalmus elegans*, B.-Lund (olim).

" " *Mengii*, Weber (not Zaddach).

Specific Characters.—Form of body resembling that of the preceding species, being, as a rule, somewhat shorter and compacter in male than in female; dorsal face very rough on account of numerous, somewhat unequal tubercles arranged in longitudinal rows, though not forming distinctly defined ribs, as in *H. Mengii*. Cephalon with the front acutely produced, lateral lobes broadly rounded. Side-plates of mesosome as in *H. Mengii*. Metasome nearly smooth above, without the slightest trace of any prominences on the 3rd segment. Appendages of body almost exactly agreeing in structure with those in the preceding species, except

that the antennulæ are provided with 6, instead of 4 sensory filaments. Colour greyish white, less pellucid than in *H. Mengii*. Length of adult female 4 mm.

Remarks.—The present species was at first wrongly identified by Mr. Budde-Lund with *H. elegans*, Schöhl, which is the same as *H. Mengii*, Zaddach; but was subsequently recognised by the same author as a distinct species, and described under the above name. According to him, the *H. Mengii* of Dr. Weber is the present species, and not that of Zaddach. Though very nearly allied to that form, it is easily distinguishable from it by the rather different sculpturing of the dorsal face, and by the complete absence of the 2 conspicuous dorsal prominences occurring in *H. Mengii* on the 3rd segment of the metasome. It also grows to a rather larger size.

Occurrence.—I have found this form in great abundance in 2 places in the neighbourhood of Christiania, both located in the so-called Ladegaardsö. It occurred here in loose mould beneath leaves and decaying pieces of wood. I have also received some few specimens of this form from conservator Storm, who collected them in the neighbourhood of Trondhjem. In habits, it exactly agrees with *H. Mengii*.

Distribution.—Denmark, Holland.

Fam. 3. Oniscidæ.

Characters.—Body oval or oblong, with the lateral parts of the segments more or less expanded. Metasome with the 2 anterior segments rather small, and having the epimeral plates concealed; last segment much narrower than the preceding ones, and conically produced at the end. Eyes generally well developed, compound. Antennulæ very small, with the apical sensory appendages short, papilliform. Antennæ, as a rule, slender, with the flagellum pauciarтикуlate. Buccal mass not very prominent below. Mandibles with the cutting part highly chitinized and, as usual, composed of 2 superposed dentate lamellæ, behind which is a membranous hairy lappet and a varying number of penicils, molar expansion obsolete, without any triturating surface, it being replaced by a brush-like recurved seta. Anterior maxillæ with the outer masticatory lobe very strong and coarsely spinous at the tip, inner lobe much narrower and provided with only 2 hairy bristles. Posterior maxillæ distinctly bilobed at the tip, and having the outer edge angularly produced near the base. Maxillipeds with the basal part

broad and laminar, though scarcely expanded distally, terminal part poorly developed and never composed of more than 3 joints, the last very narrow; masticatory lobe short, truncate at the tip; epignath large, flanking the basal part. Legs, as a rule, slender, increasing in length posteriorly. Sexual appendage of male simple, conic, and generally connected with the inner rami of the 1st pair of pleopoda; the latter very largely developed, terminating each in a highly chitinized, conical joint obliquely grooved below, for conducting the evacuated sperm. Inner ramus of 2nd pair of pleopoda in male terminating in a slender lash finely pointed at the tip. Uropoda with the outer ramus more or less flattened, lanceolate, inner much smaller, sublinear, and, as a rule, attached far in front of the outer.

Remarks.—This family belongs to the 2nd section of the Oniscoida, and comprises by far the greater bulk of the tribe, for which reason it might perhaps be convenient to subdivide it into several families. The northern forms, however, belonging to this group exhibit in reality a very close relation to each other, the structure of the oral parts being especially very uniform in the different genera, whereas these appendages exhibit well-marked differences from those in the 2 preceding families. For instance, in the mandibles of all the forms with which I am acquainted, a true molar expansion, is wanting, and instead of it there is a peculiar recurved brush-like appendage somewhat resembling a strong seta. Moreover the inner masticatory lobe of the anterior maxillæ in all the forms has but 2 hairy setæ at the tip, and is very much narrower than the outer. Finally, the terminal part of the maxillipeds is very much reduced, and never consists of more than 3 joints. The conically produced last segment of the metasome affords another characteristic feature common to all the forms, and the structure of the uropoda is also characteristic from the insertion of the inner ramus far in front of the outer. Contrary to what is the case in the *Trichoniscidae*, the structure of the copulative appendages in the male exhibits a remarkable uniformity throughout this family. About 20 different genera have been referred to this family, 5 of which will be treated of below.

Gen. 1. *Oniscus*, Linné, 1767.

Generic Characters.—Body broad and depressed, with the lateral parts of the segments lamellarly expanded. Cephalon with well defined lateral lobes, front imperfectly defined from the epistome. Metasome not abruptly contracted;

last segment considerably produced. Eyes large, sublateral. Antennulæ with the terminal joint well developed. Antenna slender and elongated, with the flagellum composed of 3 articulations. Mandibles with numerous penicils behind the cutting part. Legs moderately slender, gradually increasing posteriorly. Opercular plates of uropoda without any air-cavities, those of the 2 anterior pairs deeply bilobed. Uropoda rather produced, with the inner ramus originating far in front of the outer.

Remarks.—This is the genus first established, and indeed formerly embraced all the Oniscoida. In the restriction now generally adopted, it comprises only a restricted number of species, chiefly characterised by the broad, depressed body and the 3-articulated flagellum of the antennæ. Only a single species belongs to the fauna of Norway, and will be described below.

Oniscus asellus, Lin.

(Pl. LXXV.)

Oniscus asellus, Linneus, *Fauna suecica*, IV. p. 163.

Syn: *Oniscus murarius*, Cuvier.

" — *fossor*, Koch?

Specific Characters.—Body rather regularly oval, greatest width exceeding half the length, dorsal face but slightly convex, and, in adult specimens, nearly smooth, and glossy, in younger specimens of a duller appearance, being rough owing to small tubercles occurring especially on the anterior part of the body. Cephalon to a great extent flanked by the side-plates of the 1st segment of mesosome, and fully twice as broad as it is long, frontal edge obtusely angular in the middle, lateral lobes rather prominent, narrow linguiform, dorsal face clothed with small rounded tubercles. Side-plates of mesosome greatly prominent, lamellar, subcontiguous, all terminating behind in an acute corner. Metasome about half the length of the mesosome and not much narrower, the 2 anterior segments very small and wholly embraced by the preceding segment, epimeral plates of the 3 succeeding segments narrowly produced and strongly recurved, the posterior pair extending almost as far as the last segment; the latter much longer than it is broad at the base, outer part narrow conic, convex above. Eyes oval and but slightly convex. Antennulæ with the terminal joint about the length of the basal one, and conically tapered. Antennæ long and slender exceeding half the length of the body, flagellum shorter than the last peduncular joint, and having the 1st and last articulations of about equal length, the middle one shorter. Legs rather slender, with the outer joints densely spinous inside. Uropoda with the outer

ramus narrow lanceolate, and exceeding the basal part in length, inner ramus narrow linear, and extending to about the middle of the outer. Colour of dorsal face in adult specimens dark chocolate, with a regular row of whitish patches along each side of mesosome, at the base of the side-plates, and a few small, opaque white dots nearer the median line. Length of adult female reaching 16 mm.

Remarks.—There seems not to be sufficient reason for rejecting the specific name *asellus* assigned to this form by Linnaeus. It may be that he confounded several species under this name, but a similar case undoubtedly concerns also many others of the Linnean names now generally adopted. The specific name more generally used for this species is that proposed by Cuvier, viz., *murarius*. The *Oniscus fossor* of Koch is scarcely different from this species, the characters assigned to this form being such as pretty well apply to younger specimens of *Oniscus asellus*, which are generally of a duller appearance, with the dorsal face more roughly granulated than in adult animals.

Occurrence.—This is one of our most common Oniscoida, occurring often in great abundance, especially in the immediate vicinity of towns. In Christiania I have taken it very plentifully around the ramparts of Akershus, especially beneath old tiles, where often hundreds of them may be found associated. It is also very common in the hot-houses of the Botanical Garden. It has also been collected at Dröbak, Skien, Brevig, Langesund, Kragerö, and Grimstad; and conservator Storm states that it occurs plentifully in the vicinity of Trondhjem. It is not particularly rapid in its motions, though it runs away at once, when disturbed, to conceal itself.

Distribution.—Sweden, Denmark, Germany, Holland, Britain, France, Spain, Italy, Azores, Iceland, Greenland, North America.

Gen. 2. *Philoscia*, Latreille, 1804.

Generic Characters.—Body oval, slightly convex, with rather thin integuments. Cephalon rounded in front, without any projecting lateral lobes. Side-plates of mesosome but slightly prominent. Metasome abruptly contracted, with the epimeral plates small and appressed; last segment not much produced. Eyes well developed, lateral. Antennæ very slender, with the flagellum composed of 3 articulations. Mandibles with only a single pencil behind the cutting part. Legs very slender and greatly increasing in length posteriorly. Opercular plates

of uropoda without any air-cavities and scarcely bilobed. Uropoda not much produced, with the inner ramus not attached so far in front as usual.

Remarks.—This genus, established as early as in the year 1804 by Latroille, is nearly allied to *Oniscus*, with which it agrees in the 3-articulate flagellum of the antennæ, but from which it is easily distinguishable by the far less expanded lateral parts of the segments, and by the narrowness of the metasome. Mr. Budde-Land describes no less than 20 species from different parts of the world, and adds several other species not examined by him. To the fauna of Norway belongs only a single species, to be described below.

Philoscia muscorum, (Scopoli).

(Pl. LXXVI, fig. 1.)

Oniscus muscorum, Scopoli: Entomologia Carniolica, pag. 415.

- Syn: *Oniscus sylvestris*, Fabr.
 " *Philoscia marmorata*, Brandt.
 " *Oniscus agilis*, Koch.

Specific Characters.—Body oblong oval, slightly widening behind, greatest width not attaining half the length, and occurring rather behind the middle; dorsal face moderately convex, and perfectly smooth, shining. Cephalon transversely oval, with the frontal edge evenly arched. Side-plates of the 4 anterior segments of mesosome but very slightly expanded; those of the 3 posterior segments somewhat more prominent, and terminating behind in obtuse points. Metasome very small, scarcely exceeding $\frac{1}{2}$ of the length of the body, and abruptly much narrower than the mesosome, epimeral plates of 3rd to 5th segments comparatively small and appressed; last segment subtriangular, flattened above, tip acute. Eyes rather large and convex. Antennulæ with the terminal joint shorter than the basal one, and conically tapered. Antennæ very slender and elongated, exceeding half the length of the body, flagellum longer than the last peduncular joint, and having the 1st articulation as long as the other 2 combined. Legs greatly increasing in length posteriorly, the anterior pairs in male densely setous inside. Uropoda with the outer ramus lanceolate, inner not much shorter but narrower, and originating at a short distance from the outer. Colour of dorsal face reddish brown or fulvous, with numerous irregular lighter patches on each side of the median line, and a more regular series of similar patches on each side of the mesosome, at the base of the side-plates; cephalon and $\frac{1}{2}$ a median band along the back generally dark brown; antennæ and bases of the legs banded with same colour. Length of adult female $8\frac{1}{2}$ mm.

Remarks.—This form was first described by Scopoli as early as in the year 1763 under the name of *Oniscus muscorum*, and has subsequently been recorded by Fabricius, Brandt and Koch under other names; but now the specific name proposed by Scopoli is generally adopted. In its external appearance, it exhibits some resemblance to *Ligidium hypnorum*, but, on a closer examination, is easily distinguished by the very different structure of the antennæ and uropoda.

Occurrence.—Two specimens of this form are preserved in our university Museum, having been taken by the late Dr. Jensen, the one at Brevik, the other at Langesund. I have not myself succeeded in finding it in the neighbourhood of Christiania, nor in any other locality examined by me, and it would thus seem to be very rare in this country. According to Mr. Budde-Lund, it is chiefly found in forests, beneath moist leaves and moss. As might be supposed from its slender and elongated legs, it is very rapid in its motions.

Distribution.—Denmark, Prussia, Germany, Holland, Poland, Austria, Britain, France, Spain, Italy, Algeria.

Gen. 3. **Platyarthrus**, Brandt, 1833.

Syn: *Typhloniscus*, Schöbl.

Generic Characters.—Body oval, much depressed, with the lateral parts of the segments lamellarly expanded. Cephalon with well-marked projecting lateral lobes. Metasome not abruptly contracted; last segment but slightly produced. Eyes wholly absent. Antennæ comparatively short and very strongly built, with the joints of the peduncle flattened, flagellum only consisting of a single joint. Oral parts resembling those in *Philoscia*. Legs short and thick, scarcely increasing in length posteriorly. Opercular plates of pleopoda without air-cavities. Uropoda rather produced, with the inner ramus originating far in front of the outer.

Remarks.—This genus, established by Brandt, is chiefly characterised by the total absence of eyes, the peculiar structure of the antennæ, and the short and thick legs. In the structure of the oral parts, it does not exhibit any essential difference from that in other Oniscidæ. The genus *Typhloniscus* of Schöbl is identical with Brandt's genus. We know of only 3 species belonging to this genus, one of which will be described below.

Platyarthrus Hoffmannseggi, Brandt.

(Pl. LXXVI, fig. 2.)

Platyarthrus Hoffmannseggi, Brandt, *Consp. monogr. Crust. Onisc.* p. 12, Pl. 4. fig. 10.

Syn: *Itea crassicornis*, Koch.

" *Typhloniscus Steinii*, Schöbl.

Specific Characters.—Body broadly oval, and much depressed, with the dorsal face smooth, though slightly granulose all over. Cephalon partly flanked by the side-plates of 1st segment of mesosome, frontal edge arcuate and minutely crenulated, lateral lobes narrowly rounded at the tip, and obliquely produced in front, edges crenulated. Side-plates of mesosome rather large, lamellar, subcontiguous, 1st pair the largest, edges finely denticulate. Metasome scarcely exceeding $\frac{1}{3}$ of the length of the mesosome, the 2 anterior segments very small, epimeral plates of the 3 succeeding segments narrow, recurved; last segment comparatively short, triangular, resembling that in *Philoscia muscorum*. Antennule with the basal joint fully as long as the other 2 combined. Antennae scarcely exceeding $\frac{1}{3}$ of the length of the body, and hirsute all over with short hairs; last peduncular joint very large and dilated, flagellum shorter than that joint, and lanceolate in form. Legs densely spinous inside, propodal joint conical in form. Uropoda with the basal part rather large, oblong, outer ramus about same length and lanceolate in form, inner ramus much narrower, and scarcely extending to the middle of the outer. Colour pure white. Length of adult female 3 mm.

Remarks.—This peculiar Oniscid was first described under the above name by Brandt. It was subsequently observed by Schöbl, who regarded it as new, and described it as *Typhloniscus Steinii*. Koch too does not seem to have been aware of Brandt's description, and hence recorded it under another name, viz., *Itea crassicornis*, referring it wrongly to his genus *Itea*, which is identical with *Trichoniscus* of Brandt. It is an easily recognizable Oniscoid, being easily distinguished by its pale, flat body, the strongly built antennae, and the total absence of visual organs.

Occurrence.—In Norway this form has not yet been observed; but, as it is widely distributed over the northern part of Europa, I cannot doubt that, on a closer investigation, it will be found to exist in this country also. Its peculiar habits and occurrence within ants' nests may also be the cause of its having hitherto escaped the attention of Norwegian zoologists. The figures here given are from specimens kindly sent to me from the Zoological Museum in Copenhagen.

Distribution.—Denmark, Germany, Holland, Britain, France, Bohemia, Austria, Tyrol, Helvetia.

Gen. 4. **Porcellio**, Latr., 1804.

Generic Characters.—Body oval, more or less depressed, with the lateral parts lamellarly expanded. Cephalon partly flanked by the side-plates of the 1st segment of mesosome, lateral lobes well developed, frontal lobe more or less projecting, and distinctly defined from the epistome. Metasome not abruptly contracted, epimeral plates of 3rd to 5th segments prominent and recurved; last segment conically produced. Eyes, as a rule, well developed, subdorsal. Antennæ moderately slender, with the flagellum composed of 2 articulations only. Oral parts normal. Legs gradually increasing in length posteriorly, last pair in male sometimes slightly differing from that in female. Opercular plates of the 2 anterior pairs of pleopoda, and sometimes also of the 3 succeeding pairs, provided with distinct air-cavities. Copulative organs of male of a similar structure to that in *Oniscus*. Uropoda distinctly projecting, outer ramus lanceolate, inner much smaller, linear, and originating far in front of the former.

Remarks.—The present genus was established as early as in the year 1804 by Latreille. It is chiefly distinguished from the 3 preceding ones by the biarticulate antennal flagellum, and by the opercular plates of the 2 anterior, or of all pairs of pleopoda having distinct air-cavities (pseudo-trachææ). Otherwise this genus is very nearly allied to *Oniscus*. The genus comprises numerous species from all parts of the world, no less than 62 species being described in the work of Mr. Budde-Land, and 18 others, not examined by him, being enumerated; whereby the number of as yet known species amounts to 80 in all. In the following pages, 6 species will be described.

1. **Porcellio scaber**, Latr.

(Pl. LXXVII.)

Porcellio scaber, Latreille, Hist. nat. des Crustacés et des Insectes, Vol. VII, p. 45.Syn: *Oniscus granulatus*, Lamck." *Porcellio niger*, Say." " *Brandtii*, M.-Edv." " *dubius*, Koch." " *asper*, Koch." " *Montezianæ*, Sauss." " *paulensis*, Heller.

Specific Characters.—Body oblong oval, about twice as long as it is broad, dorsal face slightly convex and very rough, owing to the presence of numerous rounded tubercles. Cephalon with the lateral lobes rather large and rounded, frontal lobe less prominent, obtusely triangular. Side-plates of mesosome of moderate size, with

the posterior corners acutely produced. Metasome occupying about $\frac{1}{4}$ of the length of the body, epimeral plates of 3rd to 5th segments strongly recurved; last segment rather produced, terminating in an acute point slightly grooved dorsally. Antennae less slender, scarcely attaining half the length of the body, flagellum about as long as the last peduncular joint, and having its 2 articulations of nearly equal size. Last pair of legs differing but little in the two sexes. Opercular plates of only the 2 anterior pairs of pleopoda with air-cavities. Uropoda with the outer ramus broadly lanceolate, and comparatively larger in male than in female. Colour of dorsal face generally a uniformly greyish black; sometimes, however, lighter, and variegated with irregular dark patches, more rarely black, with the side-plates light yellowish. Length of adult female 14 mm.

Remarks.—Of all our Oniscoida, this is perhaps the commonest and most widely distributed species. I have taken it rather abundantly around Christiania, especially in refuse-heaps. At Drøbak it is also very common, both in the town and at some distance from it, beneath stones on the beach. Furthermore, I have taken it at Skien, and at Sauesund, west coast of Norway. In the latter place it occurred near the shore, just above high-water-mark, beneath decaying algae, and in company with *Ligia oceanica*. According to conservator Storm, it is also common at Trondhjem, and last summer conservator Sig. Thor collected it on one of the Lofoten Islands. Finally, I have received from conservator Schneider a few specimens of this species taken in Finmark from a Laplanders turf-hat. The variety *marmorata* is found occasionally both here in Christiania and at Drøbak together with the typical form, and more rarely also the var. *marginata*, in which the dark back is flanked by a broad light yellow border occupying the side-plates of the mesosome. The animal is rather agile, running away with considerable speed, when disturbed, to conceal itself.

Distribution.—Northern, western and central Europe everywhere, south Europe less frequent, Iceland, Greenland, North America, Mexico, islands St. Paul, St. Croix and Ascension, Kamtschatka, Cape of Good Hope.

2. *Porcellio pictus*, Brandt.

(Pl. LXXVBI, fig. 1.)

Porcellio pictus, Brandt & Ratzeburg, Medicin. Zoologie, Vol. II, p. 78, Pl. 12, fig. 5.

Syn: *Porcellio melanocephalus*, Koch.

" " *mixtus*, Fitch.

Specific Characters.—Body oblong oval, and considerably depressed, with the face rough owing to the presence of small elevated tubercles, less densely crowded than in *P. scaber*. Cephalon with the lateral lobes very large and slightly curved out-

wards, frontal lobe less prominent, and broadly rounded. Side-plates of mesosome well developed, with the posterior corners acuminate. Metasome scarcely attaining $\frac{1}{4}$ of the length of the body, epimeral plates of 3rd to 5th segments prominent, recurved; last segment considerably produced, being almost as long as it is broad at the base, terminal part acute and slightly grooved above. Antennæ rather slender, nearly half as long as the body, 2nd and 3rd joints of the peduncle carinated outside, the carina being in each of the joints produced at the end to a dentiform projection; flagellum not attaining the length of the last peduncular joint, and having its proximal articulation nearly twice as long as the distal one. Last pair of legs in male more strongly built than in female, with the carpal joint considerably dilated. Opercular plates of the 2 anterior pairs of pleopoda with very distinct air-cavities. Uropoda with the outer ramus rather broad, and considerably larger in male than in female. Colour of dorsal face yellowish grey, variegated with dark brown patches, which are generally arranged in 5 longitudinal series on the mesosome, cephalon and middle part of metasome uniformly blackish. In fresh specimens, moreover, a double row of very conspicuous light yellow patches occurs along the middle of the mesosome, caused by some opaque matter lying beneath the skin (renal excretions). Length of adult female reaching to 14 mm.

Remarks.—The present species may be easily recognized by the comparatively greatly depressed body, the broadly rounded frontal lobe, the slender antennæ, and the peculiar colouring of the dorsal face. In fresh specimens, the above-mentioned opaque patches along the dorsal face of the mesosome are very conspicuous, and may at once suffice for distinguishing this species from its allies. The extent of the dark patches is, on the other hand, rather variable; but in all the specimens the cephalon and the middle part of the metasome exhibit a uniformly dark colour, and this has, indeed, given rise to the specific name, *melanocephalus*, proposed by Koch for this species.

Occurrence.—In the vicinity of Christiania this form is by no means uncommon, occurring in some places rather abundantly beneath stones and pieces of wood, and I have also received specimens collected by conservator Storm at Trondhjem. It is not uncommonly found in rather dry situations, where no other Oniscoid seems to thrive. It is very agile, running about with great rapidity when disturbed, and is thus only to be got hold of with difficulty.

Distribution.—Sweden, Denmark, Germany, Britain, France, Hungary, Russia, North America.

3. *Porcellio dilatatus*, Brandt.

(Pl. LXXVIII, fig. 2.)

Porcellio dilatatus, Brandt & Ratzeburg, Medicin. Zoologie, Vol. II, p. 78, Pl. 12, fig. 6.Syn: *Porcellio scaber*, M. Edw. (not Latr.).

Specific Characters.—Body broadly oval, not nearly twice as long as it is broad, dorsal face moderately convex, and rough owing to rounded elevated tubercles, especially densely crowded in the middle of the segments. Cephalon with the lateral lobes large, obtusely truncated at the tip, frontal lobe distinctly projecting, obtusely triangular. Side-plates of mesosome rather large, with the posterior corners obtusely acuminate. Metasome nearly twice as broad as it is long, and scarcely attaining $\frac{1}{4}$ of the length of the body, epimeral plates of 3rd to 5th segments greatly prominent, semilunar; last segment nearly as long as it is broad at the base, outer part considerably produced and plane above, tip obtusely rounded. Antennæ rather strongly built, 2nd joint of the peduncle much dilated, flagellum shorter than the last peduncular joint, and having its articulations subequal in length. Legs comparatively short and thick. Opercular plates of the 2 anterior pairs of pleopoda with air-cavities. Uropoda with the outer ramus rather broad, inner ramus scarcely extending beyond the last caudal segment. Colour of dorsal face dark slaty grey, the segments of mesosome exhibiting on each side of the median line an assemblage of irregular, somewhat lighter patches. Length of adult female 14 mm.

Remarks.—Though rather nearly allied to *P. scaber*, with which it was confounded by M.-Edwards, this form may be easily recognized by its unusually broad body, and by the shape of the last segment of the metasome.

Occurrence.—A well-marked adult specimen of this form, the one here delineated, was sent to me from conservator Storm, who found it in a garden hot-house in Trondhjem. I have myself taken 2 not yet fully grown specimens in the Botanical Garden in Christiania, likewise from a hot-house. It is slower, in its motions than most other species.

Distribution.—Denmark, Germany, Poland, Holland, Britain, France, Trieste, New Guinea, Australia.

4. *Porcellio Rathkei*, Brandt.

(Pl. LXXIX, fig. 1.)

Porcellio Rathkei, Brandt, *Consp. monogr. Crust. Isop. terrestr.*, p. 15, fig. 10.

Syn: <i>Porcellio ferrugineus</i> , Brandt.
" " <i>trilineatus</i> , Koch.
" " <i>trivittatus</i> , Lereb.
" " <i>tetramoerus</i> , Schmitz.
" " <i>striatus</i> , Schmitz.
" " <i>sylvestris</i> , Schöbbl.

Specific Characters.—Body oval, somewhat broader in female than in male, dorsal face rather convex and slightly tuberculated. Cephalon with the lateral lobes well developed, rounded, frontal lobe short, obtusely triangular. Side-plates of mesosome of moderate size, subcontiguous, with the posterior corners obtusely acuminate. Metasome scarcely attaining $\frac{1}{4}$ of the length of the body, epimeral plates of 3rd to 5th segments well developed, recurved; last segment subtriangular, outer part acutely produced and plane above. Antennæ rather slender, nearly attaining half the length of the body, flagellum about the length of the last peduncular joint, and having its proximal joint somewhat shorter than the distal one. Last pair of legs in male stronger than in female, with the carpal joint remarkably dilated near the base. Opercular plates of all the pleopoda with air-cavities. Uropoda with the outer ramus broadly lanceolate, inner extending considerably beyond the last caudal segment. Colour of dorsal face somewhat variable, being in female, as a rule, lighter than in male, with irregular dark patches intermingled with some of a ferruginous hue, and more generally exhibiting a row of more or less distinct whitish patches on each side of the mesosome, at the base of the side-plates. Colour of male specimens generally dark slaty grey, with 3 longitudinal rows of whitish patches on the mesosome, the one median, the 2 other sublateral, and between these rows on each segment an assemblage of light, wavy stripes. Length of adult female 12 mm.

Remarks.—This species was first described under the above name by Brandt, but has subsequently been recorded under several other names, that proposed by Koch, *trilineatus*, having been more generally used. It may be distinguished from the preceding species by its comparatively convex body and the mutual longitudinal relation between the 2 articulations of the antennal flagellum. The colour, especially of female specimens, is rather variable, and has occasioned the establishment of several spurious species. In some cases it even changes to a rather uniformly light ferruginous hue, with scarcely any trace of the characteristic sublateral row of light patches. More generally, however, these

patches may be plainly seen, and in male specimens, as a rule, the median row is also easily distinguishable.

Occurrence.—In the neighbourhood of Christiania, this is one of the commonest Oniscoida, being found rather plentifully, not only within the limits of the town, but also at rather great distance from it, on open fields beneath stones and pieces of wood. I have also taken it at Dröbak and Skien, and have received specimens collected by Mr. Ellingsen at Fredrikstad and Kragerö. It is rather active, and when disturbed, runs away at once to conceal itself, but it is not nearly so rapid in its motions as *P. pictus*, to which it bears some resemblance in its variegated markings.

Distribution.—Northern, western and middle Europe, everywhere; Transcaucasia, North America.

5. *Porcellio lævis*, Latr.

(Pl. LXXIX, fig. 2.)

Porcellio lævis, Latreille, Hist. nat. des Crust. & Insectes, Vol. VII, p. 46.

Syn: *Porcellio Degeerii*, Aud. & Savign.

»	»	<i>eucercus</i> , Brandt.
»	»	<i>syriacus</i> , Brandt.
»	»	<i>musculus</i> , Brandt.
»	»	<i>cinerascens</i> , Brandt.
»	»	<i>dubius</i> , Brandt.
»	»	<i>Poggi</i> , Guérin.
»	»	<i>urbicus</i> , Koch.
»	»	<i>flavipes</i> , Koch.
»	»	<i>cubensis</i> , Sauss.
»	»	<i>sontichrasti</i> , Sauss.
»	»	<i>cotilla</i> , Sauss.
»	»	<i>aztecus</i> , Sauss.
»	»	<i>mexicanus</i> , Sauss.

Specific Characters.—Body oval, greatest width slightly exceeding half the length, dorsal face moderately convex and almost perfectly smooth. Cephalon with the lateral lobes well developed, rounded, frontal lobe obtusely triangular. Side-plates of mesosome subcontiguous, 1st pair considerably larger than the succeeding ones, which have the posterior corners but slightly produced. Metasome not nearly attaining $\frac{1}{4}$ of the length of the body, epimeral plates of 3rd to 5th segments of moderate size and slightly recurved; last segment subtriangular, outer part acutely produced and slightly grooved above. Antenna very slender, equaling half the length of the body, flagellum not attaining the length of the last peduncular joint, and having the proximal articulation somewhat longer than the distal one. Last pair of legs differing but little in the two sexes. Opercular

plates of only the 2 anterior pairs of pleopoda with air-cavities. Uropoda with the outer ramus in male nearly twice as long as in female. Colour of dorsal face leaden grey, the segments of mesosome having on each side of the median line an assemblage of lighter, wavy stripes; lower face and legs pale yellowish. Length of adult male reaching to 15 mm.

Remarks.—The long list of synonyms given above, which could still be somewhat augmented, proves that this species has been described under many different names, a fact that may be accounted for, partly by a certain amount of variability, partly by its occurrence in widely distant parts of the world. According to the great authority of Mr. Budde-Land, all these supposed species are in reality spurious, being referable to the well-known European form *P. larvis* of Latreille. From the other species of the genus, it may be recognized by its comparatively broad and smooth body, the form of the side-plates of the mesosome, and the greatly produced uropoda, partly also by its colour.

Occurrence.—Though as yet I have no trustworthy knowledge of the occurrence of this species in Norway, I regard it as beyond doubt that, on a closer investigation, it will be found to exist somewhere in this country, since its occurrence otherwise has turned out to be almost ubiquitous. The figures here given are from Danish specimens kindly forwarded to me from the Zoological Museum in Copenhagen. According to Mr. Budde-Land, it is especially found in cellars beneath bakeries, or in other places where a rather high and uniform temperature prevails, sometimes also in refuse-heaps close to the towns. It is said to be not particularly agile in its movements.

Distribution.—Sweden, Denmark, Germany, Belgium, Britain, France, Austria, Spain, Italy, Dalmatia, Greece, Turkey, Tunis, Syria, Egypt, Turkestan, Madeira, Azores, North America, Mexico, West-Indies, Peru, Brazil, Chili, Pacific Islands.

6. *Porcellio Ratzeburgii*, Brandt.

(Pl. LXXX, fig. 1.)

Porcellio Ratzeburgii, Brandt, *Consp. monogr. Crust. Isop. terrestr.*, p. 13, fig. 3.

Syn: *Porcellio nemorensis*, Koch.

" " *quercuum*, Schnitzl.

" " *lugubris*, Koch.

Specific Characters.—Body oblong oval, with the sides almost parallel, dorsal face slightly convex, and obtusely granular in the middle of the segments. Cephalon almost wholly flanked by the side-plates of the 1st segment of mesosome, lateral lobes rather large, and narrowly rounded at the tip, frontal lobe very prominent and evenly curved, almost semicircular. Side-plates of mesosome

rather large, sub-discontiguous, 1st pair securiform in shape, posterior corners of this and the succeeding pairs acuminate. Metasome scarcely occupying $\frac{1}{4}$ of the length of the body, epimeral plates of 3rd to 5th segments prominent, recurved; last segment nearly as long as it is broad at the base, outer part conically produced and plane above. Antennæ slender, though scarcely attaining half the length of the body, flagellum shorter than the last peduncular joint, and having its proximal articulation scarcely more than half as long as the distal one. Legs about as in *P. Rathkei*. Opercular plates of all pleopoda provided with air-cavities. Uropoda of moderate size, resembling those in *P. Rathkei*. Colour of dorsal face more or less dark grey, with a regular row of whitish patches on each side, at the base of the side-plates of mesosome, and an assemblage of less distinct wavy stripes on each side of the median line; edges of the side-plates tinged with light yellow. Length of adult male 11 mm.

Remarks.—For the identification of this interesting species, not yet found in any of the Scandinavian countries, I am indebted to Mr. Budde-Lund, who kindly sent me for comparison some specimens of this form from the central part of Europe. It is nearest allied to *P. Rathkei*, but easily distinguishable from it by the very prominent cephalic lobes, of which the middle one (frontal lobe) especially exhibits a rather peculiar appearance from its regular semicircular form.

Occurrence.—I have hitherto only succeeded in finding 2 specimens of this form, a female and a male. They were taken this summer in the neighbourhood of Christiania (Bygdø) beneath loose bark, and were at first confounded with *P. Rathkei*, to which species it bears a rather close resemblance.

Distribution.—Central part of Europe: Upper Pfaltz, Bohemia, Saxony, Rætia, Tyrol.

Gen. 5. **Metoponorthus**, B.-Lund, 1879.

Syn: *Porcellionides*, Miers.

Generic Characters.—Body oblong, subdepressed, with very thin integuments. Cephalon with the lateral lobes very small, frontal lobe obsolete. Side-plates of mesosome but very slightly prominent. Metasome abruptly contracted, with the epimeral plates of 3rd to 5th segments sub-appressed; last segment comparatively short, triangular. Eyes well developed, lateral. Antennulæ very small, with the last joint quite short. Antennæ slender and elongated, flagellum biarticulate. Oral parts nearly exactly as in *Porcellio*. Legs slender, and greatly

increasing in length posteriorly. Opercular plates of the 2 anterior pairs of pleopoda with air-cavities, more rarely also those of 3rd or of all pairs. Copulative organs of male nearly as in *Porcellio*. Uropoda rather produced, and of a similar structure to that in *Porcellio*.

Remarks.—This genus established by Mr. Budde-Lund, is nearly related to *Porcellio*, though easily distinguishable from it by the smallness of the cephalic lobes, the poor development of the side-plates of the mesosome, and the abruptly contracted metasome. The generic name refers to the fact, that the frontal edge of the cephalon is nearly straight, not as in *Porcellio* produced in the middle. Mr. Budde-Lund describes no less than 35 species of this genus, chiefly from the southern part of Europe. Only a single species belongs to the fauna of Norway; it will be described below.

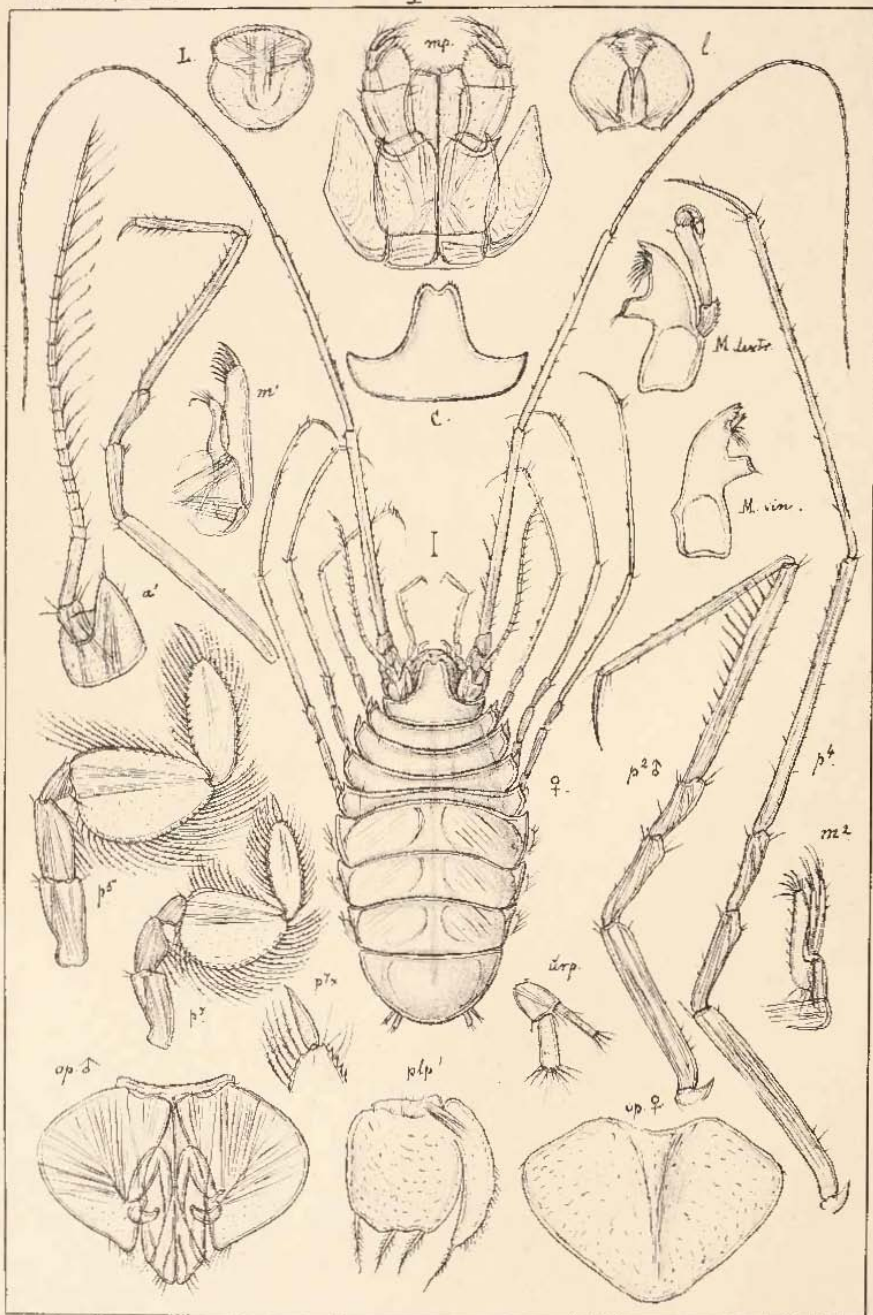
Metoponorthus pruinus (Brandt).

(Pl. LXXX, fig. 2.)

Porcellio pruinus, Brandt, *Consp. monogr. Crust. Isop. terrestr.* p. 19, fig. 21.

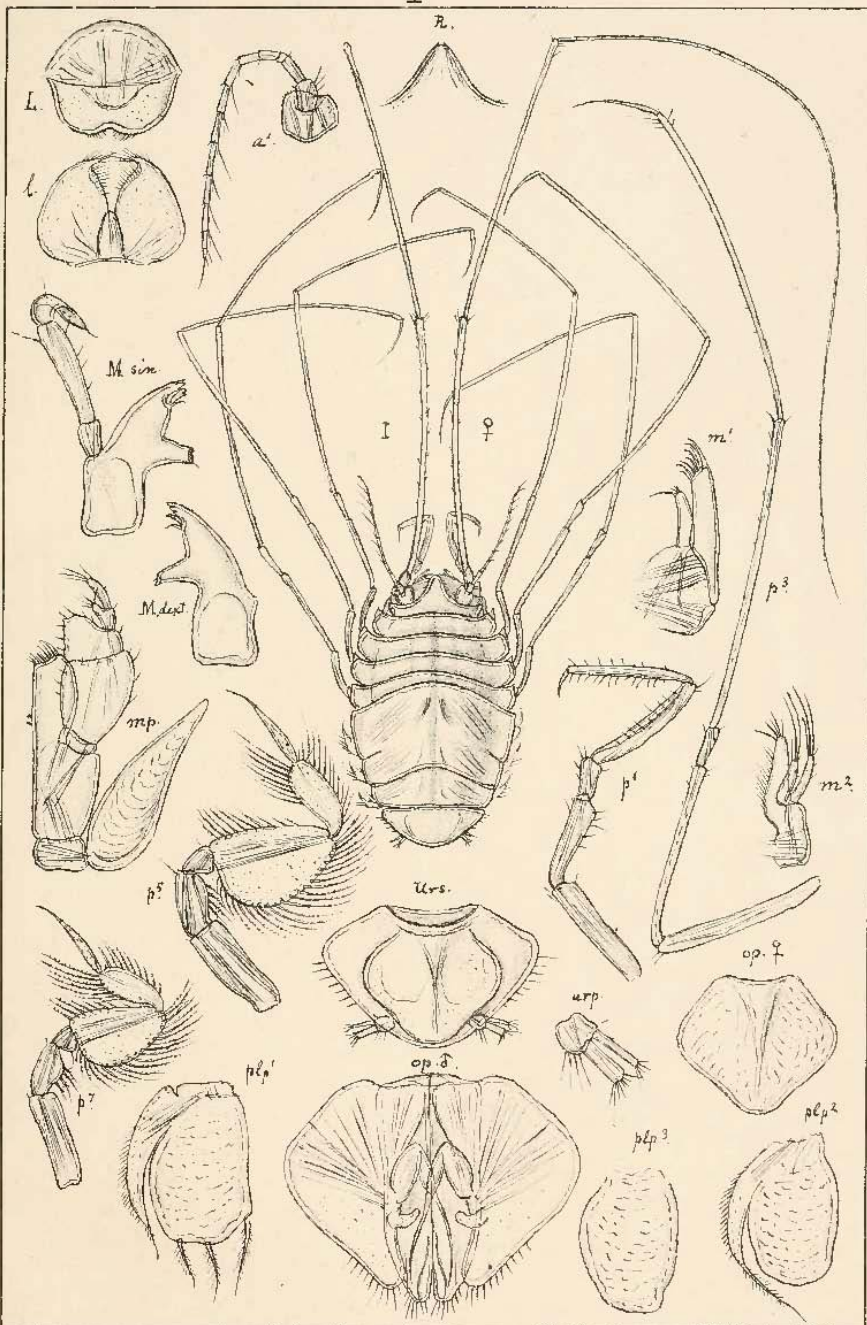
Syn: *Porcellio truncatus*, M. Edw.
 " " *maculicornis*, Koeh.
 " " *frontalis*, Lereb.
 " *Porcellionides flavo-rictatus*, Miers.

Specific Characters.—Body oblong, more than twice as long as it is broad, dorsal face but slightly convex and nearly smooth, though, on a closer examination, exhibiting a very fine granulation. Cephalon transversely quadrangular, almost twice as broad as it is long, lateral lobes extremely small, frontal margin straight. Side-plates of the 4 anterior segments of mesosome scarcely at all projecting, those of the 3 posterior segments somewhat larger, with the posterior corners obtusely acuminate. Metasome not attaining $\frac{1}{4}$ of the length of the body, and much narrower than the mesosome, epimeral plates of the 2 anterior segments concealed, those of 3rd to 5th segments comparatively small, recurved; last segment nearly twice as broad at the base as it is long, subtriangular, tip pointed. Antennulae with the last joint scarcely longer than the middle one. Antennae very slender and elongated, exceeding half the length of the body, flagellum somewhat shorter than the last peduncular joint, and having its proximal articulation nearly twice as long as the distal one. Legs very slender, minutely spinulose inside, propodal joint narrow, sublinear. Opercular plates of only the 2 anterior pairs of pleopoda provided with air-cavities, and of somewhat different shape in the two sexes. Uropoda with the outer ramus nearly twice as long as the basal part, inner ramus extending scarcely to the middle of the



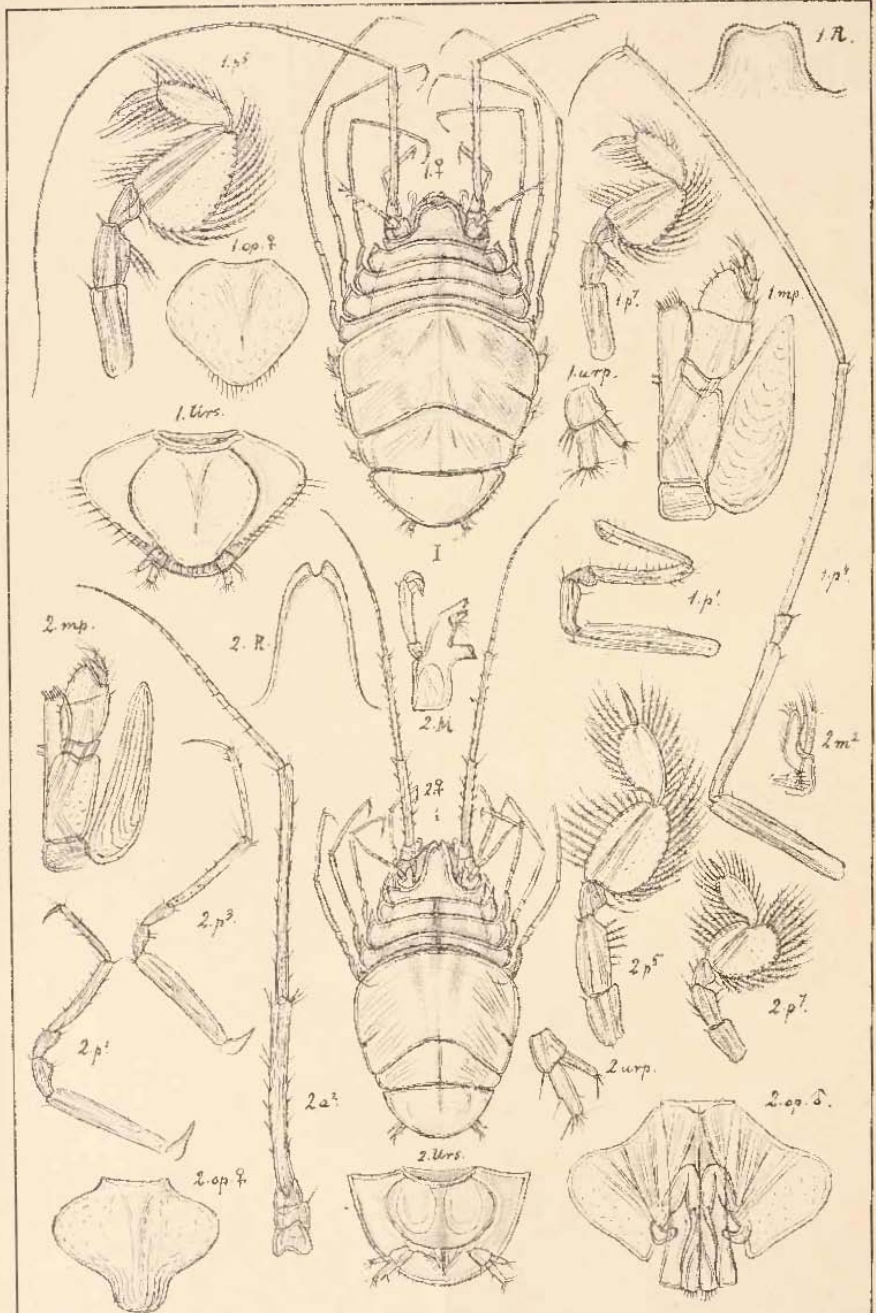
G.O Sars, autogr.

Eurycope producta, G.O. Sars.



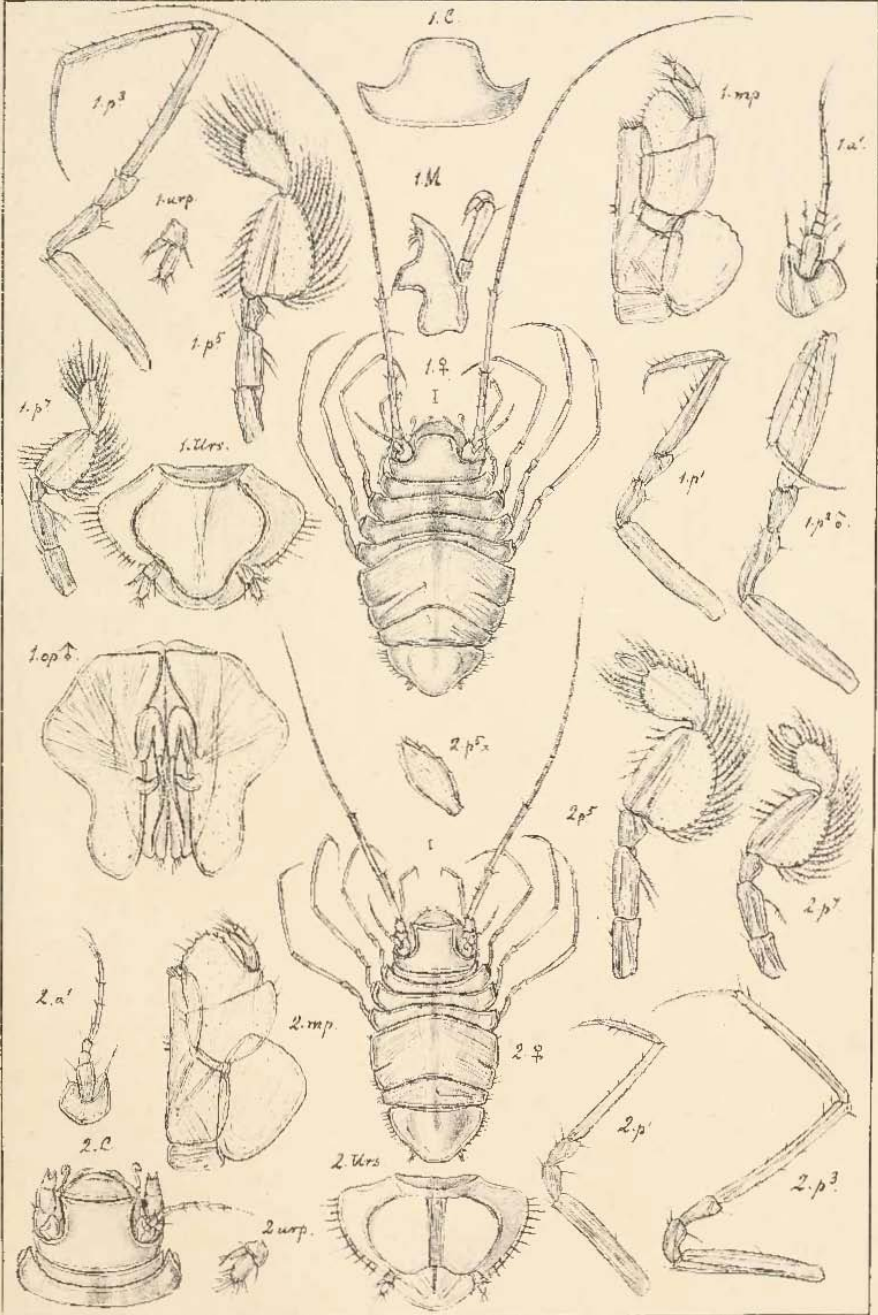
G. O. Sars, autogr.

Eurycope phallangium, G. O. Sars.



G. O. Sars, autogr.

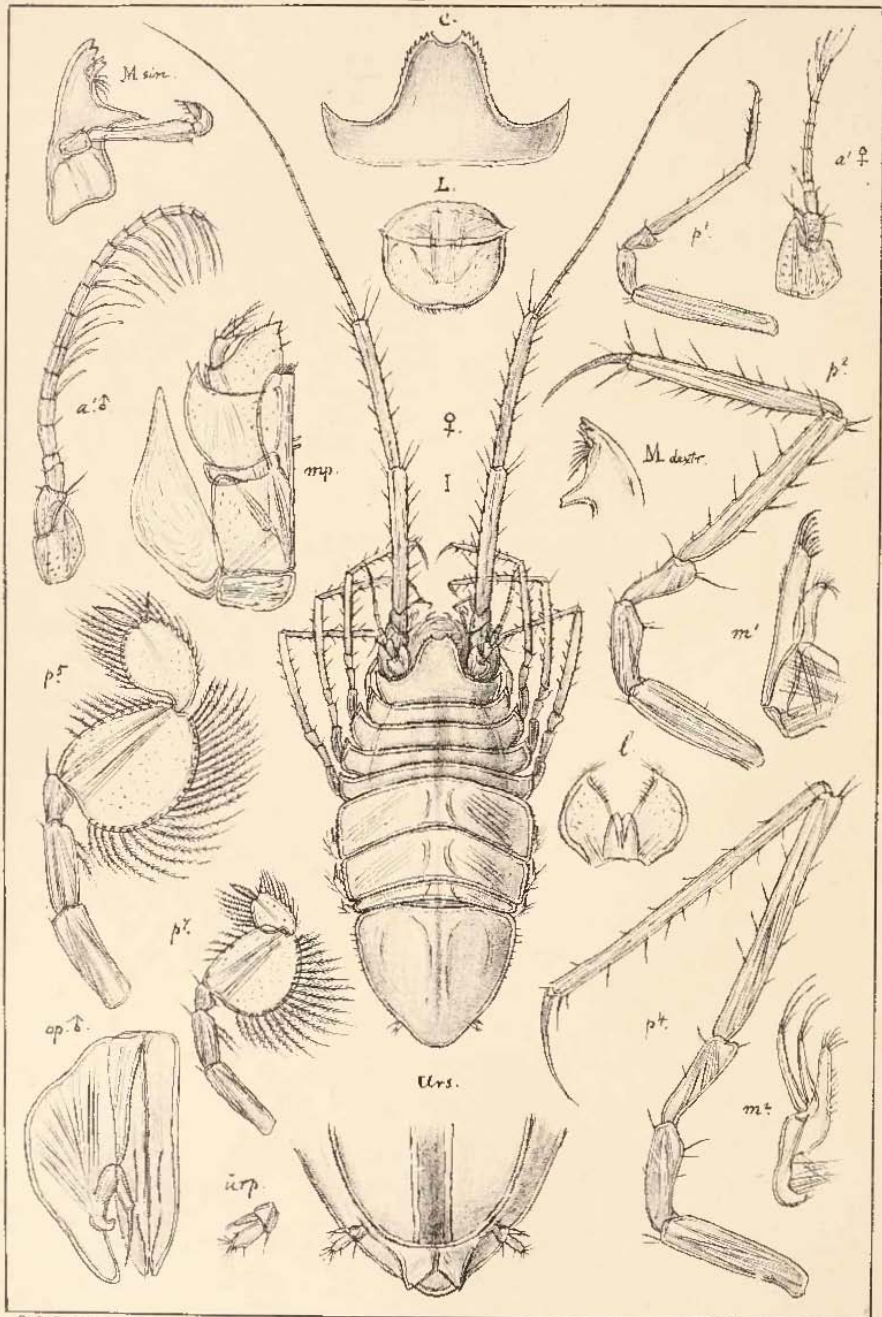
1. *Eurycope latinostris*, G. O. Sars.
 2. *Eurycope furcata*, G. O. Sars.



G. O. Sars, autogr.

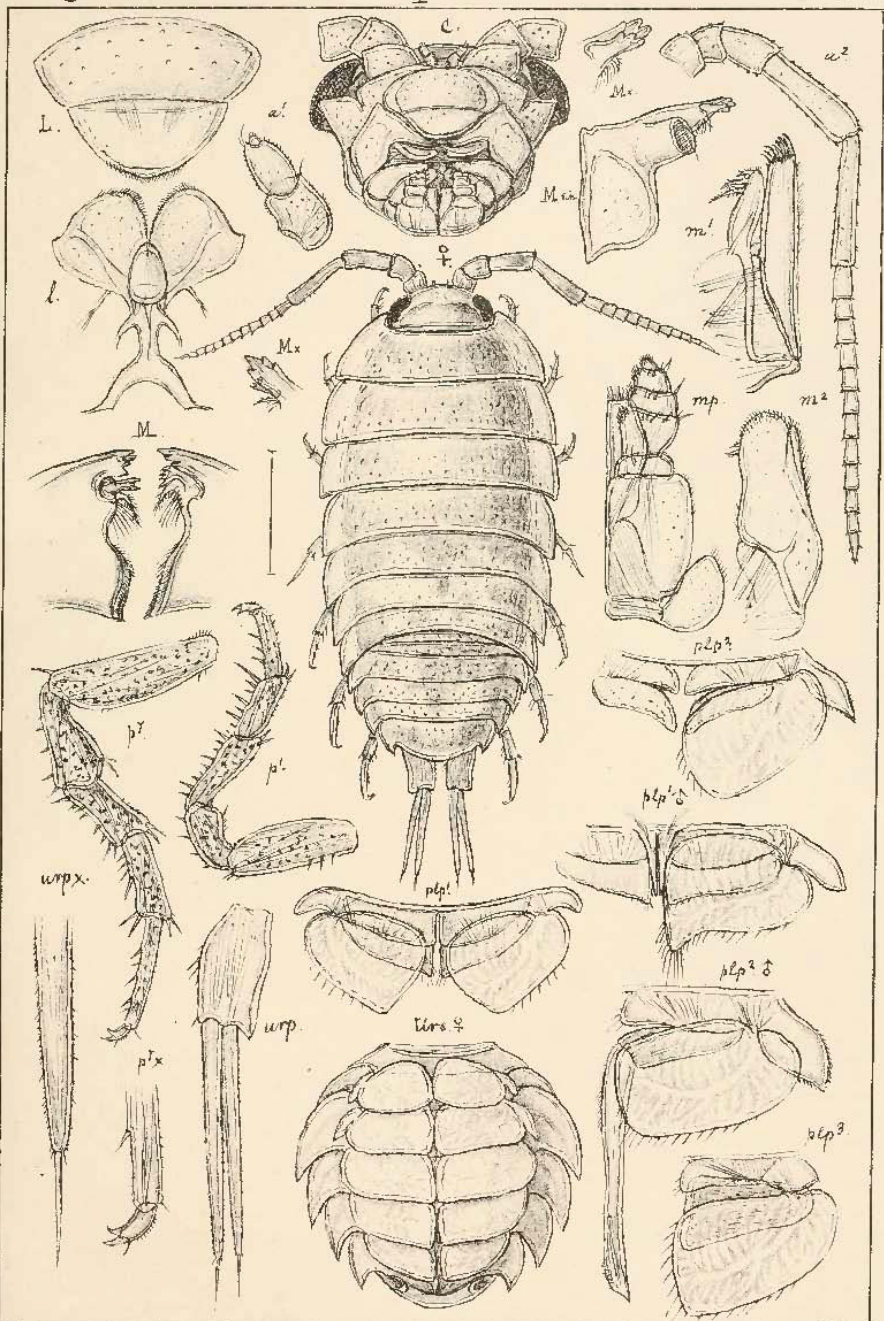
1. *Eurycope mutica*, G. O. Sars.

2. *Eurycope nyemæa*, G. O. Sars.



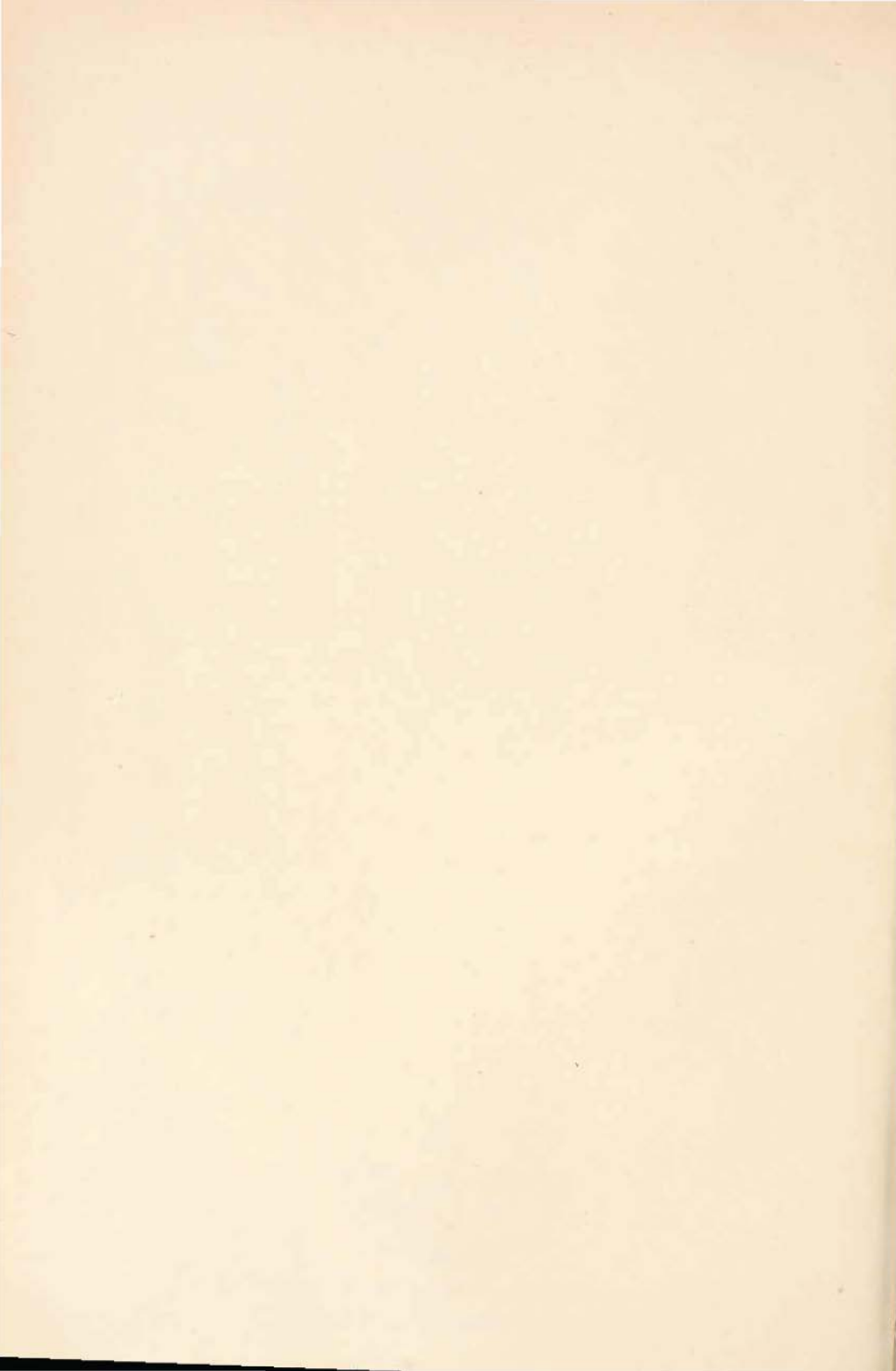
G.O. Sars, autogr.

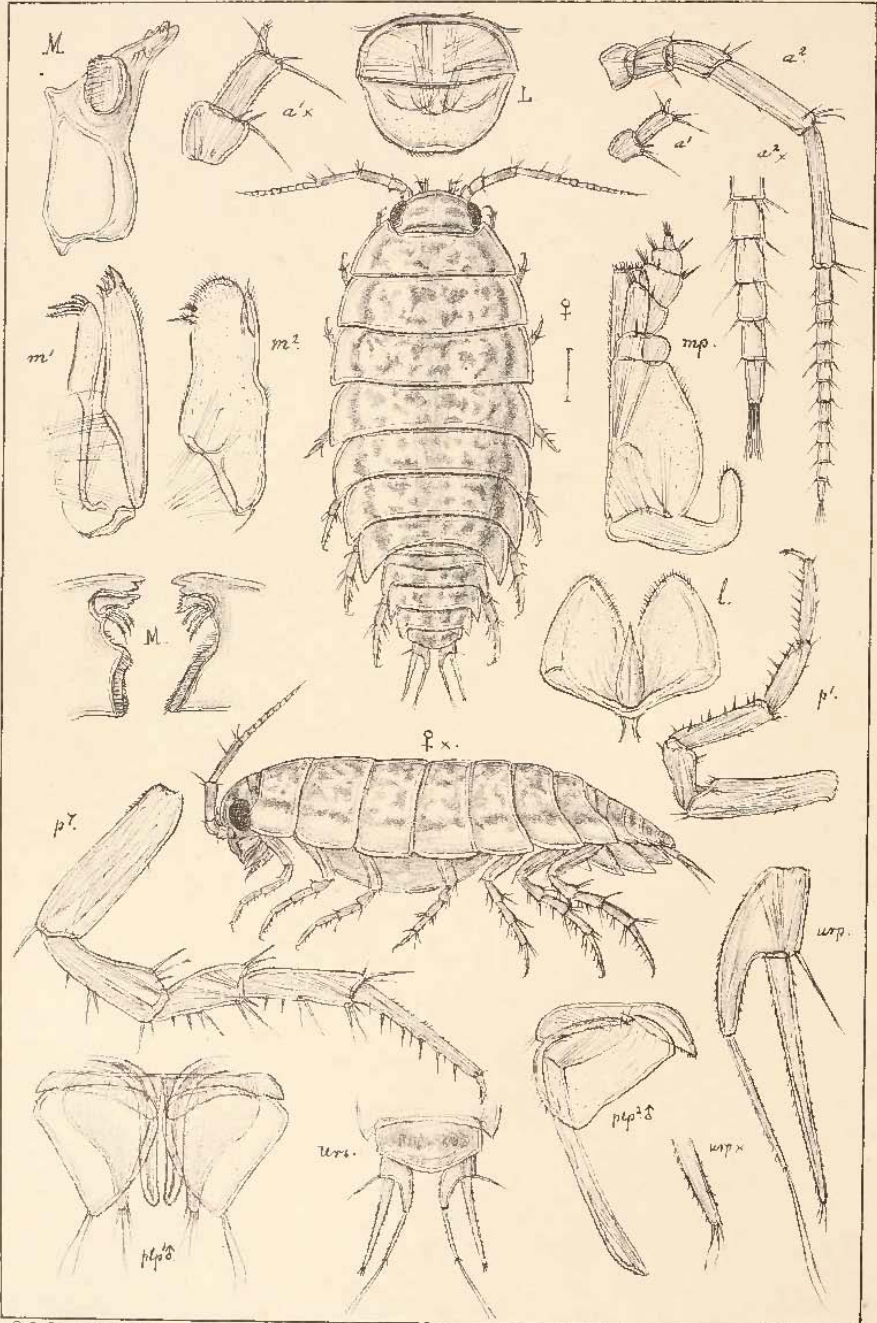
Eurycope megalura, G. O. Sars.



G.O. Sars, autogr.

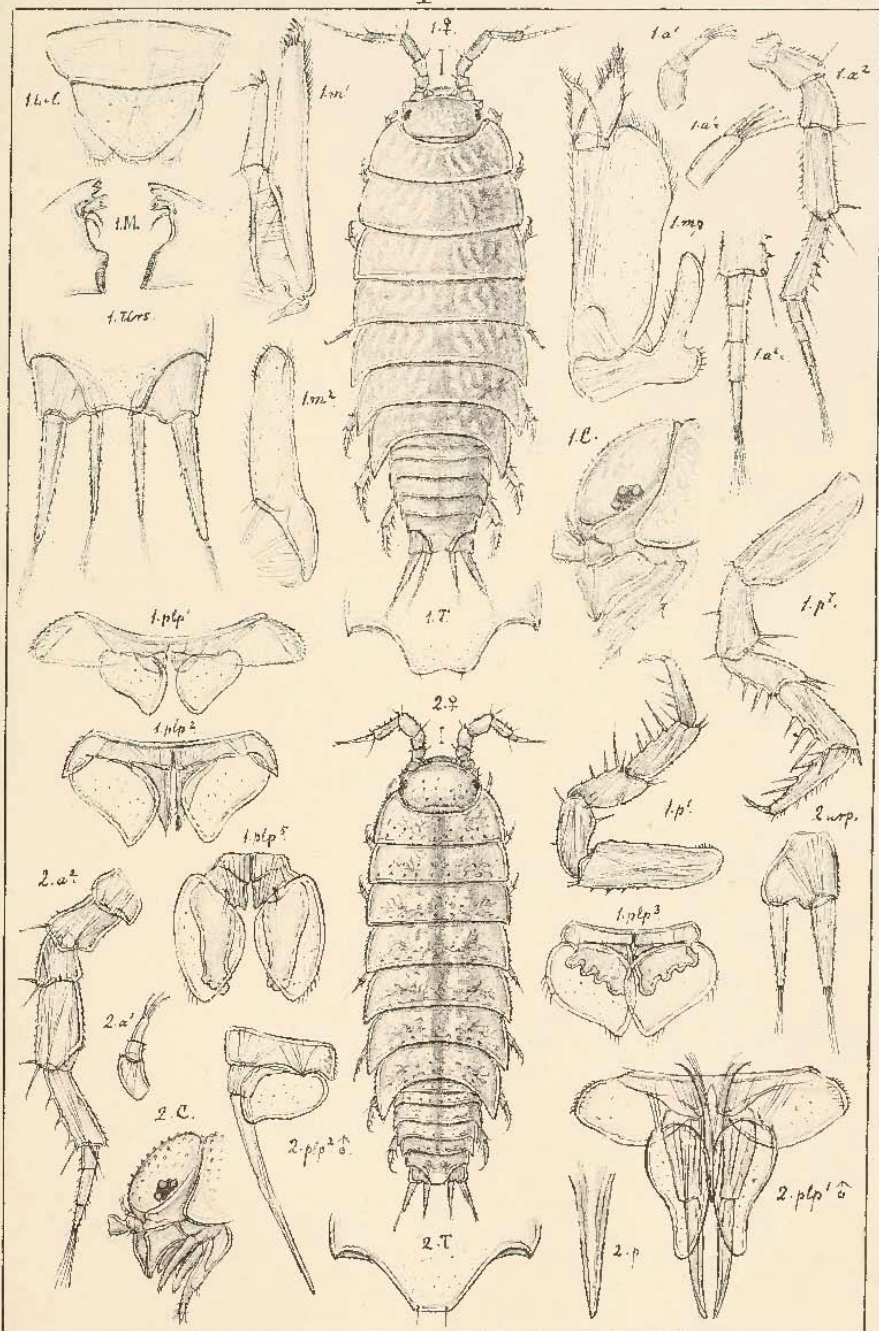
Ligia oceanica, (Lin.).





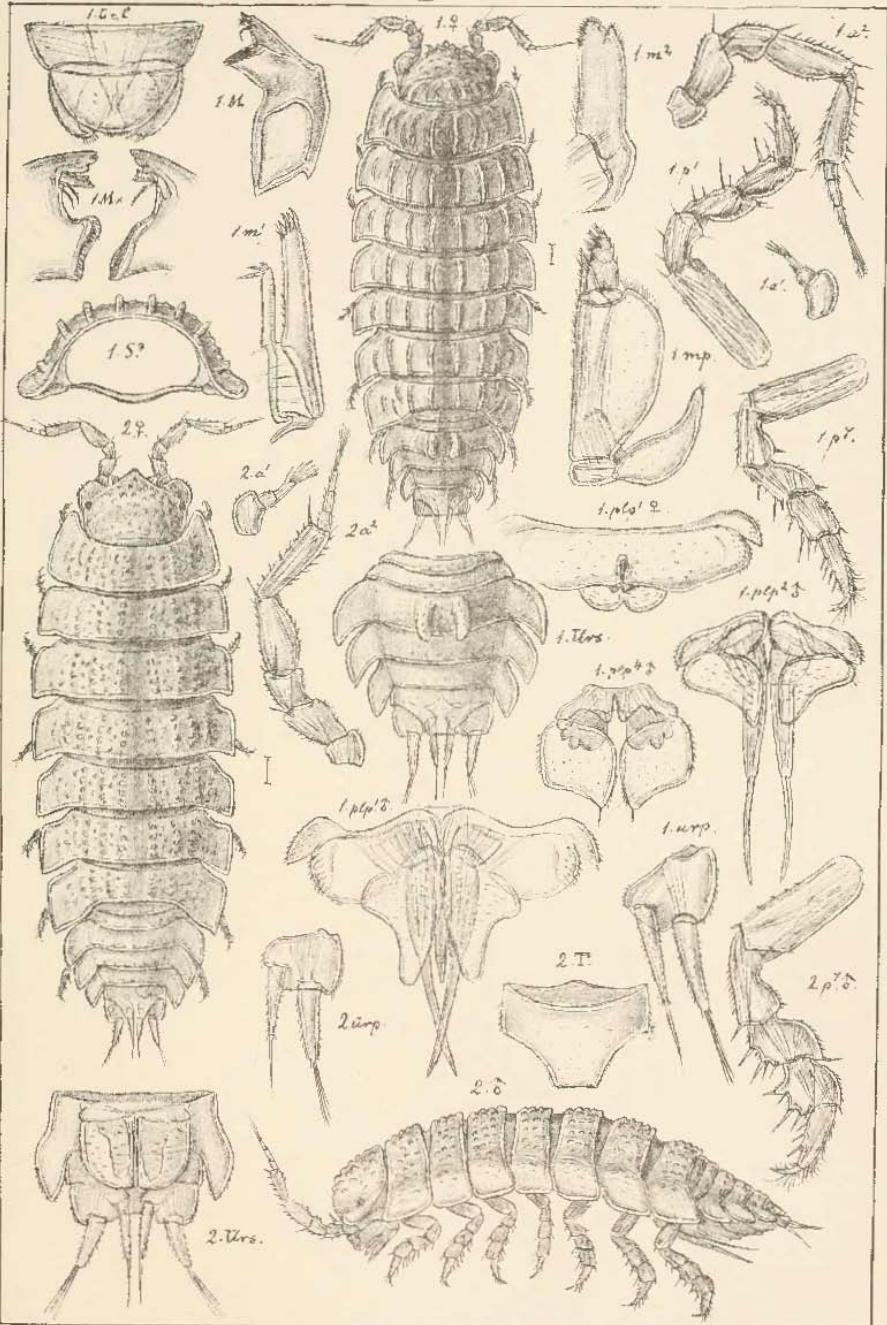
G.O Sars, autogr.

Ligidium hypnorum, (Cuv.).



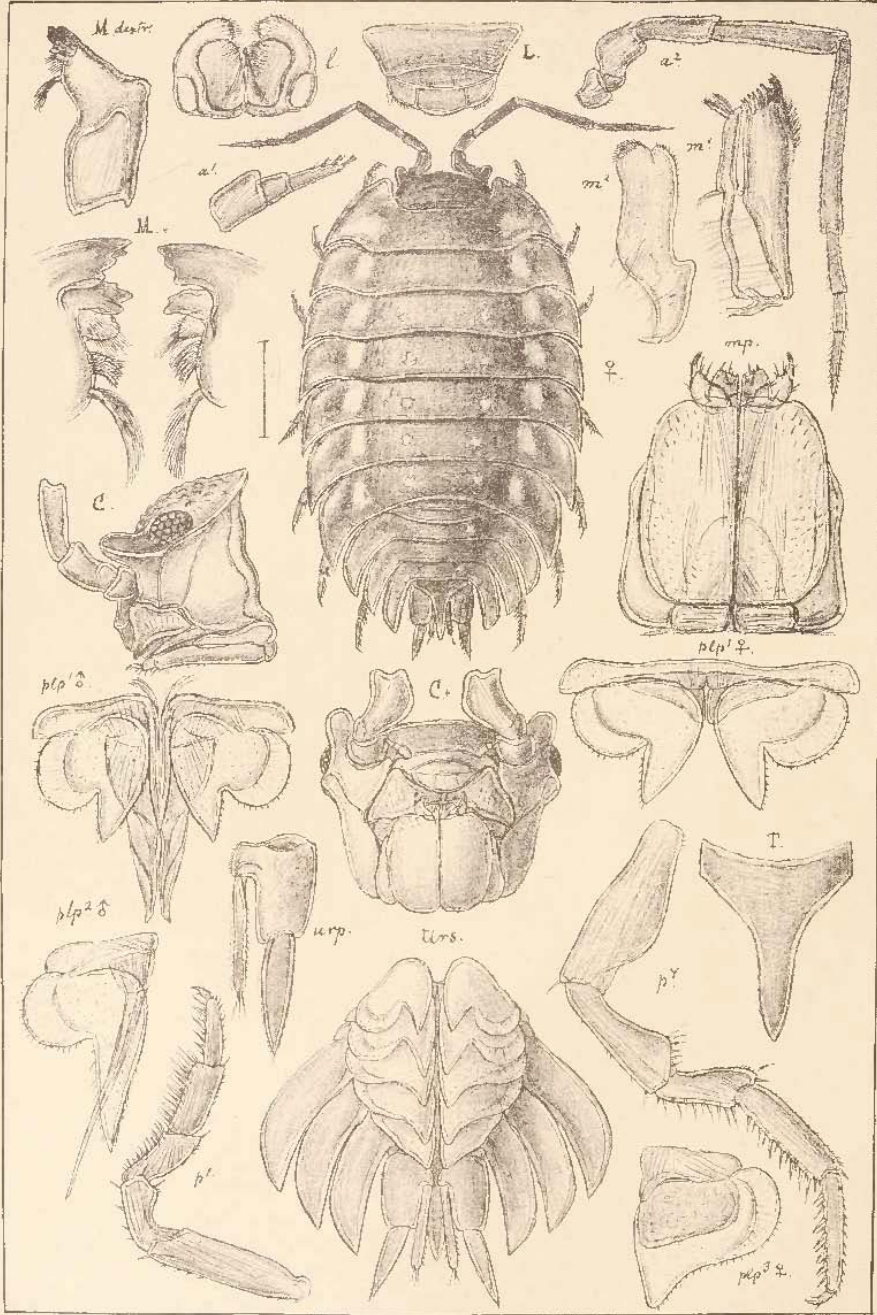
G.O. Sars, autogr.

1. *Trichoniscus pusillus*, Brandt.
2. *Trichoniscus ovemæus*. G.O. Sars.



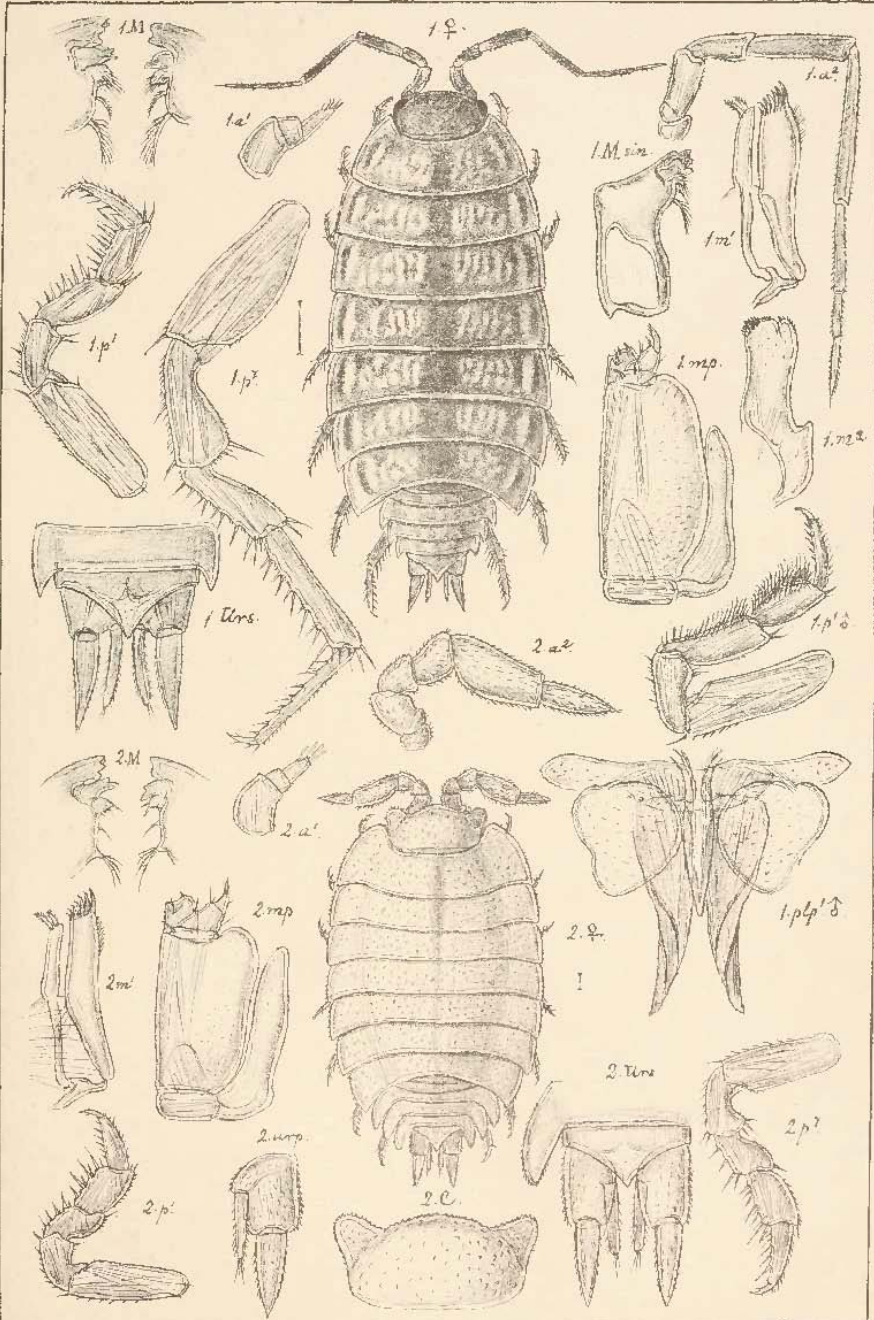
G. O. Sars, autogr.

1. Haplophthalmus Mengii, (Zaddach).
 2. D:o danicus, B-Lund.



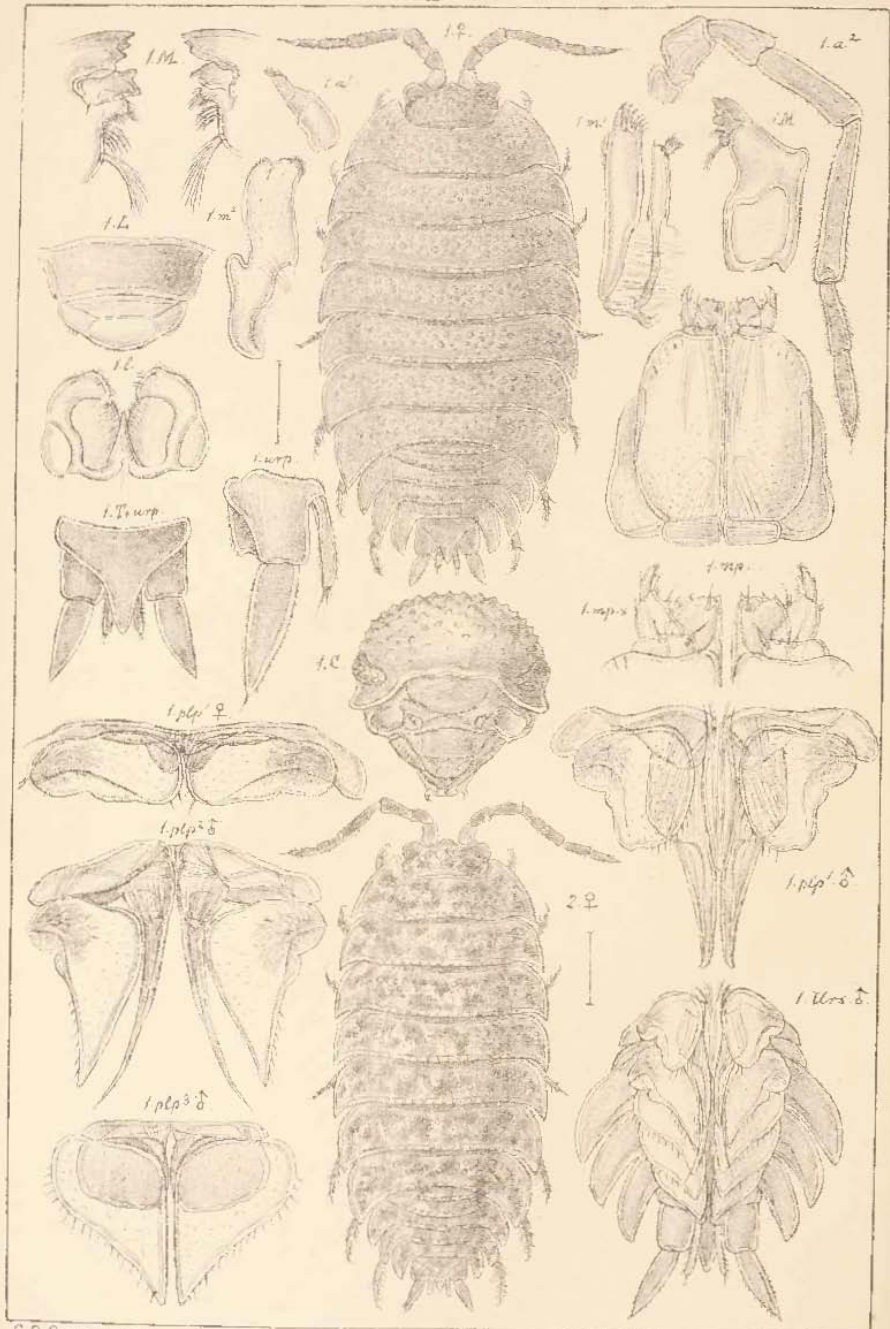
G.O. Sars, autogr.

Oniscus asellus, Lin.



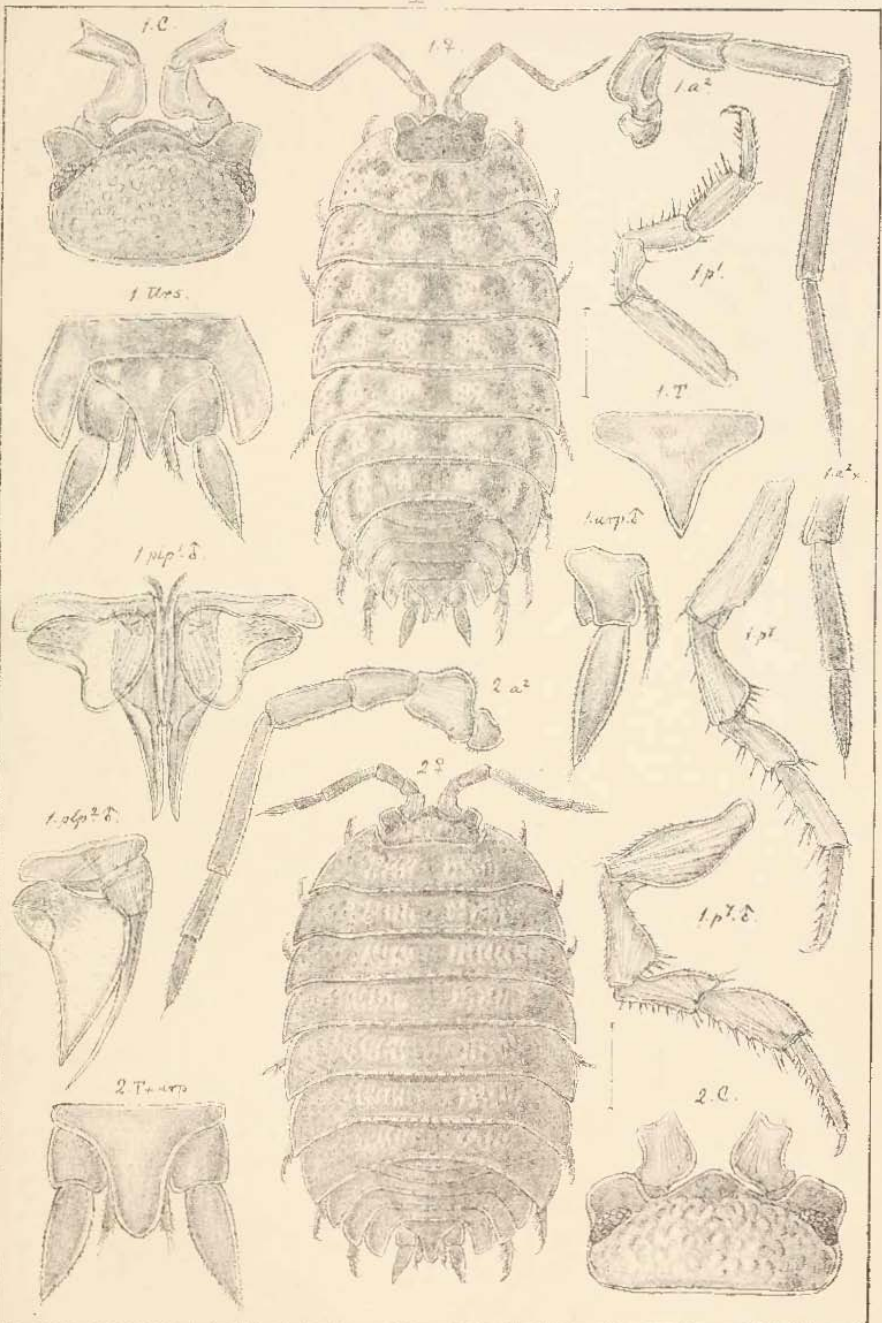
G.O. Sars, autogr.

1. *Philoscia muscorum*, (Scopoli).
 2. *Platyarthrus Hoffmannseggi*, Brandt.



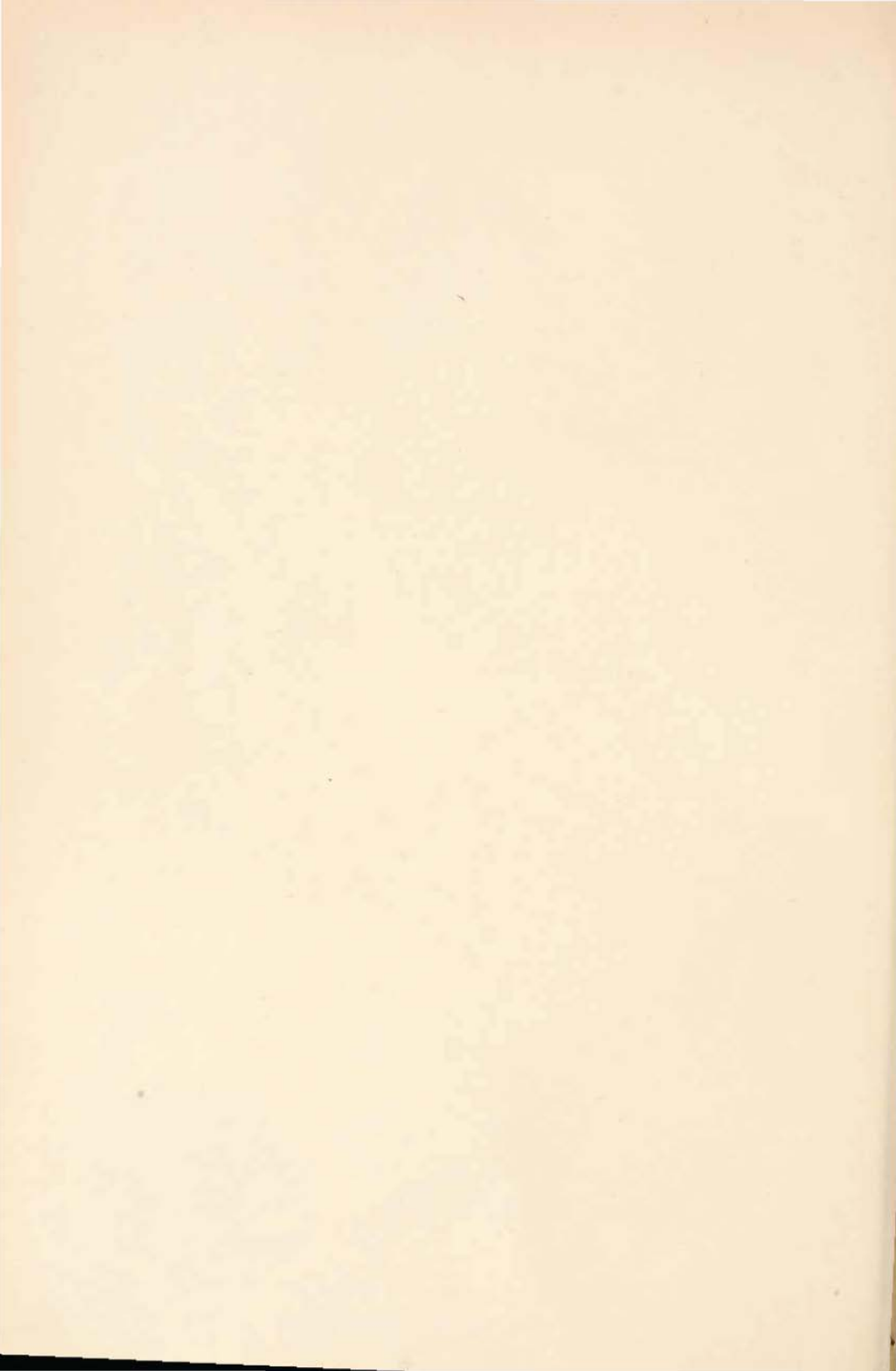
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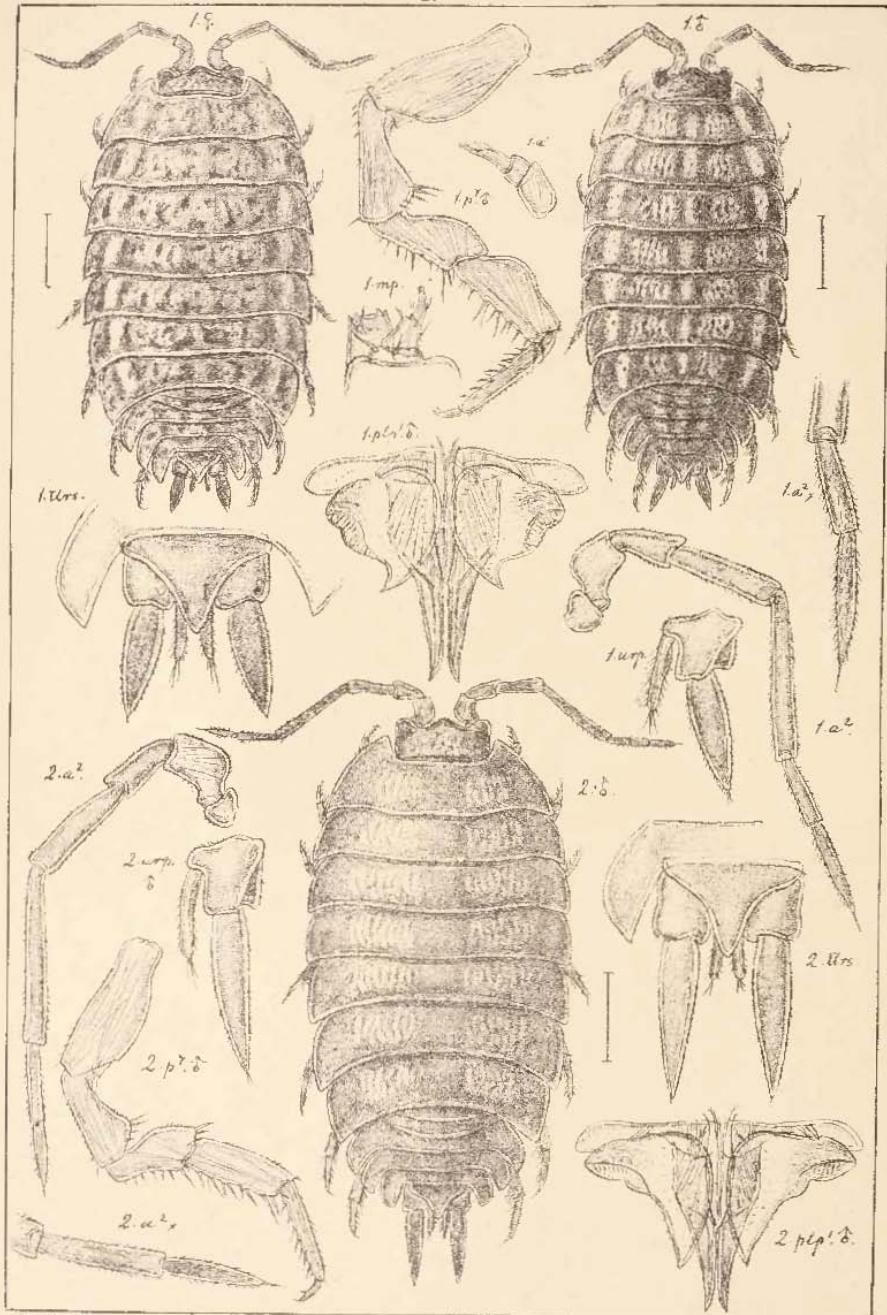
1. Porcellio scaber, Latr.
 2. Do var. marmorata.



G. O. Sars, autogr.

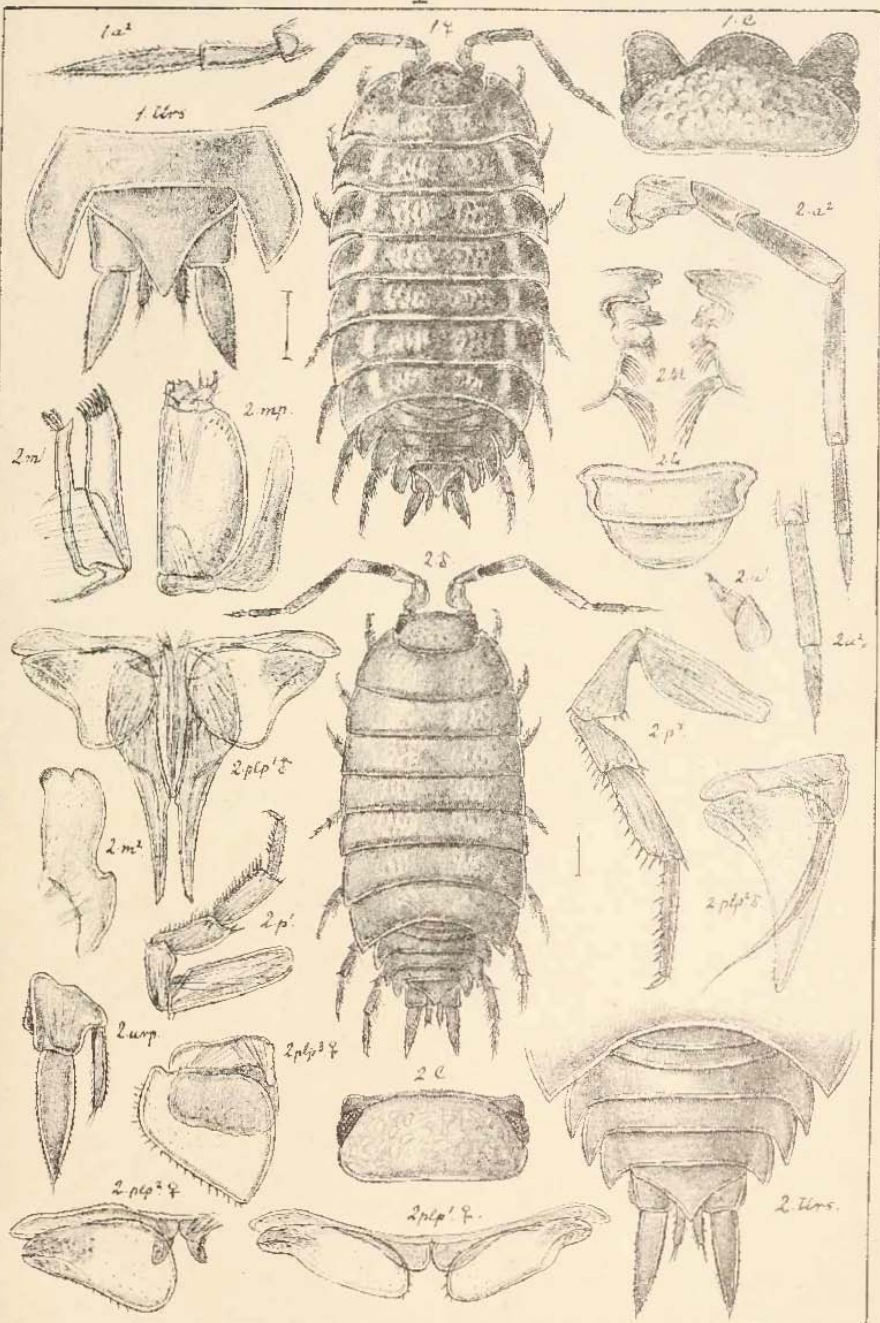
1. Porcellio pictus, Brandt.
2. Dorothea dilatatus, Brandt.





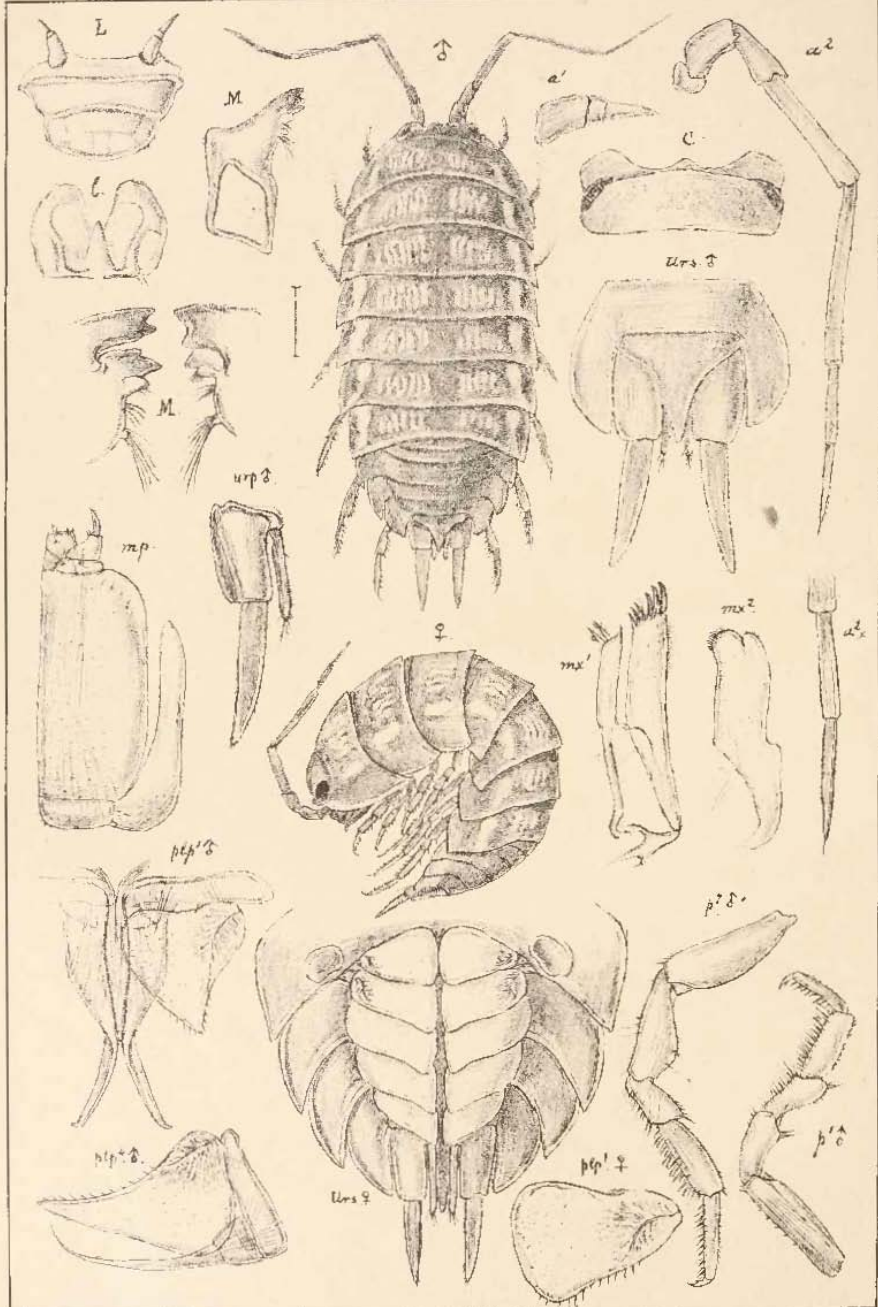
G.O. Sars, autogr.

- 1. *Porcellio Rathkei*, Brandt.
- 2. *Dorothea lævis*, Latr.



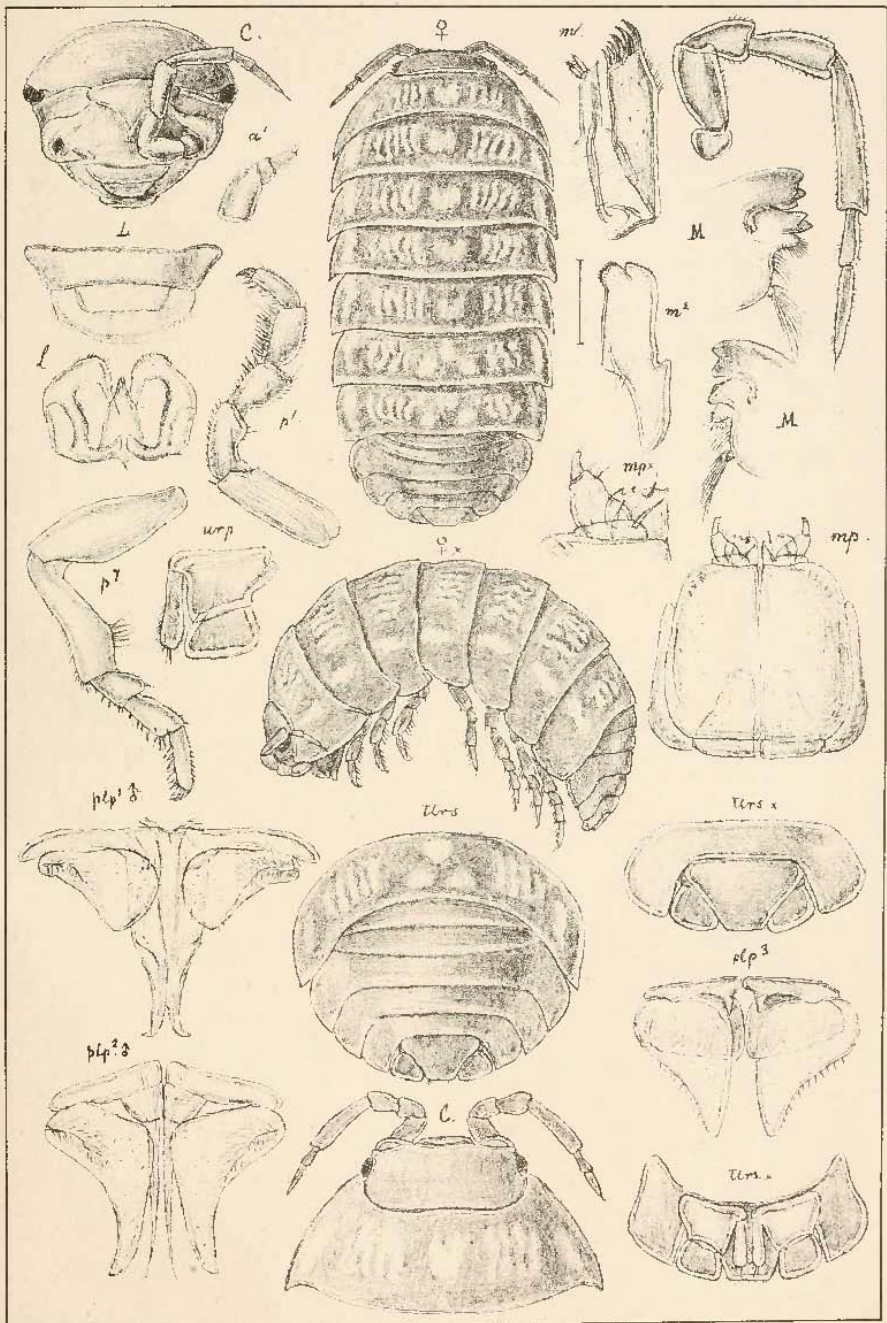
G.O. Sars, autogr.

1. *Porcellio Ratzeburgi*, Brandt.
2. *Metoponorthus pruinosis*, Brandt.



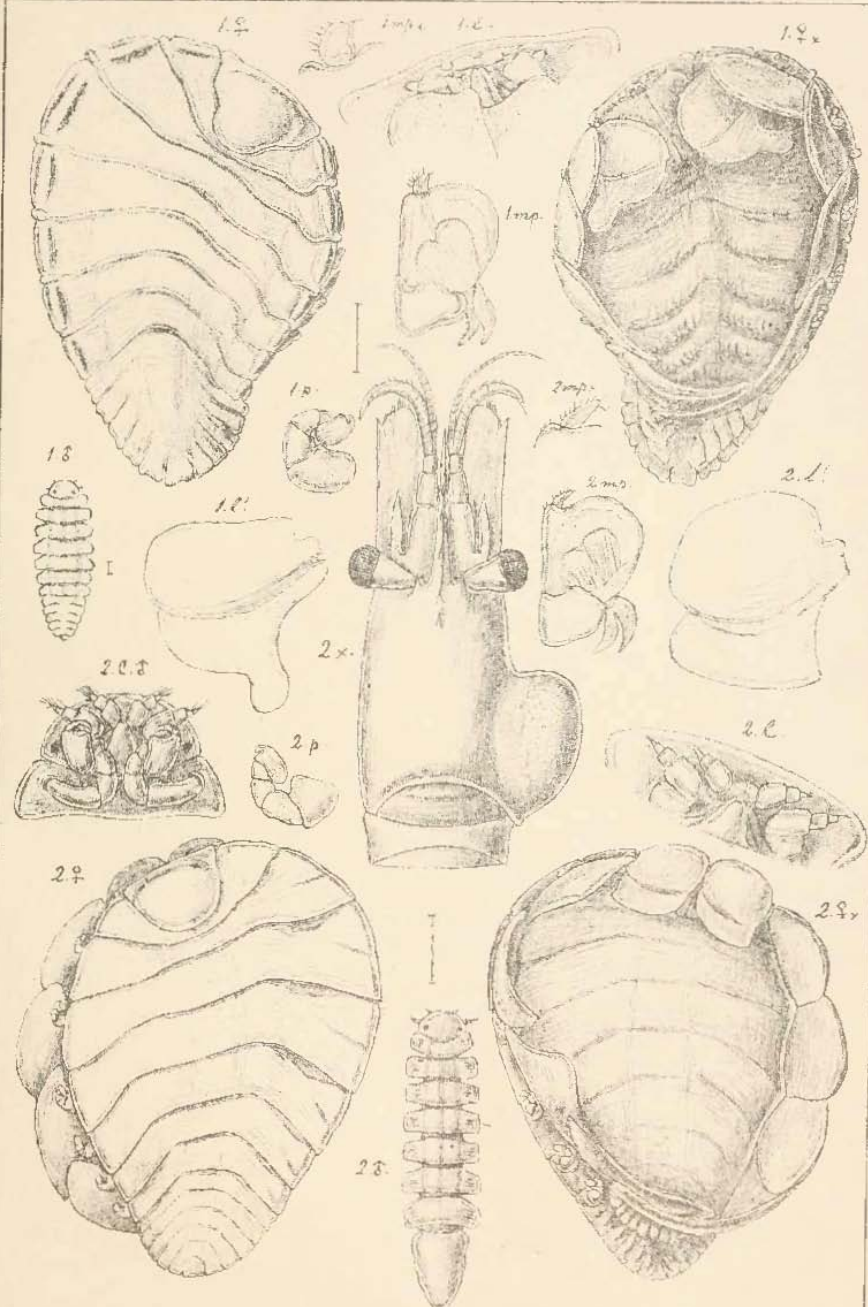
G.O. Sars, autogr.

Cylisticus convexus, (de Geer).



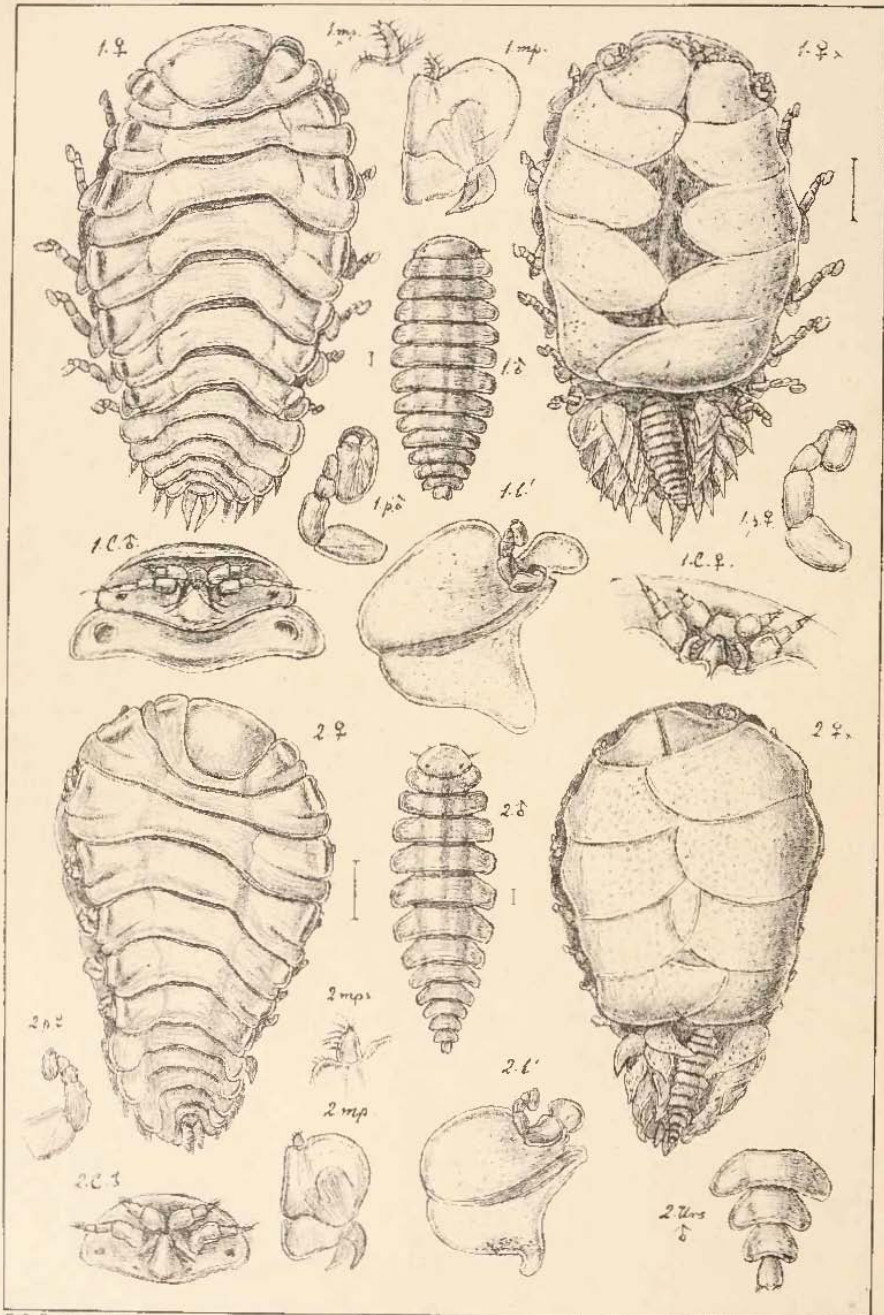
G.O. Sars, autogr.

Armadillidium vulgare, (Latr.).



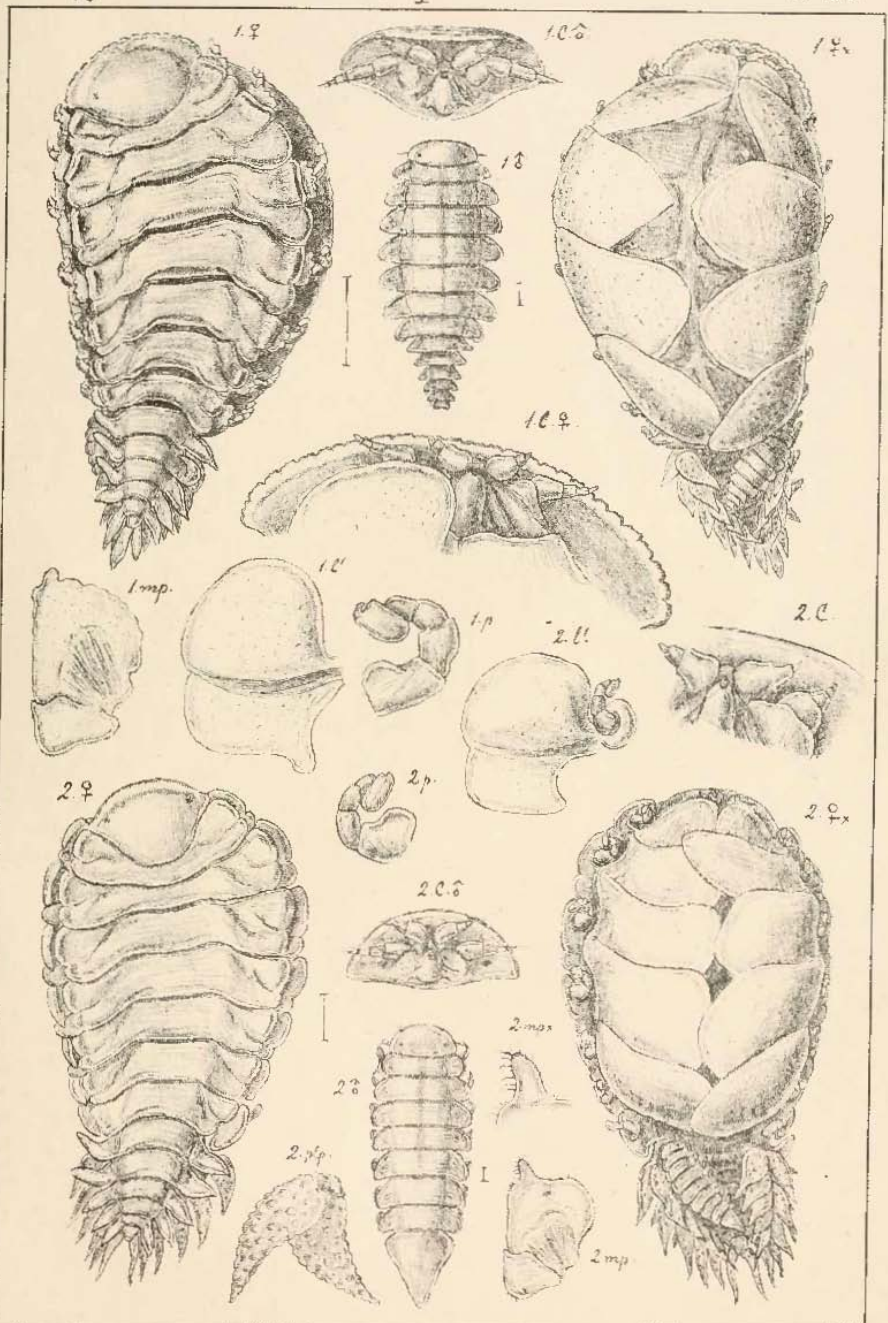
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1. Bopyrus squillarum, (Latr).
 2. Bopyroides hippolytes, (Krøyer).



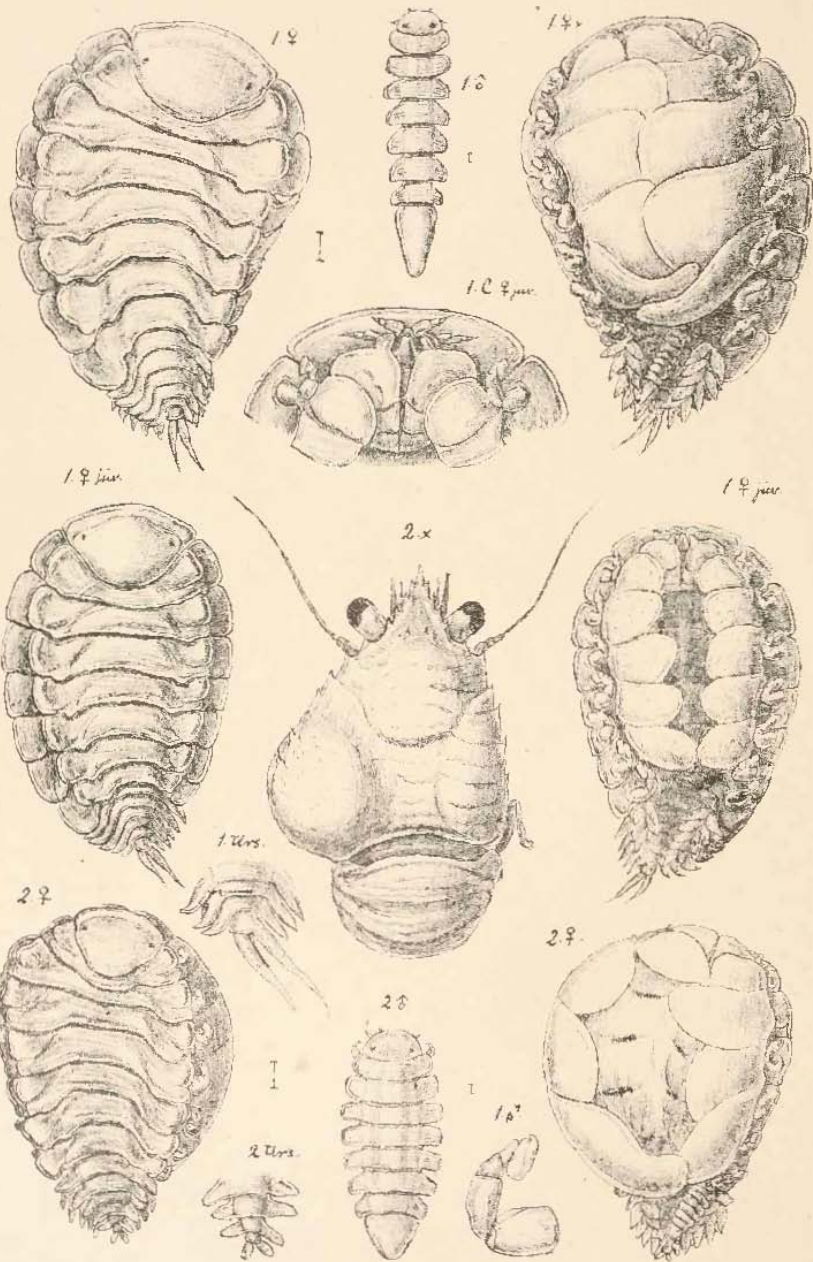
G. O. Sars, autogr.

- 1. *Pseudione affinis*, G. O. Sars.
- 2. *Pseudione Hyndmanni*, (Bate & Westw.).



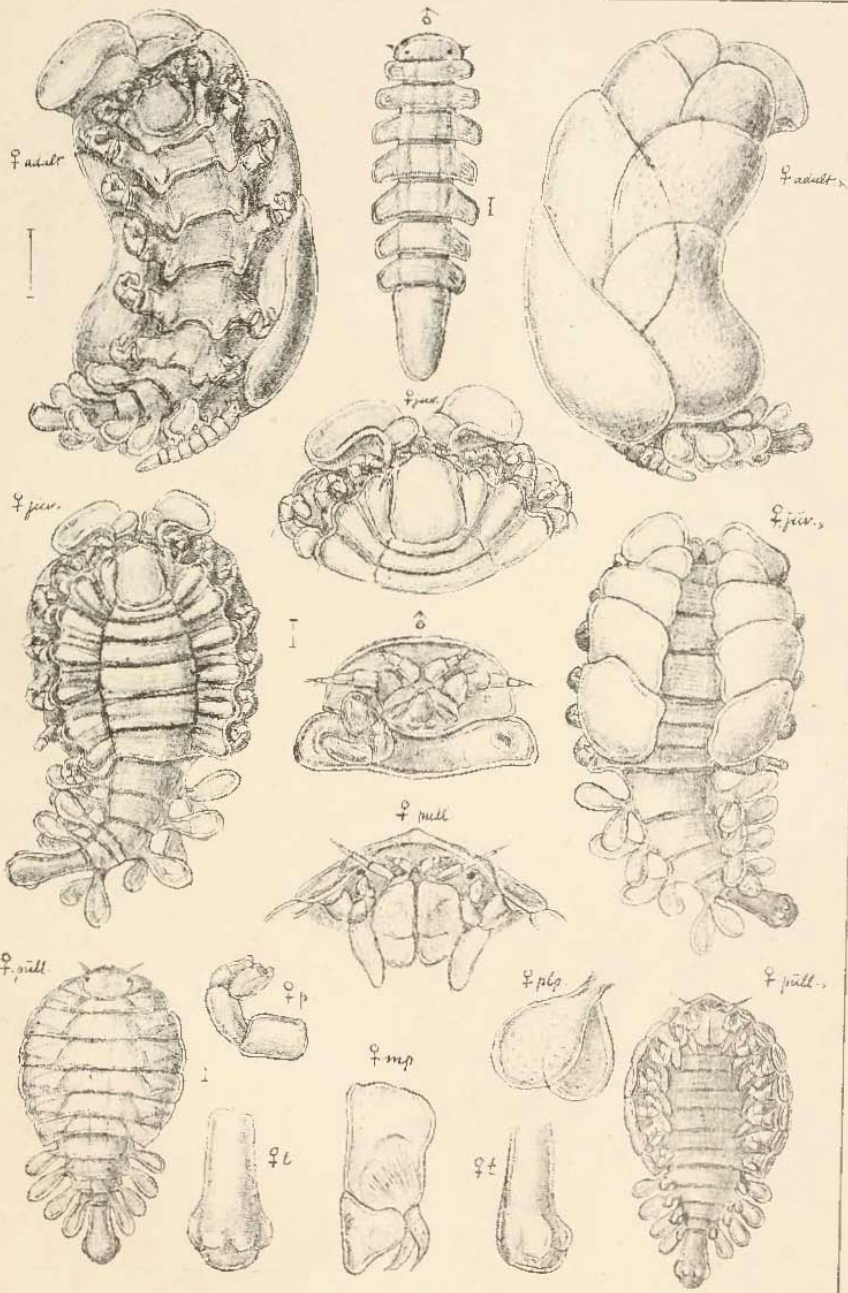
G.O Sars, autogr.

1. *Pseudione crenulata*, n. sp.
2. *Pleurocrypta longibranchiata* (Bate & Westw.).



G. O. Sars, autogr.

1. *Pleurocrypta marginata*, n. sp.
2. *Pleurocrypta microbranchiata*, n. sp.



outer. Colour of dorsal face light reddish brown, the segments of mesosome being bordered behind with darker brown, and having on each side of the median line a group of lighter dots or stripes; antennæ banded with white. Length of adult female 9 mm.

Remarks.—This form has more generally been recorded under the specific name *maculicornis* proposed by Koch; but, as the name *pruinosus* is the older one, it ought certainly to be retained. Some other synonyms are quoted above. It is easily recognizable by the oblong, flattened body, the abruptly contracted metasome, and the long and slender antennæ, in these points somewhat resembling *Philoscia muscorum*, from which, however, it is at once distinguished by the bi-articulate antennal flagellum.

Occurrence.—I have met with this form not infrequently in the immediate vicinity of Christiania, especially in refuse-heaps, together with *Porcellio scaber*; and it has also been found by conservator Storm in similar situations at Trondhjem. It is a very agile animal, running about with great rapidity when disturbed; and, as the integuments are very thin and soft, it is easily injured when being captured, unless great care be exercised.

Distribution.—Greater part of Europe, North Africa, North and South America, Sumatra, Madagascar, etc.

Gen. 6. *Cylisticus*, Schmitzler, 1853.

Generic Characters.—Body oblong, very convex, capable of being rolled up into a perfect ball, integuments rather hard. Cephalon with the lateral lobes distinct, median lobe very small or obsolete. Side-plates of [mesosome large, those of 1st segment the largest. Metasome not abruptly contracted, epimeral plates of 3rd to 5th segments well developed, recurved; last segment conically produced behind. Eyes distinct, lateral. Antennulæ with the last joint conically produced. Antennæ long and slender, with the flagellum biarticulate. Oral parts of a similar structure to that in *Porcellio*. Legs of moderate size, successively increasing in length behind. Opercular plates of all the pleopoda provided with air-cavities. Copulative appendages of male of a similar structure to that in *Porcellio*. Uropoda rather much produced, especially in male; inner ramus very narrow, and issuing far in front of the outer.

Remarks.—The present genus, established by Mr. Schnitzler, is nearly allied to *Porcellio*, though in some points, especially in the very convex body and its capability of being rolled up into a nearly perfect ball, it exhibits, as it were, a transition to the next family, the *Armadillidiidae*. Mr. B.-Lund describes 7 species of this genus. Of these only a single species is represented in the northern part of Europe.

Cylisticus convexus (De Geer).

(Pl. LXXXI.)

Oniscus convexus, De Geer, Mem. des Insectes, Vol. VII. p. 553, Pl. 35, fig. 11.

Syn: *Porcellio spinifrons*, Brault.

" " *levis*, Koch.

" " *armadilloides*, Lereboullet.

Specific Characters.—Body oblong oval, more than twice as long as it is broad, side-contours nearly parallel, dorsal face strongly vaulted and perfectly smooth. Cephalon short, transverse, almost 3 times as broad as it is long, lateral lobes rather large, obliquely truncated at the tip, median lobe forming a very small, but distinct acute projection. Side-plates of 1st segment of mesosome very large, partly flanking the cephalon, and acutely produced behind; the succeeding pairs with the posterior corner less acute. Meta-some not attaining half the length of the mesosome, epimeral plates of the first 2 segments concealed, those of the 3 succeeding segments large, recurved, their lateral margins being continuous with the sides of the mesosome; last segment about as long as it is broad at the base, its terminal part conically pointed, and extending as far as the basal part of the uropoda. Eyes rather large and convex. Antennule with the last joint about as long as the basal one, and conically pointed. Antennæ very slender, considerably exceeding half the length of the body, flagellum a little shorter than the last peduncular joint, and having its 2 articulations subequal in length. Legs moderately slender, and of same structure in the 2 sexes. Inner rami of 1st pair of pleopoda in male with the terminal parts divergent. Uropoda rather large, with the basal part oblong quadrangular, and distinctly keeled along the lower side, outer ramus narrow lanceolate, in male considerably exceeding the basal part in length; inner ramus very narrow, linear, and issuing far in front, thus but slightly projecting beyond the basal part. Colour of dorsal face dark iron grey, with a regular row of light patches along each side of the mesosome, and in each segment a group of less conspicuous flexuous stripes on either side of the median line; uropoda generally ferruginous. Length attaining 12 mm.

Remarks.—This form was described as early as in the year 1778 by De Geer as *Oniscus convexus*. The *Porcellio armadilloides* of Lereboullet is unquestionably identical with it, and, according to B.-Lund, *P. spinifrons* of Brandt and *P. lewis* of Koch ought also to be referred to this species. It is easily recognised from our other Oniscidæ by its strongly convex body and its capability of being rolled up into a ball, in which respect it strongly recalls the species of the genus *Armadillidium*. The slender antennæ and the very different structure of the uropoda, however, suffice at once to distinguish it from that genus.

Occurrence.—I have found this form not infrequently in the neighbourhood of Christiania, as also at Dröbak and Skien; and some specimens were, moreover, sent to me by Mr. Ellingsen, who collected them near Kragerö. It is generally found in rather dry situations, beneath stones, especially where the ground consists of loose pebbles. It moves about rather quickly, but, when alarmed, at once rolls its body up into a ball, which easily escapes the eye of the observer.

Distribution.—Sweden, Denmark, British Isles, Germany, Bohemia, Holland, Belgium, France, Turkey, Caucasus, North America.

Fam. 4. Armadillidiidæ.

Characters.—Body convex, contractile into a ball; integuments strongly incrustated. Cephalon flanked by the side-plates of the 1st segment of mesosome, front sub-truncate, marginate, lateral lobes distinct, median lobe obsolete, epistome vertical. Metasome not abruptly contracted, terminal segment short and broad. Antennæ comparatively small, with the flagellum biarticulate or triarticulate. Oral parts of a similar structure to that in the *Oniscidæ*. Legs comparatively short. Opercular plates of all the pleopoda, or only of the 2 anterior pairs, provided with air-cavities. Copulative appendages about as in the *Oniscidæ*. Uropoda short, not extending beyond the limits of the last segment and the epimeral plates of the penultimate one. The young, on leaving their mother, have all the 7 segments of mesosome distinctly defined.

Remarks.—The present family agrees in most points rather closely with that of the *Oniscidæ*, and it is somewhat questionable, if it should in reality be kept apart, as there are transitory forms between the two families, e. g. the

above-described genus *Cylisticus*. Yet there are some characters which seem to distinguish all the forms belonging to this family, viz, the peculiar structure of the caudal segment and of the uropoda, as also the comparatively short antennæ and legs. Moreover, Mr. B.-Lund has stated that the young leave their mother in a more advanced stage of development than in other Oniscoida, having all the 7 segments of the mesosome well defined. According to the same author, no marsupial pouch is formed in the female. But this may be less correct, as I have found in one specimen of *Armadillidium pictum* distinctly developed incubatory plates. Mr. B.-Lund refers to this family 8 different genera, and 2 more are added by Mr. Dollfus, increasing the number to 10 in all. Of these, only a single genus is represented in the fauna of Northern Europe.

Gen. *Armadillidium*, Brandt, 1830.

Generic Characters.—Body oblong or elliptical in form, very convex, and capable of being rolled up into a perfect ball. Cephalon with the front distinctly marginate, lateral lobes rounded, and sharply defined at the base. Epistome vertical, forming above a triangular shield, advancing more or less beyond the frontal edge. Side-plates of 1st segment of mesosome large, securiform, not incised behind. Metasome semicircular, with the edges continuous throughout; last segment lamellar, quadrangular or triangular in form, not extending beyond the limits of the epimeral plates of the penultimate segment. Eyes distinct, lateral. Antennulæ with the terminal joint but little produced. Antennæ, as a rule, not attaining half the length of the body, penultimate peduncular joint scarcely longer than the 2nd; flagellum biarticulate. Opercular plates of only the first 2 pairs of pleopoda with air-cavities. Uropoda very short, with the basal part broad, lamellar, outer ramus spatulate, inner narrow, cylindrical.

Remarks.—This genus, established by Brandt, is easily distinguished from *Cubaris* (*Armadillo*), with which it was formerly confounded, by the non-incision of the anterior side-plates of the mesosome, and by the broad, spatulate form of the outer ramus of the uropoda. It comprises numerous species chiefly from southern Europe, amounting, according to B.-Lund, to more than 30 in all. Of these, only 4 species are represented in the fauna of northern Europe, and will be described below.

1. *Armadillidium vulgare*, Latr.

(Pl. LXXXII.)

Armadillo vulgaris, Latreille, Hist. Crust. Vol. VII, p. 48.

Syn:	<i>Armadillo pibularis</i> ,	Say.
"	"	<i>trivialis</i> , Koch.
"	"	<i>ater</i> , Schnitzler.
"	"	<i>variegatus</i> , Latr.
"	"	<i>maculatus</i> , Risso.
"	"	<i>pustulosus</i> , Desm.
"	<i>Armadillidium commutatum</i> , Brandt & Ratzeb.	

Specific Characters. — Body oblong oval, more than twice as long as it is broad, side-contours sub-parallel, dorsal face strongly vaulted and perfectly smooth. Cephalon, seen dorsally, broadly quadrangular, transversely truncated in front, lateral lobes comparatively small, rounded. Side-plates of 1st segment of mesosome with the posterior corner acute. Metosome broad, semicircular, scarcely occupying more than $\frac{1}{6}$ of the length of the body; last segment much shorter than it is broad at the base, and slightly tapering distally, tip transversely truncated. Antennæ very short, scarcely exceeding in length $\frac{1}{4}$ of the body, flagellum about the length of the last peduncular joint, and having its 1st articulation somewhat shorter than the 2nd. Last pair of legs with the ischial joint rather large, equalling in length the succeeding part of the leg. Copulative appendages of 1st pair of pleopoda in male with the tips slightly divergent; opercular plate of 2nd pair rather produced, but scarcely curved outwards at the tip. Uropoda with the outer ramus much shorter than the basal part, and very broad, its distal edge being continuous with the last segment. Colour of dorsal face somewhat variable, sometimes uniformly dark grey or nearly black, sometimes variegated with lighter patches generally arranged on the mesosome in 3 longitudinal rows, one median and 2 lateral; between them, moreover, on each segment is a group of more or less distinct flexuous stripes. Length attaining 1.4 mm.

Remarks.—This is the first described form of the family *Armadillidiidæ*, and it is even very probable that the *Oniscus armadillo* of Linnæus may refer to this species. It may be recognised from the other known species especially by the form of the cephalon and the last segment of the metasome, as also by the very broad spatulate form of the outer ramus of the uropoda.

Occurrence.—The only record of the occurrence of this widely distributed species in Norway is in a short note of Dr. Aug. Hansson, who states its occurrence at Femsjö near Fredrikshald. I cannot, however, doubt that, on a closer investigation, it will be found to exist in many other parts of the country,

as it is very common both in Sweden and Denmark. The figures here given are from specimens kindly sent to me from the Museum of Copenhagen.

Distribution.—Throughout the whole of Europe and the adjacent parts of Africa and Asia; Madeira, New York, Montevideo, Melbourne.

2. *Armadillidium opacum*, (Koch).

(Pl. LXXXII, fig. 1.)

Armadillo opacus, Koch, *Deutschl. Crust. etc.* 34, fig. 2, 3.

Syn: *Armadillidium conspersum*, Zaddach.

" " *sulcatum*, B.-Lund (not M.-Edw.)

Specific Characters. Very like the preceding species as to its general appearance, but of somewhat smaller size. Cephalon with the frontal margin slightly arched, and surpassed by the epistomal shield. Side-plates of mesosome discontinuous. Last segment of mesosome very broad, bluntly rounded at the tip. Antennæ with the last joint of the flagellum nearly twice as long as the 1st. Colour of dorsal face light grey, irregularly variegated with darker patches. Length 9 mm.

Remarks.—This species was at first confounded by B.-Lund with the Algerian form *A. sulcatum* M.-Edw.; but in a supplement to his work he has kept it apart from that species. It is very like *A. vulgare*, but, on a closer examination, it may be distinguished by the somewhat different form of the cephalon and of the last segment of the metasome, as also by the different colour of the body.

Occurrence.—From Norway this species has not yet been recorded, but, as it is not uncommon in Denmark together with *A. vulgare*, it is most probable, that, on a closer investigation, it will be found to exist also in this country. The figures here given are from a somewhat incomplet specimen kindly sent to me from the Museum of Copenhagen.

Distribution.—Denmark, Germany, Bohemia.

3. *Armadillidium pictum*, Brandt.

(Pl. LXXXIII, fig. 2.)

Armadillidium pictum, Brandt, *Consp.* pag. 24, fig. 6.

Syn: *Armadillidium Grubci*, Zaddach.

Specific Characters.—Body oblong oval or elliptical in form, with the dorsal face strongly vaulted and perfectly smooth and shiny. Cephalon with the frontal edge somewhat prominent in the middle, lateral corners comparatively small, rounded. Side-plates of 1st segment of mesosome with the posterior corner

acnte. Last segment of metasome triangular, almost as long as it is broad at the base, and gradually tapering distally, tip obtusely pointed. Antennæ short, scarcely exceeding $\frac{1}{4}$ of the length of the body, last joint of the flagellum more than twice as long as the 1st. Last pair of legs with the ischial joint not attaining the length of the succeeding part of the leg. Copulative appendages of 1st pair of pleopoda in male greatly produced, with the extremities very slender and abruptly curved outwards; opercular plate of 2nd pair likewise produced in the form of a hook. Uropoda with the outer ramus about the length of the basal part, and quadrate in form. Colour of dorsal face dark reddish brown, or chestnut brown, with a double row of rather conspicuous angular yellow patches along the middle of the mesosome, and another series of lighter patches on each side, at the base of the side-plates; between this series and the dorsal patches in each segment, there is a group of less distinct flexuous stripes. Length of adult female 8 mm.

Remarks.—This species, first described by Brandt, may be easily distinguished from either of the 2 preceding species by the different shape of the last segment of the metasome, as also by its beautiful colouring. The *A. Grubei* of Zaddach is, according to B.-Lund, identical with this species.

Occurrence.—I have found this form in two localities near Christiania, viz. on the Ladegaardsö and at Lysaker. In the former place it occurred occasionally in rather dry situations below stones; in the latter it was found exclusively beneath loose bark. I have also received the species from Mr. Ellingsen, who found it likewise under loose bark at Kragerö. There are also some specimens in our Univ. Museum from Langesund, having been collected many years ago by the late Dr. Jensen; and B.-Lund records it also from Arendal. Finally, Dr. Ang. Hansson states its occurrence at Femsjö near Fredrikshald.

It moves rather slowly, and at the slightest touch rolls its body up into a perfect ball, which is easily lost to sight in the hollows of the ground.

Distribution.—Sweden, Denmark, Germany, Belgium, France.

4. *Armadillidium pulchellum*, Brandt.

(Pl. LXXXIII, fig. 4.)

Armadillidium pulchellum, Brandt, *Consp.* p. 26, fig. 18.

Syn: *Armadillo maculatus*, Sill.

„ *Armadillidium pictum*, Plateau (not Brandt).

Specific Characters.—Form of body about as in *A. pictum*. Cephalon with the frontal edge distinctly prominent in the middle, lateral lobes evenly rounded.

Side-plates of 1st segment of mesosome abruptly truncated at the posterior corner. Last segment of metasome much broader than it is long, and obtusely truncated at the tip. Antennæ very short, with the last joint of the flagellum nearly 3 times as long as the 1st. Legs, pleopoda and uropoda nearly as in *A. pictum*. Colour of dorsal face dark brown, more or less distinctly variegated with lighter patches, arranged as in the above-named species. Length of body scarcely exceeding 5 mm.

Remarks.—In its general appearance this species bears considerable resemblance to *A. pictum*, and may easily be confounded with it. On a closer examination, it is however found to differ very markedly in certain points, and may thus undoubtedly be regarded as specifically distinct. The peculiar form of the side-plates of the 1st segment of the mesosome is an especially marked character, and the caudal segment also differs essentially in its form.

Occurrence.—I have myself only met with this species in a single locality near Christiania, viz., close to the shore on the outermost point of the Ladegaardsö, where it was found occasionally below stones together with *Porcellio pictus*. Mr. Ellingsen has, however, collected it in 3 different places, viz., at Kragerö, Grimstad and Borö, and some few specimens in our Univ. Museum were also found among *A. pictum*, and were collected at Langesund by the late Dr. Jensen. In habits it exactly resembles *A. pictum*.

Distribution.—Northern and Central Europe, in the same places as *A. pictum*.

Tribe 6.

EPICARIDA.

The Isopoda belonging to this tribe are all parasitic forms, and their hosts are invariably other Crustacea of different orders; hence the above name of the tribe. They are the most degraded forms of Isopoda, and in some instances the fully-grown female represents merely a simple sac filled with ova, and without any trace of segmentation or of limbs, so that the idea of its being a crustacean animal would hardly suggest itself, if the development were not known. In all the forms a more or less pronounced regressive metamorphosis has been observed, comprising at least two distinct larval stages, very dissimilar both in their general appearance and in the structure of the several appendages, and equally different from the adult animal. As will be shown further below, there is in all probability in most of the forms even a 3rd intermediate larval stage, the *Microniscus* stage, which, however, has not hitherto been recognized as such, but has been wrongly regarded as an adult form of Epicarida representing even a distinct family. The sexual dimorphism in all the forms is very pronounced. The male in all cases, as compared with the adult female, is of diminutive size, and is generally found clinging to the genital region of the female like a parasite. It is also of an appearance very different from that of the female, retaining, as it does, several of the larval characters, and in some instances it does not differ from the last larval stage except by the presence of generative organs. In certain cases (Entoniscidæ), the parasite penetrates to the inner organs of its host, looking merely like an endoparasite, and in all such cases the body of the female is found to be greatly deformed. But when the parasite retains its character as a true ectoparasite, the female also exhibits, as a rule, some more or less pronounced deformity — and is often conspicuously asymmetrical, even when the segmentation of the body is

apparent. In the latter case, the 3 chief divisions, cephalon, mesosome and meta-some, may, as a rule, be tolerably well distinguished, though not very sharply defined from each other. Of appendages, the cephalon carries generally in front two pairs of rudimentary antennæ, and is produced below to a conical prominence exhibiting on the tip the oral aperture. The oral parts are much reduced, only the mandibles and maxillipeds being distinctly developed, the former being styli-form and converging to the oral orifice, the latter lamelliform. The legs, when present, are all alike, prehensile, terminating in a minute hand. The pleopoda are in some instances rather large, and all of them branchial in character, whereas in the larvæ these organs are natatory. The uropoda, when present, are always very small and simple, and do not in any instance form with the last segment a caudal fan.

As to the systematical relation of this tribe to other Isopodous tribes, Dr. H. J. Hansen has suggested, that it is closely related to the *Cymothoidæ* and cannot therefore be set apart from the tribe *Flubellifera*. In this opinion I am, however, by no means prepared to agree with the distinguished Danish author. The apparent resemblance to the *Cymothoidæ* is only due to the parasitic habits of both; but in the more essential points of organisation, as also in their development, both these groups are in reality widely different, and no transition forms between them are as yet known.

Of recent authors, who have made this tribe their special study, may in the first place be named the two distinguished French naturalists M.M. Giard and Bonnier, who have published several admirable treatises on these interesting Isopoda, accompanied by excellent illustrations. It is however to be regretted, that these authors have introduced considerable confusion as to the definition of species and genera, owing to an assumption, according to which it is postulated, that one and the same species of parasite cannot be found on different species of Crustacea, and that, as a rule, parasites infesting different genera of Crustacea must also be generically different. This assumption is most certainly un-maintainable, and a great number of species, and perhaps also genera founded only upon this principle, must of course be cancelled. The grouping of the several genera, into families has also to a great measure been made according to a similar principle. No less than 7 families have thus been established by the above-named authors, viz.

1. *Microniscidæ* parasitic on Copepoda.
2. *Cyproniscidæ* " " Ostracoda.
3. *Dajida* " " Schizopoda.
4. *Cabiropsidæ* " " Isopoda and Amphipoda.

5. *Cryptoniscidæ* parasitic on Cirripedia.
 6. *Entoniscidæ* " " Brachyura.
 7. *Bopyridæ*. " " Decapodous Crustacea.

Of these families, the 1st must be wholly cancelled, as only representing transitory larval stages of different Epicarida, and the 3 families *Cyproniscidæ*, *Cabiropsidæ* and *Cryptoniscidæ* ought to be combined into one family only, for which the name of *Cryptoniscidæ* may be retained. The number of families is thereby reduced to 4 in all. It is not improbable that these families in future may assume the character of superior groups, and that each of them may be again subdivided. At present, however, I consider it convenient to maintain the above-named 4 families as such.

Of *Entoniscidæ* no form has hitherto been recorded from Norway; but I regard it as beyond doubt, that, on a closer investigation, also this family will be found to be represented in the fauna of this country. Of the other 3 families several genera and species will be described in the following pages.

Fam. 1. Bopyridæ.

Characters. — Body of female distinctly segmented, more or less asymmetrical, twisted now to the right, now to the left, dorsal face flattened. Cephalon deeply sunk into the mesosome, and carrying in front 2 pairs of rudimentary antennæ; eyes, when present, dorsal. Maxillipeds lamellar, biarticulate, obtecting the oral area below, and more frequently exhibiting a small terminal joint, and at the base 2 curved lanceolate appendages (epignaths). Legs 7 pairs, sometimes obsolete on one side, and all of the same structure, short, prehensile; coxal plates obsolete or distinctly defined. Incubatory plates 5 pairs, more or less arching over the ventral face of the mesosome; 1st pair, as a rule, concealed by the 2nd and divided by a transversal fold into 2 segments, of which the distal one projects freely within the incubatory cavity. Metasome more or less distinctly segmented, pleopoda, forming simple or double lamellæ, all of the same structure, rarely obsolete. Uropoda, when present, simple, lanceolate. Male more or less slender, perfectly symmetrical, with the cephalon evenly rounded in front, and all the segments of mesosome sharply defined, those of metasome sometimes distinct, sometimes confluent. Last larval stage with the mouth

simple, conic; posterior antennæ with the flagellum 4-articulate; legs of uniform structure; uropoda with the inner ramus shorter than the outer. Parasitic on decapodous Crustacea.

Remarks.—This family comprises the more differentiated forms of Epica-rida, in which the retrograde metamorphosis is less pronounced. Yet the adult female in every case exhibits an appearance very different from that of the male and the larvæ, the body being more or less deformed and asymmetrical, though its segmentation, as a rule, is distinct at least on the dorsal side, with the 3 chief divisions well defined. The greater number of forms are found as parasites in the branchial cavity of higher Crustacea; but there are a few forms which infest the ventral or dorsal face of the metasome of their hosts, and which also in several other respects differ considerably from the others, and might therefore perhaps more properly be separated into a particular subfamily (the genera *Athelges* and *Phryxus*). Rather a great number of genera have been established, especially by M.M. Giard and Bonnier; but I believe that some of these genera are not very well defined, so that a reduction may perhaps be found to be necessary. In the following pages will be described 6 genera, at least 5 of which are stated to belong to the fauna of Norway.

Gen. 1. **Bopyrus**, Latr., 1804.

Generic Characters.—Body of female broad, flattened, rather asymmetrical, with the segments of mesosome firmly connected. Cephalon deeply immersed within the 1st segment of mesosome, frontal edge broad, lamellar. Lateral parts of mesosome slightly elevated, subcontiguous, coxal plates inconspicuous. Metasome narrowed, with the segments confluent in the middle of the dorsal face, epimeral plates distinct, subcontiguous, last segment resembling them. Anterior antennæ distinctly 3-articulate, posterior ones apparently consisting of only 2 articulations. Terminal joint of maxillipeds well defined, broadly oval or cordiform. 1st pair of incubatory lamella rather large, divergent, distal segment terminating in a narrow linguiform lobe; the 4 succeeding pairs widely apart, leaving a broad open space in the middle, the marsupial pouch being here closed by the carapace of the host. Legs very small, concealed within the lateral edges of the mesosome. Pleopoda simple, lamellar. Uropoda wanting. *Male* with the segments of metasome imperfectly defined. Parasitic in the branchial cavity of prawns.

Remarks.—This genus was established as early as in the year 1804 by Latreille, and may be regarded as the type of the family. We know as yet with certainty of only a single species, to be described below. Several other species, it is true, have been named by M.M. Giard and Bonnier; but none of them have been as yet described or figured in detail, and as they seem chiefly to be established according to the different species of prawns in which they were found, it is highly probable that their number will be greatly reduced and perhaps combined into one and the same species.

Bopyrus squillarum, Latr.

(Pl. LXXXIV. fig. 1.)

Bopyrus squillarum, Latreille, Hist. Nat. Crust. Vol. VII, p. 55, Pl. LIX, fig. 2.

Syn: *Monoculus crangorum*, Fabr.

" *Bopyrus Fougerouvi*, Giard & Bonn. etc.

Specific Characters.—Body of female broadly oval or pyriform in outline, obtusely truncated in front, narrowly rounded behind, twisted sometimes to the right, sometimes to the left, according to its place on the host. Cephalon subtriangular in form, widening considerably distally, frontal edge nearly straight and continuous with the side-contours of mesosome, lateral corners narrowly rounded. Segments of mesosome with the lateral parts slightly elevated, each with a small indentation in front of the posterior corner, defining sutures strongly curved. Median length of metasome about half that of the preceding part of the body, epimeral plates slightly bilobed, terminal segment of exactly the same appearance as the epimeral plates. *Male* oblong oval in form, with the segments of mesosome well defined, those of metasome confluent along the middle. Colour of female (according to Sp. Bate & Westwood) pale greenish, with the head and incubatory lamella darker blackish. Length of female 11 mm., of male 2 mm.

Remarks.—This form was first recorded by O. Fabricius as *Monoculus crangorum*; but as the specific name proposed by that author involves a confusion of shrimps with prawns, it is impossible to retain it and therefore, though the older one, it ought to give place to that proposed by Latreille. It is the only as yet known species of the genus, for the several species named by M.M. Giard and Bonnier cannot be admitted as such until it is clearly shown, that in reality they differ specifically from the type species. It is very probable, that the present species infests several species of prawns and perhaps also species of nearly-allied genera.

Occurrence.—This form is found parasitic in the branchial cavity of species of *Leander* (Palæmon), such as *L. serratus*, *squilla* and *Rathkei*, sometimes on the left, sometimes on the right side, in every case causing a strong lateral tuberosity of the carapace, similar to that caused by *Bopyroides hippolytes* (fig. 2 x). It has not yet been recorded from Norway; but as at least 2 of the species of *Leander*, which at times are infested by this parasite, are very common on our coasts, it is most likely that, on a closer investigation, it will be found to belong to the fauna of Norway. The figures of the female here given are from a specimen found on *Leander serratus* from the Danish coast; that of the male is copied from Sp. Bate and Westwood's work.

Distribution.—Danish coast (Meinert), British Isles (Sp. Bate), coast of France (Giard & Bonnier), Mediterranean.

Gen. 2. **Bopyroides**, Stimpson, 1864.

Syn: *Bopyrus*, Krøyer (not Latreille)

" *Gyge*, Sp. Bate (not Corn. & Penn.)

Generic Characters.—Body of female resembling that of *Bopyrus*, though having the cephalon less broad, the lateral parts of mesosome perfectly smooth, and the metasome distinctly segmented. Posterior antennæ 4-articulate. Terminal joint of maxillipeds well defined, but rather narrow. 1st pair of incubatory plates concealing the whole ventral face of cephalon, and having the distal segment broadly semicircular; the succeeding pairs, as in *Bopyrus*, widely apart. Legs short, more or less concealed within the lateral margins of the mesosome. Pleopoda obsolete, being replaced by slight fleshy ridges. Uropoda wanting. *Male* with the segments of metasome fused together. Parasitic in the branchial cavity of species of the genus *Spirontocaris* (Hippolyte).

Remarks.—This genus, established by Stimpson, is nearly allied to *Bopyrus*, from which it is chiefly distinguished by the absence of true pleopoda, and by the male having all the segments of metasome fused together. The species of this genus are found parasitic in the branchial cavity of different *Carida* belonging to the genus *Spirontocaris* Sp. Bate (Hippolyte Krøyer). To the fauna of Norway belongs only a single species, to be described below.

Bopyroides hippolytes, (Krøyer).

(Pl. LXXXIV, fig. 2).

Bopyrus hippolytes, Krøyer, Gronlands Amphipoder, p. 78, Pl. 4, fig. 22.Syn.: *Gyge hippolytes*, Sp. Bate & Westw.

Specific Characters. — Body of fully grown female broadly oval, rather asymmetrical, being curved to the right or left, according to its place on the host; dorsal face much flattened and very smooth. Cephalon almost semicircular in form, and deeply immersed within the mesosome, frontal edge nearly straight, lateral corners obtusely pointed. Segments of mesosome firmly connected, with the lateral parts perfectly smooth, contiguous, and without any marginal indentations. Metasome comparatively short, its median length scarcely exceeding $\frac{1}{3}$ of that of the preceding part of the body, sutures between the segments much curved and distinct also in the middle of the dorsal face, epimeral plates contiguous, truncate at the tip, last segment likewise truncate. *Male* very slender, linear, 4 times as long as it is broad, segments of mesosome very sharply marked off from each other, metasome forming an undivided obtusely conical piece. Colour of female whitish, with the incubatory plates dark violet. Length of female reaching to 11 mm., that of male to $2\frac{1}{2}$ mm.

Remarks. — This form was first described by Krøyer as *Bopyrus hippolytes*, and was subsequently referred by Sp. Bate and Westwood to the genus *Gyge* of Cornalia and Panceri. It must, however, unquestionably find its place within the genus *Bopyroides* of Stimpson, and it is indeed somewhat questionable, if the species of Stimpson, *B. acutimarginata*, is not identical with the North European form. In its general appearance and its mode of infesting its host, the female of this Bopyrid bears a great resemblance to *Bopyrus squillarum*, but may, on a closer examination, be easily distinguished by the distinct segmentation of the metasome, and by the want of true pleopoda, the latter being replaced by very slight, fleshy ridges. The male, moreover, distinguishes itself by its very slender form and the complete fusion of the segments of the metasome.

Occurrence. — I have met with this form along the whole Norwegian coast, from Vadsø to the Christianiafjord. It is found parasitic in the branchial cavity of 3 different species of the genus *Spirontocaris* Sp. Bate (*Hippolyte* Krøyer), viz., *S. polaris*, in which species it was first found by Krøyer, *S. spinus* and *S. securifrons*. I have very carefully compared specimens from all these 3 species, and have not been able to find any difference between them. When

fully grown, the parasite causes a very large and conspicuous rounded tuberosity on the carapace of its host, occurring sometimes on the left, sometimes on the right side (see fig. 24). The walls of this tuberosity fit exactly around the sides of the parasite, and the very capacious marsupial pouch is thereby completely closed, the incubatory plates extending only for some distance up the sides of the cavity. As is the case with most other Epicarida, the parasite invariably turns its head backwards in relation to its host, and the dorsal face towards the body of the latter. Such a position is in this instance of essential significance for the aeration of the marsupial cavity, the water washing the branchial cavity of the host from behind forwards being thus easily introduced into the marsupium of the parasite from between the 1st pair of incubatory plates. The number of ova contained in the marsupium is immense, and may amount to several thousand in all. I have observed the embryo in its last stage of development, immediately preceeding the 1st free larval stage, and have found it to agree exactly with that of *Phryxus abdominalis*, as represented in Pl. 91. The male is found clinging to the ventral face of the metasome of the female, just behind the last pair of incubatory plates, being generally placed transversally to the axis of the female.

Distribution. — Greenland (Krøyer), Barents Sea (Hock), British Isles (Sp. Bate).

Gen. 3. **Pseudione**, Kossman, 1881.

Syn.: *Palæogyge*, Giard & Bonn (part).

" *Phryxus*, Sp. Bate & Westw. (part).

Generic Characters. — Body of female oval or pyriform in outline, more or less asymmetrical, with the segments both of mesosome and metasome very sharply defined. Cephalon distinctly marginate in front. Segments of mesosome with the lateral parts elevated and divided by a transverse groove into 2 lobes; coxal plates well defined, though rather small, discontinuous. Epimeral plates of metasome more or less projecting, lamellar; last segment very small. Antennæ and oral parts as in *Bopyroides*. 1st pair of incubatory plates with the distal segment produced to a narrow linguiform lobe, as in *Bopyrus*; the succeeding pairs large, arching over the ventral face. Legs more or less projecting laterally, and of usual structure. Pleopoda well developed, biramous, rami lanceolate,

smooth or tuberculated. Uropoda distinct, forming a pair of simple lanceolate lamellæ. *Male* with all the segments of the body well defined. Parasitic in the branchial cavity of *Anomura*, *Macroura* and *Carida*.

Remarks.—From the 2 preceding genera, the present genus is clearly distinguished by the presence in the female of distinctly defined coxal plates, of rather fully developed pleopoda, and of distinct though simple uropoda. Moreover, the incubatory plates are much larger, so as to encompass the marsupial cavity more or less completely. Finally, the metasome of the male is as distinctly segmented as the mesosome. Several species of this genus have been established, some of which, however, are referred by M.M. Giard and Bonnier to their genus *Paleogyge*. To the fauna of Norway belong 9 species, to be described below.

1. *Pseudione affinis*, G. O. Sars.

(Pl. LXXXV, fig. 1).

Pleurocrypta affinis, G. O. Sars. Oversigt over Norges Crustaceer I, p., 68, Pl. 2, figs. 7, 8.

Syn.: *Paleogyge affinis*, Giard & Bonn.

" " *Hoyli*, Giard & Bonn.

Specific Characters.— Body of female but slightly asymmetrical, oblong oval in outline, with the greatest width in the middle. Cephalon semicircular, convex above, and encircled in front by a broad arched lamella. Segments of mesosome very sharply defined in the middle, lateral parts distinctly bilobed, anterior lobe somewhat elevated and transversely truncated at the tip, posterior narrowly rounded; coxal plates distinctly projecting, lamelliform. Metasome comparatively short, but rather broad, epimeral plates rounded, sub-imbricate; last segment very short. Eyes distinctly perceptible, though very small and simple in structure. Terminal joint of maxillipeds well defined, narrow, incurved, setous on both edges. 1st pair of incubatory plates with the terminal lobe straight; the succeeding pairs not completely overlapping each other in the middle. Legs more fully developed than in most other species, and distinctly projecting on each side. Pleopoda with the lamellæ quite smooth and partly projecting beyond the edges of the epimeral plates. Uropoda resembling in size and structure the lamellæ of the pleopoda. *Male* rather broad, depressed, not nearly 3 times as long as it is broad, metasome not abruptly contracted, last segment minutely bilobed. Colour of female (according to notes left by my late father) whitish, with the incubatory plates dark brownish violet at their bases, somewhat lighter in their outer part; colour of male light yellowish. Length of female 10 mm., of male 2 mm. —

Remarks. — This Bopyrid was first described by the present author as *Pleurocrypta affinis*. It was subsequently referred by M.M. Giard and Bonnier to their genus *Palagyge*, the type of which is *P. Borvei*, found on a fresh-water prawn (*Palaemon dispar*) from the Indian Archipelago. On comparing the figures and description given by the above named authors, I find, however, that this form differs in several points very essentially from the one here treated of, exhibiting, it would seem, a closer relation to the genus *Bopyrus*. On the other hand, I cannot see any objection to including the present species in the genus *Pseudione* of Kossman; for the distinctive character quoted by M.M. Giard and Bonnier between the genera *Palagyge* and *Pseudione*, viz., the presence or absence of tubercles on the pleopoda, is certainly of no generic value, since there are species in the genus *Pleurocrypta* both with and without such tubercles.

Occurrence. — The type specimen, described by the present author in 1882, was found in the branchial cavity of a *Pandalus leptorhynchus* taken off the west coast of Norway. Subsequently I have had the opportunity of examining 3 other specimens preserved in our Univ. Museum and named *Bopyrus erangorun* Fabr. According to the label, they were taken by my late father at Drøbak from the branchial cavity of *Pandalus Montagu* (*annulicornis*), and in all respects agreed exactly with the specimen formerly examined by me. I cannot therefore doubt that the nominal species *Palagyge Høyli* Giard & Bonnier, which was likewise procured from *Pandalus Montagu*, is the very same species.

Distribution. — British Isles. (Giard & Bonnier).

2. *Pseudione Hyndmanni*, (Sp. Bate & Westw.).

(Pl. LXXXV, fig. 2).

Bopyrus Hyndmanni, Sp. Bate & Westwood, Brit. sessile-eyed Crust. Vol. II, p. 243.

Specific Characters. — Body of female slightly asymmetrical, curved sometimes to the left, sometimes to the right, according to its place on the host, and oblong pyriform in outline, with the greatest width in front of the middle. Cephalon comparatively small and deeply sunk into the 1st segment of mesosome, frontal edge nearly straight and narrowly marginate. Segments of mesosome with the lateral parts distinctly bilobed, anterior lobe slightly elevated and truncated at the tip, posterior lobe rounded; coxal plates very small, scarcely projecting laterally. Metasome scarcely exceeding in length $\frac{1}{4}$ of the body, epimeral plates rounded, subimbricate, considerably larger on the one side than on the other; last segment extremely small. Eyes inconspicuous. Antennæ very small

and concealed inside the frontal edge. Terminal joint of maxillipeds short, oval or cordiform, setous only on the inner edge. 1st pair of incubatory plates with the terminal lobe sharply defined and incurved; the succeeding pairs large, overlapping each other in the middle. Legs very small, scarcely projecting at all laterally. Pleopoda with the lamellæ rather large, lanceolate and distinctly tuberculate. Uropoda forming 2 smooth, juxtaposed lamellæ considerably smaller than those of the pleopoda. *Male* rather slender with the metasome gradually tapering; last segment obscurely trilobate. Colour not yet stated. Length of female reaching to 10 mm.; that of male 2 mm.

Remarks. — The female of this species is described and figured in the History of Brit. sessile-eyed Crustacea as *Phryxus Hyndmanni*. There cannot, however, be any doubt that it is a genuine *Pseudione*, exhibiting, as it does, all the chief characters of that genus; and it is also referred by M.M. Giard & Bonnier to the 2nd section of their genus *Palagogye*, which answers to the above-named genus. By a strange mistake, the above authors have adduced to the present species the *Phryxus fusticaudatus* of Sp. Bate & Westwood, indicating it as the „phryxoid stage“ of that species. This is most certainly wrong, and it will be shown further on, that that form is in reality the immature female of a very different Bopyrid, viz., *Athelges paguri* (Rathke). From the preceding species the present one is easily distinguished both by the general form of the body and by the structure of the several appendages.

Occurrence. — A single specimen of this form was found by the present author many years ago in the branchial cavity of a *Eupagurus bernhardus* taken at Molde, west coast of Norway. Another specimen, exactly agreeing with the former, is preserved in our Univ. Museum, having been found on a different species of *Eupagurus*, viz., *E. pubescens* (Krøyer). I have, moreover, had an opportunity of examining numerous specimens of this form belonging to the Museum of Copenhagen, all of them infesting young specimens of *Eupagurus bernhardus*.

Distribution. — British Isles (Sp. Bate), Kattegat and Skagerak (Meinert).

3. *Pseudione crenulata*, G. O. Sars, n. sp.

(Pl. LXXVI, fig. 1)

Specific Characters. — Body of female oblong pyriform, rather asymmetrical, one of the sides being almost straight, the other strongly curved. Cephalon comparatively large, bordered anteriorly by a broad, evenly-arched fron-

tal lamella, the distal edge of which is minutely crenulated throughout. Segments of mesosome sharply defined, with the posterior edge forming on each side of the median line a slight elevation, lateral parts distinctly bipartite, anterior lobe thickened, truncate; coxal plates well defined, though rather small, with the edges irregularly lobular or coarsely crenulated. Metasome rather narrow, and scarcely occupying more than $\frac{1}{4}$ of the length of the body, epimeral plates discontinuous, narrow lanceolate and resembling the lamellæ of the pleopoda. Eyes very small, though distinctly observable. Antennæ of normal structure. Terminal joint of maxillipeds very small, nodiform, and imperfectly defined. 1st pair of incubatory plates with the terminal lobe well defined; the succeeding pairs very large, arching over the ventral face. Legs of the usual structure, slightly prominent laterally. Pleopoda with the lamellæ lanceolate and obscurely tubercular. Uropoda somewhat asymmetrical, resembling in size and structure the epimeral plates. Male rather broad, depressed, with the cephalon obtusely truncated in front, and all the segments very sharply marked off, from each other, those of metasome narrowed abruptly to a width much narrower than those of mesosome; last segment bilobed. Colour not yet stated. Length of female reaching to nearly 15 mm., that of male 4 mm.

Remarks. — This is a very distinct species, though unquestionably referable to the genus *Pseudione*. Its specific name refers to the peculiar crenulation of both the frontal edge and the coxal plates in the female. It is by far the largest of the Norwegian Epicarida.

Occurrence. — Two specimens of this form were secured during the Norwegian North Atlantic Expedition, both having been extracted from the branchial cavity of young specimens of *Munida rugosa*, taken of the Romsdal coast. They were provisionally determined as *Pleurocrypta galathea* Hesse, and were recorded under that name in my account of the Crustacea of that Expedition. Another specimen, the one from which the accompanying figures have been drawn, and exactly agreeing with the 2 other specimens, was recently forwarded to me from the Museum of Copenhagen, still resting on its host, a nearly full grown specimen of *Munida tenuimana*, G. O. Sars. The latter was taken by Dr. Petersen in the Skagerak near the Norwegian coast, from a depth of 275 fathoms. The parasite had caused a very conspicuous deformity off the carapace of the *Munida*, the right branchial region being greatly distended, so that it was necessary to break off a piece, in order to extract the parasite in an undamaged state. Its marsupial pouch contained an immense quantity of embryos in the last stage of development, and exhibiting the appearance common, it would seem, to all the Bopyridæ. It may be noted, that only in two other in-

stances have Bopyrids been observed on species of this genus of Anomura. One of these forms has recently been described by Dr. Hansen as a type of a new genus under the name of *Munidion princeps*; it was procured from a specimen of *Munida refulgens* taken in the Pacific. The other form is recorded by M.M. Girard and Bonnier under the name of *Palogyge insignis* from the Mediterranean, and is stated to infest *Munida rugosa*. It may be that this form will turn out to be the same species as that here described; but as no description or figure has as yet been given, it is impossible at present to state this with certainty.

Gen. 4. *Pleurocrypta*, Hesse 1865.

Syn.: *Phryxus*, Sp. Bate & Westw. (part).

Generic Characters. General form of body in female resembling that in *Pseudione*. Cephalon broadly marginate in front. Segments of mesosome well defined, with the lateral parts, as in *Pseudione*, divided by a transversal groove; coxal plates generally very largely developed and contiguous, forming sometimes a broad marginal area flanking the sides of the mesosome. Epimeral plates of metasome distinctly developed, and of different form in the different species. Antennæ as in *Pseudione*. Terminal joint of maxillipeds imperfectly defined. 1st pair of incubatory plates with the distal segment securiform; the succeeding pairs large, arching over the ventral face. Legs comparatively small, more or less completely concealed beneath the coxal plates. Pleopoda biramous, with the rami tuberculate or smooth. Uropoda forming 2 simple juxtaposed appendages, as in *Pseudione*. Male of different form in the different species, segments of metasome completely fused together. Parasitic in the branchial cavity of Anomura belonging to the genera *Galathea* and *Porcellana*.

Remarks. — This genus, established by Hesse, is undoubtedly very closely related to *Pseudione*, and the only more essential characters by which it distinguishes itself, is the fuller development of the coxal plates in the female, and the fusion of the segments of the metasome in the male. The type of the genus is *Pleurocrypta galathee* Hesse, found on *Galathea squamifera*. The description and figures given of this form by Hesse, exhibit, however, so many singular features unknown in other Bopyridæ, that I should, indeed, have hesitated in referring any of the Norwegian species to that genus, if the deplor-

able want of correctness, as regards the said author, had not been universally known. We also see, that M.M. Giard & Bonnier, who may be presumed to have examined the species of Hesse, do not doubt that *Phryxus longibranchiatus* of Sp. Bate & Westw., one of the species here described, is congeneric with *Pleurocrypta galathæa* Hesse; they even regard this form as merely the young female („phryxoid stage“) of Hesse's species, an opinion which I, however, am not prepared to endorse. Three different species of this genus have hitherto been stated to belong to the fauna of Norway, and they will be described and figured in this work.

1. *Pleurocrypta longibranchiata*, (Sp. Bate & Westw.).

(Pl. LXXXVI. fig. 2).

Phryxus longibranchiatus, Sp. Bate & Westwood. Brit. sessile-eyed Crust.

Vol. 11, p. 216.

Specific Characters. — Body of female but slightly asymmetrical, oblong pyriform in outline, being gradually narrowed behind. Cephalon of moderate size, frontal edge strongly curved, lateral corners somewhat produced. Segments of mesosome well defined, with the lateral parts slightly elevated, coxal plates forming a somewhat discontinuous border flanking the sides. Epimeral plates of metasome narrow lanceolate, discontinuous. Eyes small, but distinct. Antennæ short and thick, subequal in size. Terminal joint of maxillipeds conical in form, setous on both edges. 1st pair of incubatory plates with the distal segment deeply emarginate outside; the succeeding pairs large, overlapping each other in the middle. Legs small, scarcely projecting laterally. Pleopoda rather fully developed and projecting far beyond the epimeral plates, lamellæ narrow lanceolate and very distinctly tuberculated. Uropoda of about the same length as the lamellæ of the pleopoda, but much narrower. *Male* somewhat depressed, with the mesosome of nearly uniform width throughout, metasome forming an undivided piece, rather broad at the base and gradually tapering to an obtuse point. Colour not yet stated. Length of female 8 mm., of male 2 mm.

Remarks. — I cannot doubt that the above-described form is identical with that described in Brit. sessile-eyed Crust. as *Phryxus longibranchiatus*. The general form of the body is the same, and the structure of the pleopoda seems also to agree perfectly well. The statement of the British authors that the last segment of the metasome carries 4, instead of 2 appendages, is certainly due to a miscomprehension, and may easily be explained by the close resemblance of

the uropoda to the projecting lamellæ of the pleopoda, 2 of which may have been wrongly adduced to the last segment. The above mentioned opinion entertained by Messrs. Giard and Bonnier, that this form is only the „bryoid stage“ of *Pleurocrypta galathea*, Hesse, cannot be admitted, since the specimens examined by me had all characters of being fully grown animals.

Occurrence. — Two specimens of this form are in our Univ. Museum, having been taken many years ago by my late father at Manger, west coast of Norway, from the branchial cavity of *Galathea nexa*. The host of the specimen figured by Sp. Bate and Westwood is not stated, but they assert to have received another much larger specimen taken from an old *Galathea squamifera*, and the Rev. A. M. Norman announce it even from *Eupagurus Thompsoni*. As to the latter statement, I am, however, disposed to believe, that a confusion of this form with *Pseudione Hydmanii* might have taken place.

Distribution. — British Isles, Shetland Isles (Sp. Bate).

2. *Pleurocrypta marginata*, G. O. Sars, n. sp.

(Pl. LXXXVII, fig. 1).

Specific Characters. — Body of female comparatively short, oval or broadly pyriform in outline, and rather asymmetrical in full grown specimens, the one side being almost straight, the other boldly curved. Cephalon rather large and broad, with the frontal margin evenly curved and pronouncedly lamellar, lateral corners obtusely produced. Segments of mesosome well defined, with the lateral parts somewhat elevated; coxal plates very fully developed, subcontiguous, forming a broad marginal area. Metasome comparatively small, not attaining $\frac{1}{4}$ of the length of the body, epimeral plates on one side more fully developed than on the other, and subimbricate. Eyes distinct. Legs wholly concealed beneath the largely developed coxal plates. Incubatory plates large, overlapping each other in the middle. Pleopoda not very large and but little projecting beyond the epimeral plates, lamellæ quite smooth. Uropoda unusually elongated, forming 2 slender, almost filiform appendages, about twice the length of the lamellæ of the pleopoda. *Male* very narrow, sublinear in form, metasome forming an undivided narrowly conical piece, obtuse at the tip. Colour not yet stated. Length of female 5 mm., of male $1\frac{1}{2}$ mm.

Remarks. — This new species is easily distinguished from the preceding one in both sexes, the female being of a considerably shorter and stouter form, whereas the male is quite contrary much more slender than that of *P. longi-*

branchiata. In the female, moreover, the coxal plates are much more fully developed, forming together a broad continuous area flanking the sides of the mesosome. Also the appendages of the metasome are rather different, the lamellæ of the pleopoda being much smaller and perfectly smooth, whereas the uropoda are quite unusually elongated.

Oocurrence. — I have only seen 2 specimens of this form, the one apparently adult, or nearly so, the other evidently not yet fully grown, having the incubatory plates in process of formation. Both these specimens are figured on the accompanying plates, in order to show the differences. The young specimen has the body less asymmetrical, and of a rather regular oval form, and the coxal plates are also more regular, forming on both sides of the mesosome a quite continuous row; but otherwise the 2 specimens agree exactly. They were both found in the branchial cavity of *Galathea dispersa*, Sp. Bate. Messrs. Giard and Bonnier record likewise a species of Pleurocrypta from the same host, naming it *P. Hendersoni*; but, as no description or figure has been given, it is impossible to state, if these 2 forms are identical or not. That the statement alone of the host is quite insufficient for identifying the parasite, is clearly proved by the fact, that one and the same species of Crustacea not seldom is found to be infested by several species of parasites, often belonging to very different genera. In the present case it may be mentioned, that a species of *Pesulione*, *P. confusa* Norman, is recorded from the very same species of *Galathea*.

3. *Pleurocrypta microbranchiata*, G. O. Sars, n. sp.

(Pl. LXXXVII, fig. 2).

Specific Characters. — Body of female broadly oval, rather asymmetrical, being twisted to the right or left hand, according to its place on the host. Cephalon of moderate size, frontal edge slightly curved, lateral corners obtuse. Segments of mesosome well defined, with the lateral parts slightly elevated; coxal plates less fully developed than in the 2 preceding species. Epimeral plates of metasome discontinuous, lanceolate. Eyes distinct. Antennæ, oral parts and legs of the usual structure. Incubatory plates large, though somewhat apart in the middle. Pleopoda comparatively small, with the lamellæ perfectly smooth. Uropoda of inconsiderable size, forming 2 small oblong lamellæ. *Male* comparatively short and stout, depressed, oblong oval in form, with the greatest width in the middle, metasome forming an undivided obtusely triangular piece. Colour

not yet stated. Length of adult female scarcely exceeding 4 mm.; that of male 1 mm.

Remarks. — This form is evidently distinct from either of the 2 preceding species, differing, as it does, pronouncedly in both sexes. The specific name here proposed refers to the poor development of the pleopoda and uropoda. The latter appendages especially are very small as compared with those in the 2 preceding species.

Occurrence. — I have found this form occasionally in the branchial cavity of *Galathea intermedia* Lilljeborg, taken off the south coast of Norway. The parasite, when fully grown, causes a very strong and conspicuous tuberosity on one side of the carapace of the Galathea (see fig. 2 *). I have also received the same form from the Copenhagen Museum, likewise infesting that species of Galathea.

Distribution. — Kattegat. (Copenhagen Mus.).

Gen. 5. *Athelges*, Hesse, 1861.

Syn.: Phryxus, Rathke (part).

Generic Characters. — Body of fully grown female very asymmetrical, twisted both dorsally and to one (generally the left) side; body in younger stages of a rather different appearance, being more symmetrical and of a more or less pronouncedly club-shaped form. Cephalon small, and withdrawn far into the mesosome, being only visible in a dorsal view of the animal. Segments of mesosome in fully grown females distinctly defined only along the middle of the dorsal face, lateral parts unconnected, narrow, undivided, coxal plates very small. Metasome abruptly narrowed, without any epimeral plates, the last 2 segments united to a narrow, more or less claviform piece. Antennæ very small, issuing close together from the extremity of the head. Maxillipeds without any terminal joint. Legs rather robust, and in fully grown specimens pushed wholly on to the dorsal face of the animal. Incubatory lamellæ exceedingly large, overlapping each other ventrally, the anterior ones produced in front far beyond the cephalon, and folded in a funnel-shaped manner. Of pleopoda only 4 pairs present, extended laterally, and each consisting of a narrow stalk and 2 lamellæ of pronouncedly branchial structure. Uropoda only present as 2 wart-like tubercles. *Male* of normal appearance, having the segments of metasome coalesced. Parasitic on Pagurids, and always found clinging to the upper face of their soft metasome.

Remarks. — The present genus is very different from any of the preceding ones, whereas it exhibits some points of affinity to the next genus; and indeed Rathke combined them in his genus *Phryxus*. It is now, however, generally acknowledged that the genus of Rathke comprises 2 distinct generic types, and the name *Phryxus* should accordingly be restricted to one of these types only, whereas for the other type, the one here treated of, the name *Athelges*, proposed by Hesse, ought to be retained. The peculiar contortion of the body in fully grown female specimens has not yet been sufficiently recognized; for the species have generally been described as perfectly symmetrical or nearly so, an appearance which is only exhibited by immature specimens. Both in these and in fully grown specimens, the metasome exhibits several very peculiar features not found in any of the preceding genera. Firstly, it apparently consists of only 5 segments, the last of which has the form of a cylindrical or claviform piece; secondly, there is no trace of epimeral plates; and thirdly, the pleopoda, of which there are only 1 pair, are extended laterally, and each consist of a narrow stalk, to which are attached 2 lamellæ of pronouncedly branchial structure. The place where the parasite clings to its host, is also very different from that in the preceding genera. The type of the genus is *A. paguri* Rathke, to be described below. Mr. Hesse has also described several species from the French coast; but to judge from his figures, only young specimens seem to have come under his notice. One of these is regarded as the type of a separate genus (*Prosthete*).

1. *Athelges paguri*, Rathke.

(Pl. LXXXVIIII).

Phryxus paguri, Pl. Rathke, Beiträge zur Fauna Norwegens, in Nova Acta Acad. Nat. Curios. Vol. XX, p. 57, Pl. 1, figs. 13—15, Pl. 2, figs. 11, 12.

- Syn.: *Bopyrus bernhardi*, Kröyer (young).
 " *Athelge fullode*, Hesse.
 " *Prosthete cannelée*, Hesse (young).
 " *Phryxus fusticaudatus*, Sp. Bate (young).

Specific Characters. — Body in fully grown females very asymmetrical, twisted to one (generally the left) side, and at the same time exhibiting a rather strong dorsal curvature; anterior division oblong, almost semicylindric, with the dorsal face concave, the ventral one strongly vaulted. Cephalon oval quadrangular, only visible in a dorsal view of the animal. Segments of mesosome well

defined along the middle of the dorsal face, the 1st one very narrow, bandlike, flanking the sides of the cephalon; the succeeding ones forming behind, to each side, an obtuse prominence, and sending off laterally a narrow subcylindric prolongation, carrying the corresponding leg. Metasome abruptly twisted to the left, and gradually tapering distally, terminal piece pronouncedly clavate in form, and exhibiting near the tip 2 small rounded tuberosities as the rudiments of the uropoda. Lamellæ of pleopoda subequal, rounded oval in form. — Body of young female rather unlike that of the fully grown one, anterior division perfectly symmetrical and rather broad, flattened above, with the lateral edges of mesosome forming a continuous line, slightly insinuated between each segment; legs projecting laterally. Metasome turned more or less to the left, and somewhat shorter than the preceding part of the body, pleopoda more regularly arranged. — Body of still younger female (1st postlarval stage) almost perfectly symmetrical throughout, sub-pyriform in outline, anterior division rounded oval, with the dorsal face convex, the ventral concave, cephalon freely projected in front, lateral edges of mesosome curving below, legs folded in beneath the ventral face; metasome extended nearly in the axis of the body, and having the inner lamella of the pleopoda rudimentary. — Adult male narrow, sublinear, with the segments of mesosome very sharply defined, their lateral parts being separated by deep incisions, metasome forming an undivided, narrow, sub-cylindric piece. Colour of female whitish. Length of fully grown female 11 mm., of male 3 mm.

Remarks. — This is the first recorded species, and may accordingly be regarded as the type of the genus. It was described in the year 1843 by H. Rathke as *Phryxus paguri*. The *Boopagus bernhardi* of Krøyer, figured, but not described, in Gaimard's work, seems to be an immature specimen of this species, and this is also undoubtedly the case with *Phryxus justicaudatus* Sp. Bate and Westwood. The *Athelyx fulvode* of Hesse is regarded by Messrs. Sp. Bate and Westwood as identical with Rathke's species, and I am also inclined to believe that the *Prosthète cannelée* of the same author is nothing but an immature specimen of this species.

Occurrence. — Rathke found 3 specimens of this form off the west coast of Norway (probably at Christiansund), on *Eupagurus bernhardus*. I have myself taken it from the same Crustacean at Molde, and moreover have had an opportunity of examining a large number of specimens belonging to the Copenhagen Museum, and collected partly in the Kattegat, partly in the Skagerak. All these specimens were likewise found clinging to the upper face of the metasome in as many specimens of *Eupagurus bernhardus*. The parasite invariably turns its head backwards in relation to its host, and its dorsal face to the skin of the

soft metasome of this Crustacean, lying, as a rule, somewhat diagonally along the upper face of that part; hence the peculiar twist of its body. The male is generally found clinging to the left side of the metasome of the female, or, in younger specimens, to the ventral face of that division.

Distribution.—British Isles (Sp. Bate), Kattegat and Skagerak (Copenhagen Mus.), French coast (Hesse). —

2. *Athelges tenuicaudis*, G. O. Sars, n. sp.

(Pl. LXXXIX, fig. 1).

Specific Characters. — Body of fully grown female very like that of the preceding species, though somewhat more slender, with the anterior incubatory plates more projecting and expanded in a fan-like manner. Metasome comparatively longer and narrower, being abruptly twisted to the left, terminal piece nearly cylindrical in form. Lamellæ of pleopoda subequal oblong oval in shape. — Body of young female rather slender, claviform, with the anterior division of the body rounded oval and perfectly symmetrical, metasome slightly turned to the left, very slender, cylindrical, and much longer than the preceding part of the body; terminal piece somewhat flexuous and narrow cylindrical in form, apical tubercles well marked. — Adult male comparatively less slender than that of the preceding species, with the metasome abruptly narrowed beyond the base, and obtusely conical at the tip. Young male, still in the Cryptoniscian stage, rather broad, depressed, with the segments of mesosome acutely produced laterally; uropoda of a similar structure to that in the corresponding stage of *Phryxus abdominalis*. Colour not yet ascertained. Length of fully grown female 11 mm., of male 2.20 mm.

Remarks. — The fully grown female of this species looks very like that of *A. paguri*, and is twisted and deformed in a very similar manner. On a closer examination, however, the metasome is found to be somewhat more slender, and the terminal piece of a rather different form. In a less advanced stage, the difference between the two species is much more marked, the metasome in the present species being almost twice as long as in the corresponding stage of *A. paguri*, and also much narrower. Its terminal piece, moreover, is not, as in that species, club-shaped, but narrow cylindrical in form. The male, on the other hand, is comparatively less slender than that of the type-species, and has the metasome somewhat differently shaped.

Occurrence. — Of this form I have myself only found 2 specimens with

their respective males, a fully grown female with a likewise fully grown male, and a quite young female, with the male still in the Cryptoniscian stage. Both these specimens, of which figures are given on the accompanying plate, occurred on the same species of Eupagurus, viz. *E. chiroacanthus*, but came from very different localities, the one having been taken off the south coast of Norway, the other at Selsøvik lying just within the polar circle. Another adult female was found likewise on an *E. chiroacanthus* taken in the Kattegat by Dr. Petersen, and kindly sent to me for examination. The mode in which the parasite is attached to its host, is exactly as in *A. paguri* (see the middle figure at the top of the plate).

Distribution. — Kattegat (Copenhagen Mus.).

3. *Athelges bilobus*, G. O. Sars, n. sp.

(Pl. LXXXIX, fig. 3).

Specific Characters. — Body of immature female narrow oblong or fusiform in outline, nearly symmetrical, only very slightly curved to the right; dorsal face convex, ventral concave. Cephalon freely projecting anteriorly, with the frontal margin evenly curved. Segments of mesosome each produced laterally to well-defined, obtuse projections carrying the legs below. Metasome not abruptly contracted, but tapering gradually behind, each of the 4 anterior segments produced laterally to a long conical projection, apparently constituting the outer lamella of the pleopoda, the inner lamella being very small and knob-like; terminal piece with 2 rather conspicuous, juxtaposed tubercles dorsally, tip deeply incised in the middle, or forming 2 lamellar lobes. Male oblong, with the metasome attenuated and rather large, being fully half as long as the preceding part of the body, and showing traces of segmentation, as also rudiments of pleopoda, tip slightly bilobed. Colour not yet determined. Length of the female examined 3.80 mm., of male 1.40 mm.

Remarks. — The present new species, it is true, is only based upon a single evidently immature female specimen together with its male, which perhaps is also not fully developed; but there cannot be any doubt that it is quite distinct from either of the 2 preceding species and also from those described by Mr. Hesse. The only form to which it seems to exhibit a closer resemblance, is the Brazilian Bopyrid recorded by Fritz Müller as *Bopyrus resupinatus*. The latter, however, is kept apart from the genus *Athelges* by M.M. Giard and Bonnier and regarded as the type of a separate genus, to which they transfer the Ratkian name *Phrycus*. In my opinion, however, the species of Fritz

Müller ought to be referred to the genus *Athelges*, exhibiting, as it does, all the essential features of that genus. As regards the present species, the shape of the terminal piece of the metasome agrees rather closely with that in the Brazilian species, and also the form of the lamellæ of the pleopoda seems to be essentially the same. The apparently anomalous structure of the metasome in the male may perhaps be due to the fact that the specimen is not yet fully grown.

Occurrence. — The above-described specimen was found clinging to the metasome of an *Eupagurus cuanensis* taken in the Kattegat by Dr. Petersen, and kindly sent to me for examination. The species is accordingly not yet proved to belong to the fauna of Norway; but as *Eupagurus cuanensis* is not infrequently met with off the south coast of Norway, it is very probable that its parasite will also be found to exist off our coasts.

Distribution. — Kattegat. (Copenhagen Mus.)

Gen. 6. **Phryxus**, Rathke, 1843.

Sp.: Bopyrus, Krøyer (nol. Latr.)

" Hemibarthus, Giard and Bourcier.

Generic Characters. — Body of adult female very asymmetrical and deformed, one side (left or right) being greatly swollen and much longer than the other. Cephalon small and deeply sunk within the mesosome. Segments of latter densely crowded together and only visible dorsally, coxal plates very small and only present on the shorter side. Metasome, as in *Athelges*, without any true epimeral plates, and only consisting of 5 segments, the last forming a narrow terminal piece. Antennæ very small and difficult to observe. Maxillipeds without any terminal joint. Incubatory plates very unequally developed, those on one side alone sufficing to form the large marsupial pouch; 1st pair not projecting in front, being concealed by the next succeeding one. Legs wholly pushed on to the dorsal face, and more or less contorted, those of the larger side all obliterated, with the exception of the 1st. Only 4 pairs of pleopoda present, and these rather unequally developed on the two sides, outer lamella larger, foliaceous, and extended laterally, inner lamella small and pushed on to the ventral face. Body of young female less asymmetrical, with all the legs present, though rather irregularly arranged on the one side; that of immature female (immediately after the trans-

formation) almost perfectly symmetrical, vermiform. Adult male with the segments of metasome more or less fused together. Parasitic on the ventral face of different Carida.

Remarks. — This genus was established in the year 1843 by H. Rathke, to include a peculiar Bopyrid found by him on a species of *Spirontocaris* (*Hippolyte*), and named *Phryxus hippolytes*. He, moreover, refers to this genus another Bopyrid, *P. Papuri*, which, however, is now recognized as generically different and referable to the genus *Athelges* of Hesse. MM. Giard and Bonnier transfer the generic name *Phryxus*, proposed by Rathke, to a generically different exotic Bopyrid, substituting for the northern form a new name, viz. *Hemiarthrus*. This however, cannot, be sanctioned, since such a proceeding is quite contrary to the general rule in Zoology. If the name *Phryxus* is to be retained in the present group, it ought certainly to be used for the form, to which it was originally assigned, and cannot be replaced by a new generic name, unless the former name is altogether to be abandoned. It may be that this will be found necessary, as the name *Phryxus* is said to be already appropriated in Zoology.

The present genus exhibits, it is true, some points of agreement with the genus *Athelges*, especially as regards the structure of the metasome, but in several other respects it differs rather markedly, so that it ought evidently to be kept apart, though forming with it a distinct sub-division of the family Bopyridæ. In addition to the northern species described below, MM. Giard and Bonnier have recorded 4 other species from the Mediterranean; but no description or figures of these have as yet been given, and their validity is accordingly still rather problematic.

Phryxus abdominalis, (Kröyer).

(Pl. XC, XCI).

Bopyrus abdominalis, Kröyer, Nat. Tidsskr. Vol. III, p. 102, Pl. 1, II.

Syn.: *Phryxus hippolytes*, Rathke

” *Hemiarthrus abdominalis*, Giard and Bonnier.

Specific Characters. — Body of fully grown female forming an irregular, globular mass, somewhat varying in form, according to the degree of distention of the marsupial pouch, one of the sides, sometimes the left, sometimes the right, being much more swollen than the other, and the axis of the body accordingly more or less twisted to one side or the other. Cephalon comparatively small,

and to a great extent encompassed by the 1st segment of mesosome, subcordate in form, with the frontal margin thickened and deeply insinuated in the middle. Segments of mesosome only visible dorsally, very narrow, band-like, lateral parts well defined on the shorter side, and each projecting into a small, knob-like prominence, those on the other side inconspicuous; coxal plates only present on the former side, very small and imperfectly defined from the lateral parts. Metasome more or less projecting behind, abruptly contracted and slightly tapering distally, segments well defined, the last one narrow conical in form, and minutely incised on the tip. Oral area wholly concealed below. Incubatory plates on the shorter side of the body rather small and densely crowded together, each divided by a transversal fold into 2 segments; those of the other side very large, especially the 2nd, which alone forms the greater part of the boundary of the marsupium; 5th plate on this side apparently wanting. Legs more or less twisted and extended dorsally, those of the larger side all obliterated except the 1st one, though slight rudiments of the 3 posterior ones may always be found as 3 extremely small bifurcate appendages just in the angle between the mesosome and metasome. Outer lamellæ of pleopoda foliaceous, rounded oval, successively diminishing in size from before backwards, those on one side much larger than on the other. — Body of young female, with the incubatory plates not yet fully developed, subclavate in form, anterior division, as in fully grown specimens, very asymmetrical, but having all the legs distinctly developed; those of the larger side however, being, rather irregularly arranged and partly folded in beneath the ventral face. — Body of still younger female oblong oval in form, somewhat irregularly twisted, but having all the segments very sharply defined. Cephalon freely projecting in front, and rather broad. Segments of mesosome strongly vaulted above, and having the lateral parts on both sides considerably produced and deflexed. Metasome not abruptly contracted. Legs regular on both sides, being all folded in beneath the ventral face. Inner lamellæ of pleopoda larger than the outer. — Body of immature female (in the 1st postlarval stage) very slender, vermiform, nearly symmetrical throughout, with the cephalon semicircular, and the lateral parts of the segments obtusely produced; outer lamellæ of pleopoda wanting. — Adult male oblong, linear, with the segments of mesosome very sharply marked off from each other, metasome forming an undivided piece, broad at the base and conically tapered distally. Colour of fully grown female dark brownish violet. Length of female attaining 11 mm., that of male 3 mm.

Remarks. — This form was first described by Krøyer in the year 1840 as *Bopyrus abdominalis*, and it was 3 years later that H. Rathke published his description of *Phryxus hippolytes*. That these two forms are identical is

obvious, and it must accordingly be assumed, that Rathke, in describing the animal under a new name, did not know the description given by Krøyer. Of course the specific name proposed by the latter author is that which should be retained for the species. It is an easily recognizable form, though rather variable in shape, according to the degree of distention of the marsupium. Also the male is somewhat variable both as to size and in the shape of the metasome. As is generally the case with parasitic Isopoda, the immature female exhibits an appearance very different from that of the fully grown animal. In order to show this difference and the successive transformations, several stages are figured on Pl. 91, and also figures of the embryo in its last stage, and of the larva in the so-called cryptoniscian stage, are given on this plate.

Occurrence. — This is by far the commonest of our indigenous Bopyrids, being met with rather frequently along the whole coast of Norway, from the Christiania Fjord to Vadsø, infesting rather a large number of different Crustaceans. I have found it on the following 6 species of the genus *Spirontocaris* (Hippolyte): *S. Gaimardii*, *polaris*, *pusiola*, *turgida*, *spinus*, *securifrons*, and moreover on 3 species of the genus *Pandalus*, viz., *P. Montaguvi*, *borvalis*, and *propinquus*. It is also recorded by Dr. Hansen from *Spirontocaris Phippsii* and by Sp. Bate from *S. Barleei*, so that at present it is known to occur on no less than 11 different hosts. In all of them, the parasite occupies the very same place, viz., beneath the anterior part of the metasome, more or less enclosed between the epimeral plates of the first 2 segments (see the uppermost figure in Pl. 90). On a closer examination, the parasite is always found to be firmly attached by the aid of the one series of legs to the basal part of one of the anterior pleopoda of its host, sometimes the right, sometimes the left and the distortion of the body to the one or the other side depends on this mode of attachment. The male is found clinging to the ventral face of the metasome of the female, often occupying an oblique position and more or less concealed by the protruding marsupium. In immature females the attached male is often found to be still in the cryptoniscian stage, and I have also occasionally found larval males of this description in different places on fully grown females. The number of eggs and embryos contained in the marsupial cavity is immense, and may amount to several thousand in all.

Distribution. — British Isles (Sp. Bate), Kattegat (Meinert), Spitsbergen (Norw. North Atl. Exp.), the Kara Sea (Hansen), Greenland (Krøyer), Grinnels Land (Miers), Atlantic coast of North America (Harger).

The genus *Miconiscus*, Fritz Müller.

(See Pl. XCII).

In the year 1870 Fritz Müller examined a small Isopod found by him parasitic on a Copepod (Calanoid) from Brazil, and described it under the name of *Miconiscus fuscus* as the type of a new genus of Bopyridæ. Some years afterwards I found a similar form off the Lofoten Islands clinging to a *calanus finmarchicus*, and I recorded it briefly in my „Oversigt“ as a new species under the name of *Miconiscus calani*, though at the same time expressing my doubt as to its being an adult animal somewhat in the following terms: „I feel, however, great doubts as to the validity of the genus *Miconiscus*, for both the form described by Fritz Müller and that examined by myself, exhibit so strong a resemblance to larval stages of other Epicarida, that I should be much inclined to believe that both these forms represent immature animals, which would never have reached to sexual maturity in the hosts on which they were found.“ On re-examining the material of *Miconisci* subsequently collected, I am now in a position to give full proof of the correctness of the above-quoted supposition. The genus *Miconiscus*, which is even regarded by MM. Giard and Bonnier as the type of a distinct family, must indeed be altogether discarded, as only representing a transitory larval stage of Epicarida belonging to different families. In the several forms of Epicarida only 2 larval stages have hitherto been described, and these 2 stages are so very different both as to the general form of the body and the structure of the several appendages, that it is rather difficult to imagine how the one could develop from the other. Nor, so far as I know, has the immediate transformation of the one stage into the other ever been observed by any zoologist. Now the observations which I have had an opportunity of instituting, and of which the results are elucidated by the figures given on Pl. 92, make it highly probable, that in all Epicarida there exists an intermediate larval stage between the 2 formerly observed, and that this stage is actually the *Miconiscus*. Whether this stage in all cases is parasitic on Copepoda, I cannot say with certainty: but for 2 different forms at least, evidently belonging to 2 different families, the parasitism on Copepoda is now proved.

In one place on the west coast of Norway (Eggesbønes), a *Miconiscus*, not apparently differing from the one first described as *M. calani*, was met with not infrequently on the small Calanoid *Pseudocalanus elongatus* Boeck. and it often happened that a single specimen of this Copepod carried 2 such para-

sites, one on each side of the anterior division of the body, both turning their heads towards that of their host (see fig. 1). On examining the specimens more closely, they were found to be of rather different size and different degrees of development, though evidently representing the very same species. The smallest specimens (fig. 1 a) had all the characters of a normal Bopyrid-larva in the 1st stage, and exhibited a strong resemblance to the well-known larva of *Phryxus abdominalis* (cf. Pl. 91 below), the number of legs being only 6 pairs, and the antennae, pleopoda and uropoda being tipped with slender bristles. In somewhat larger specimens (fig. 1 b) the antennae had lost their bristles, and assumed the appearance characteristic of the *Micronisci*, looking merely like simple inarticulate processes. The 6 pairs of legs exhibited likewise a much more clumsy appearance, showing scarcely any trace of articulation, though terminating in a sharp hook-like point, and behind them a 7th pair of legs was seen in process of formation as 2 comparatively small rounded tuberosities. The pleopoda were still tipped with bristles, but of very small size, whereas the uropoda were wholly devoid of such bristles, and their rami were only present in the form of slight lobes. In other specimens (fig. 1 c.) of larger size and with the body more produced, the 7th pair of legs had lengthened considerably so as to project laterally, though showing as yet no trace of a terminal claw (see fig. 1 c., p. 7). In this stage, which otherwise did not differ much from the preceding one, the *Microniscus* agrees rather closely with one of the 2 specimens recently figured by Dr. Hansen in his work on the Isopoda, Cumacea and Stomatopoda of the German Plankton-Expedition. Finally, in the largest specimens (fig. 1 d), which exhibited all the characters of a normal *Microniscus calani*, all the 7 pairs of legs were distinctly developed and of exactly the same structure, representing indistinctly articulated grasping organs, (fig. 1 d. p.), and the uropoda had lengthened considerably, the outer ramus projecting far beyond the inner, and exhibiting a few small hairs at its tip (see fig. 1 d. urp.). In all the specimens, distinct though rather small eyes were present on each side of the flat, semicircular cephalon, and the lateral parts of the segments were more or less acutely produced, giving the sides of the body a jagged appearance.

Another form of *Microniscus* was found in a different locality, clinging to a deep-water Calanoid, *Metricidia longa* Lubbock (fig. 2). This form (fig. 2 a), of which 2 specimens were secured, agreed in all essential characters with that found on *Pseudocalanus elongatus*, but was of somewhat larger size, and had the lateral parts of the segments less produced. It differed, moreover, in the total absence of visual organs, as also in the structure of the uropoda. Whereas in the other form, the inner ramus of these appendages exhibited a very rudimen-

itary appearance, in the present form it was well developed, even extending considerably beyond the outer. One of the two specimens (fig. 2 b) was found, on a closer examination, to be just about to cast off its skin, and within the pellucid envelope a quite normal Cryptoniscian larva could be discerned, exactly agreeing with a form that I had previously not infrequently found free in the sea (fig. 2 c). The latter exhibits all the characters indicated by Dr. Hansen¹⁾ as peculiar to the larvæ belonging to the family *Cryptoniscidæ*, and some of these characters could also be very distinctly seen in the *Microniscus* stage mentioned above (cf. the detail figures 2 b and 2 c).

From the two above given series of observations, it is thus clearly shown, firstly, that a true *Microniscus*, apparently identical with the form previously recorded by the present author as *M. calani*, develops from the 1st stage of a normal Bopyrid larva; secondly, that another form of *Microniscus*, after having attained its normal development, is transformed by a single exuviation into the well-known 2nd larval stage, generally termed the Cryptoniscian stage; thirdly, that these 2 forms of *Microniscus*, though exhibiting a very similar appearance, in reality belong to 2 very different families of Epicarida, the one to the *Bopyridæ*, the other to the *Cryptoniscidæ*. In other words the name *Microniscus* cannot in future be taken in the formerly-adopted sense as a generic denomination, but must be restricted to designate a transitory developmental stage of Epicarida connecting the 2 previously-known larval stages.

It is rather difficult at present to state with certainty, to which species of Epicarida the 2 above-mentioned *Micronisci* belong; but I am much inclined to believe that the one form will turn out to be a developing stage of *Phryxus abdominalis*, and the other a similar stage of a species belonging to the genus *Podascon* of Giard and Bonnier.

1) Isopoda, Cumacea and Stomatopoda of the German Plankton-Expedition, p. 22.

Fam. 2. Dajidæ.

Characters.—Body of adult female perfectly symmetrical, shield-like, and more or less curved ventrally, the 3 chief divisions being only slightly indicated, and the segmentation, as a rule, only visible in the middle of the dorsal face, lateral parts of mesosome more or less expanded and hollowed, to receive the ova and embryos. Ventral face exhibiting in front a comparatively small depressed area, defined anteriorly by the frontal margin, laterally by the closely crowded coxal plates. Antennæ of different structure in the different genera. Buccal mass conically produced, and containing the styliform mandibles. Maxillæ obsolete. Maxillipeds lamellar, without any terminal joint, turned sometimes anteriorly, sometimes posteriorly. Behind them a more or less developed sternal plate, occupying the floor of the above-mentioned area. Incubatory plates comparatively small, sometimes greatly reduced in number, and scarcely at all partaking of the formation of the marsupium, which constitutes two separate cavities bounded by the lateral walls of the body itself. Only 5 pairs of legs present, these being densely crowded together around the oral area. Pleopoda generally rudimentary or wholly absent. Uropoda distinct or wanting.—Adult male narrow linear, with the cephalon and 1st segment of mesosome coalesced, metasome simple or imperfectly segmented.—Last larval stage with the basal joint of the antennulæ produced behind to a long tooth-like projection, antennal flagellum 5-articulate; oral cone terminating in a circular sucking disk; 1st pair of legs shorter and thicker than the others, last pair with 2 groups of delicate, diverging spinules on the palmar edge; uropoda with the rami subequal. Parasitic on Schizopoda.

Remarks.—This family forms, as it were, a transition between the *Bopyridæ* and *Cryptoniscidæ*, and is chiefly characterized by the shield-like, perfectly symmetrical body of the female, the total absence in the same of the 2 posterior pairs of legs, and the close crowding together of the 5 anterior pairs, which are arranged around a small depressed ventral area situated quite in front. The mode in which the marsupial cavity is formed, is also very different from that found in the *Bopyridæ*. Whereas in the latter this cavity is formed exclusively by the largely developed incubatory plates, in the forms belonging to the present family it is bounded by the lateral walls of the body itself, and therefore, strictly spoken, constitutes 2 separate cavities, more or less approximate on the ventral face, but never confluent. The incubatory plates only serve for closing the anterior and posterior openings leading to these cavities, and are therefore,

as a rule, very small and sometimes greatly reduced in number. In the male, the more or less complete fusion of the 1st segment of mesosome with the cephalon is a very pronounced character, and moreover the larva in the last (Cryptoniscian) stage exhibits several well-marked peculiarities first pointed out by Dr. Hansen. All the hitherto known forms are found parasitic on Schizopoda belonging partly to the family *Euphausiidae*, partly to that of the *Mysida*. We know at present of only 4 genera belonging to this family, 3 of which will be treated of below.

Gen I. *Dajus*. Krøyer, 1842.

Syn.: *Leptophryxus*, Buchholz.

Generic Characters.—Body of adult female very tumid, slightly curved ventrally, with the lateral parts greatly expanded and more or less projecting in front beyond the cephalon, middle part of dorsal face sub-depressed and distinctly segmented. Metasome abruptly contracted and divided into 6 segments, the last carrying 2 small juxtaposed lamellæ, the uropoda. Oral area comparatively broad, semicircular. Antennæ distinct, and of normal structure. Maxillipeds extended anteriorly, as in the Bopyridæ. Sternal plate of moderate size, trigonal in form. Incubatory plates present in the normal number (5 pairs), last pair much the largest. Legs short and thick, exactly alike. First pair of pleopoda forming 2 rather large lamellæ occurring immediately behind the last pair of incubatory plates; the succeeding pairs rudimentary.—Adult male with the metasome undivided. Parasitic on species of the genera *Mysis* (sens. strict.) and *Cynthilia* (*Siriella*), being attached to the ventral face of the last segment of mesosome, between the incubatory lamellæ of the host.

Remarks.—This genus was established in the year 1842 by Krøyer, to include a peculiar parasite found by him on a species of *Mysis*. The genus *Leptophryxus* of Buchholz is unquestionably identical with Krøyer's genus, and was founded upon the very same species. We know as yet of only 2 species belonging to this genus. One of these will be described below, the other having been briefly recorded from the Challenger Expedition by the present author, under the name of *Dajus siriella*. A 3rd species, it is true, has been estab-

lished by MM. Giard and Bonnier as *Dajus mixtus*, but this is only a nominal species, and undoubtedly identical with that originally recorded by Krøyer.

Dajus mysidis, Krøyer.

(Pl. XCIII, CIV).

Dajus mysidis, Krøyer, in Gaimard's Voyage, Pl. XXVIII, fig. 1.

Syn.: *Bopyrus mysidum*, Packard

" *Leptophryxus mysidis*, Buchholz

" *Dajus mixtus*, Giard and Bonnier.

Specific Characters.—Body of fully grown female oval quadrangular in outline, broadest in front and slightly narrowed behind. Cephalon imperfectly defined, and curved downwards, frontal margin straight. Lateral parts of mesosome greatly swollen, and projecting anteriorly in the form of bluntly rounded protuberances extending beyond the limits of the cephalon, median part subdepressed and exhibiting 5 or 6 distinct transversal sutures defining the segments. Metasome rather short and but slightly projecting, being conically tapered, its 1st segment much larger than the others. Oral area placed wholly in front, comparatively broad, semicircular. Antennulæ very short, 3-articulate; antennæ much more slender and extended laterally, being composed of 8 or 9 articulations successively diminishing in size distally. First pair of incubatory plates larger than the next succeeding ones, and divided by a transversal fold into 2 segments; last pair, extending behind the oral area, rather broadly overlapping each other in the middle. Body of young female narrower, subclavate, with the mesosome more distinctly segmented, and the metasome more produced; that of still younger female oblong, attenuated behind, with the cephalon freely projecting in front, and the coxal plates occupying the side-edges of the mesosome.—Body of immature female, immediately after the metamorphosis, still narrower, somewhat resembling the nuda in shape, but having only 5 pairs of legs, and the metasome distinctly segmented.—Adult male linear, subcompressed, with the 6 posterior segments of mesosome very sharply marked off from each other, metasome forming a thickish, undivided piece of oval or elliptical form, carrying at the tip 2 extremely small appendages (rudiments of uropoda). Colour of female along the middle of the dorsal face reddish brown, lateral parts whitish. Length of fully grown female 4 mm., that of male 1 mm.

Remarks.—As above stated, this form was first recorded by Krøyer, and figured by him in Gaimard's work from a not yet fully developed specimen. The same form was subsequently described under two different names, viz., by Packard

as *Bopyrus mysidum* and by Buchholz as *Leptophryxus mysidis*, and Dr. Hoek records it also under the latter name, none of these authors having apparently been aware of the fact that this form had long been recorded by Krøyer as *Dajus mysidis*. In more recent times MM. Giard and Bonnier have published in the "Bulletin scientifique de la France" a very exhaustive description of this interesting form, accompanied by excellent figures, and they are indeed highly to be commended, for giving such a full account, considering that they had only a solitary specimen at their disposal. As I have had an opportunity of examining numerous specimens of this form, I have been enabled to testify the great exactness of the said distinguished French zoologists, and to supplement their account as regards the development of the species. In the 2 accompanying plates, figures are given not only of the fully grown animal in both sexes, but also of 3 different stages of the female, of a young male in the Cryptoniscian stage, and of an embryo in one of the latter stages. The peculiar larval form figured at the bottom of Pl. 94 was found in a sample of plankton from Nansen's Expedition. It is figured here, because in the same sample several specimens of the easily recognizable Cryptoniscian stage of *Dajus* were found, which makes it highly probable that it represents the 1st free larval stage of the present form.

Occurrence.—I have taken this form not infrequently from 2 different species of *Mysis*, viz. *M. ocalata* Fabr. and *M. mixta* Lilljeborg, both collected off the Norwegian coast, the former in Finnmark, at Vardø and Vadsø, the latter in 2 localities of the Nordland coast. No differences whatever could be detected between the specimens infesting these 2 species of *Mysis*, and the nominal species *Dajus mixtus* Giard & Bonnier ought therefore to be altogether discarded. The parasite is only found on female specimens of the *Mysis*, being invariably attached to the ventral face of the last segment of the mesosome, turning its head backwards and its ventral face towards the belly of its host, in such a manner that its body is partly inserted between the 2 pairs of incubatory plates which form the marsupial pouch in the *Mysis*. In no instance, however, had these plates attained their full size in the infested specimens, and it is, indeed, very probable, that the presence of the parasite put a stop to their growth. The male is found clinging to the ventral face of the metasome of the female, and is partly concealed by the lamellæ of the anterior pleopoda. In young females the attached male is often found to be still in the Cryptoniscian stage, and I have also occasionally found similar larval individuals, probably belonging to both sexes, free in the sea, and likewise not infrequently attached firmly to the rudimentary pleopoda of the *Mysis*. The number of eggs or embryos

contained in the marsupial cavities is rather considerable in fully grown females, though not nearly so immense as in the Bopyridæ. They show with great distinctness through the thin body-walls bounding these cavities.

Distribution.—Greenland (Krøyer), Labrador (Packard), Sabine Island (Buchholz), Spitsberg (Hock), Jan Mayn (Norw. North Atl. Exped.), the Murman coast (Stuxberg), the Kara Sea (Hansen).

Gen. 2. *Notophryxus*, G. O. Sars, 1882.

Generic Characters.—Body of adult female ovate, more or less depressed, and but slightly curved, with the cephalic part projecting in front, and the lateral parts greatly swollen, though scarcely expanded anteriorly. Metasome forming a semicircular, incurved plate, without any appendages. Marsupial rooms subcontiguous in the middle of the ventral faces. Antennæ lamellar, imperfectly articulated. Oral area rather small, contracted behind. Tips of mandibles projecting from the oral cone in the shape of 2 narrow plates armed with recurved teeth. Maxillipeds folded backwards over the very large and broad sternal plate. Only a single pair of incubatory plates present, issuing from the base of the anterior pair of legs, and divided into 3 diverging lappets. Legs small, of normal structure. Adult male resembling that of *Dajus*. Larvæ in the 1st stage distinguished by the large size and peculiar structure of the uropoda. Parasitic on Mysidæ and Enphausiidae, being, as a rule, attached to the dorsal face of their hosts.

Remarks.—Though in the general appearance of both sexes this genus is rather like the genus *Dajus*, it is found, on a closer examination, to differ in several respects very pronouncedly. Thus, the antennæ, at least in the type species, exhibit a rather anomalous appearance, forming broad, inarticulate plates, which together constitute a broad lamella bounding the oral area in front. Moreover, the maxillipeds, instead of being turned anteriorly, are folded backwards over the large sternal plate, looking at first sight merely like a pair of incubatory plates. Of the latter there is only a single pair present, issuing from the base of the 1st pair of legs, and exhibiting a very irregular form. Finally, there is no trace of any appendages on the metasome. Four different species have been recorded by the present author as belonging to this genus; but, as remarked by MM. Giard and Bouvier, it is very probable that some of these

on a closer examination, will turn out to constitute types of distinct, though nearly allied genera. This may especially be the case with the 2 species from the Challenger Expedition, *N. lateralis* and *globularis*, both of which were found on Euphausiidae. The species described from the Norwegian North Atlantic Expedition as *N. clypeata*, seems to agree more closely with the type species, though this form, too, exhibits some rather pronounced peculiarities. The Norwegian species, described below, is the first one recorded, and must accordingly be regarded as the type of the genus.

Notophryxus ovoides, G. O. Sars.

(Pl. XCV).

Notophryxus ovoides, G. O. Sars. Oversigt af Norges Crustaceer I,
p. 71, Pl. II, figs. 9—11.

Specific Characters.—Body of fully grown female ovoid in outline, somewhat widening behind, with the cephalic part projecting in front as a broadly rounded prominence, scarcely at all deflexed. Dorsal face of mesosome slightly convex, with the segments only visible along the middle, lateral parts strongly tumefied, and projecting posteriorly beyond the tip of the metasome. Ventral face canaliculate along the middle, and forming in front a comparatively small rounded oral area, abruptly contracted behind. Metasome constituting a short, semicircular deflexed plate, with only slight traces of segmentation. Marsupial cavities nearly contiguous along the middle of the ventral face, their posterior openings pushed on to the dorsal side. Antennae imperfectly defined, lamelliform, constituting together a broad horizontal plate defining the oral area in front, and deeply incised in the middle, to receive the oral cone.—Body of young female narrower, oblong oval in form, with the metasome more distinctly segmented and projecting behind, being strongly curved downwards.—Adult male narrow linear, resembling in shape that of *Dajus mysidis*; metasome, as in the latter, undivided. Colour of female pale yellow, with short reddish orange transversal bands across the median part of the back. Length of fully grown female $3\frac{1}{2}$ mm., of male 1 mm.

Remarks.—This form was described by the present author in the year 1882, but was at that time not subjected to a more detailed analysis, for which reason several peculiarities had escaped my attention. The description and figures now given are based upon a very close examination of several specimens, one of which was carefully dissected, in order to ascertain some difficult points, especi-

ally as regards the oral parts and the incubatory plates. The larva figured at the bottom of the accompanying plate was taken from the marsupial room of a specimen, in which the greater part of the brood had been discharged, so that only a few larva still remained. On comparing this larva with that from Nansen's Expedition figured on Pl. 94 and adduced to *Dajus mysidis*, an unmistakable resemblance between the two will be found to exist, especially as regards the peculiar structure of the uropoda.

Occurrence.—I have found this form only on a single species of deep-water Mysidæ, viz. *Amblyops abbreviata*, G. O. Sars. All the specimens were found attached to the same place on their hosts, viz., to the dorsal face of the 3rd segment of the metasome, and in all the cases the parasite was found to turn its head forwards in relation to its host, as shown by fig. X. This is a rather anomalous position, and MM. Giard and Bonnier are therefore inclined to believe that my statement about this point might be due to some mistake, and that the parasite might in reality have had its head turned to the opposite side. Though none of my specimens are now in their original connection with their hosts, I must still insist on the correctness of my statement. Nor is such a position quite exceptional among the Epicarida, for, as stated above, the *Micronisci* as a rule occupy a similar position in relation to their hosts, and farther below a Cryptoniscid will be described, *Cyprioniscus cypridina*, which also, in its fully grown state, invariably turns its head to the same side as that of its host.

As to the distribution of the present form, I have found it in two rather distant localities of the Norwegian coast, viz., at Møsterhavn in the outer part of the Hardanger Fjord, and at Bejan outside the Trondhjemsfjord. Out of Norway this form has not yet been recorded.

Gen. 3. *Aspidophryxus*, G. O. Sars, 1882,

Generic Characters.—Body of female shield-like, convex above, concave below, without any distinct boundary between its chief divisions, and with only very slight traces of segmentation. Cephalic part projecting in front between the largely developed, wing-like lateral parts of the mesosome, its ventral face forming a horizontal quadrangular plate defining the very small rounded oral

area in front. Caudal part of body continuous with the preceding part, and forming below a slight hollow, in which the male is found attached. Marsupial rooms approximate along the middle of the ventral face, though not contiguous. Antennæ quite rudimentary, forming 4 extremely small and closely set tubercles just within the frontal margin. Oral cone short, simple. Maxillipeds, as in *Notophryxus*, folded backwards over the comparatively small cordiform sternal plate. Only a single pair of distinctly developed incubatory plates present, issuing, as in *Notophryxus* from the bases of the anterior pair of legs. A narrow longitudinal fold also extends on each side behind the oral area, terminating behind in a projecting lappet, which serves for closing the posterior openings of the marsupial cavities. Legs small, somewhat more slender than in *Notophryxus*, and densely crowded around the oral area. Pleopoda and uropoda wholly absent. Male with the metasome rather produced and indistinctly segmented, last segment carrying 2 small appendages (uropoda). Parasitic on Mysida, being, as a rule, attached to the dorsal side of the carapace.

Remarks.—In some respects this genus agrees with that of *Notophryxus*, especially as regards the structure of the oral parts and the reduction of the incubatory plates; but in other points it differs rather markedly, for instance in the pronouncedly clypeiform shape of the body in the female, the peculiar form of the cephalic part and the rudimentary condition of the antennæ. The male also is easily distinguishable by the different structure of the metasome.

We know as yet of only a single species belonging to this genus. For the form described by MM. Giard and Bonnier as *A. Sarsi* cannot in my opinion be maintained as such. In describing this form, the above authors have fallen into some serious errors as regards the structure of the antennæ, oral parts and incubatory plates, and this may easily be accounted for by the fact, that they had for examination only a single specimen, which could not be dissected, as it belonged to a foreign collection.

Aspidophryxus peltatus, G. O. Sars.

(Pl. XCVI).

Aspidophryxus peltatus, G. O. Sars, Oversigt af Norges Crustaceer, I, p. 72, Pl. II, figs 12—15.

Syn.: *Aspidophryxus* Sars. Giard and Bonnier.

Specific Characters.—Body of fully grown female oval triangular in outline, being broadest in front and somewhat attenuated behind, terminating in an obtuse point. Dorsal face slightly vaulted, and exhibiting 5 or 6 indistinct

transversal folds as an indication of segments, ventral face concave, or more properly grooved along the middle. Cephalic parts narrowly truncated in front, and defined laterally from the wing-like projecting lateral parts of mesosome by deep incisions, its ventral portion forming a narrow quadrangular plate deeply emarginated behind. Oral area very small, rounded, placed far in front. — Body of immature female nearly quadrangular in outline, scarcely tapering at all posteriorly, hind extremity bluntly truncated, cephalic part narrowly produced. — Adult male narrow, linear, somewhat resembling that of *Notophryxus ovaldes*, but having the metasome considerably more produced, tapering distally, and divided into 5 not very sharply defined segments, the last of which carries 2 indistinctly bifid appendages (the uropoda). — Young male, still in the cryptomiscian stage, resembling that of *Dajus*, though having the front narrower and the oral sucking disc of smaller size. Colour of female somewhat varying in different specimens, the dorsal face being more or less variegated by a dark brownish red pigment, generally arranged in broad transversal bands. Length of female attaining 3 mm., of male 0.70 mm.

Remarks.—As above mentioned, this is, in my opinion, the only as yet known species of the genus. As regards the supposed new species described by MM. Giard and Bonnier, and kindly dedicated to the present author, the only distinguishing character given is the smaller number and comparatively greater size of the ova contained in the marsupial cavities; but this is simply due to the circumstance that the specimen examined was of rather small size, in which case the ova cannot of course be so numerous as in larger specimens, and must also naturally appear of greater size in relation to the parent animal. The other apparent differences, relating to the structure of the antennae, oral parts, and incubatory plates, evidently are due to an imperfect examination. It is, indeed, very difficult to get any correct idea of these parts without a very careful dissection and preparation, and such a close examination could not, as above stated, be instituted by the said authors. As to the incubatory plates, MM. Giard and Bonnier say that they have found them to be of essentially the same structure as in *Dajus mysilis*, and they are also thus represented in one of the detail-figures given. The fact is, however, that in the present genus these plates, both as to form and number, are very different from those in *Dajus*, and much more resembling those in *Notophryxus*. As in that genus, only a single pair of such plates are developed in front, to close the anterior opening leading to the marsupial cavities, and these plates in this case too, issue from the bases of the foremost pair of legs, the next succeeding legs having no traces of plates at their bases. The above-named plates (see the

2 middle figures on Pl. 96) are of very considerable size, projecting with their outer, broadly rounded parts far into the marsupial cavities, and they are divided by several irregular folds, so that they might have presented themselves for the above mentioned authors as consisting each of several superposed plates. It is also very probable that the maxillipeds, owing to their anomalous direction, have been taken by them for another pair of incubatory plates. The 2 narrow, juxtaposed folds, which extend behind the oral area, and which, by their posterior lappet, serve for closing the posterior openings of the marsupial cavities, are described by MM. Giard and Bonnier as the 5th pair of incubatory plates. It may be that they answer to the plates so named in *Dajus*, but between these folds and the above described 1st pair no other plates exist, for a slight lobe found at about the middle of the length of the folds, and extended laterally within the marsupial cavities, has on dissection turned out to be only a lateral lappet issuing from these folds (see the upper middle figure on Pl. 96).—The appearance of the immature females, of which I have examined specimens scarcely exceeding 1 mm. in length, is rather perplexing; for, contrary to what is the case in *Dajus* and probably also in *Notophryxus*, the body exhibits in such specimens a still more compact form than in fully grown females, and there is scarcely any trace of a caudal division. In such young specimens, the appertinent male is generally found to be still in the Cryptoniscian stage, and is invariably found clinging to a peculiar, more or less contorted fleshy cord hanging down from the posterior hollowed part of the body answering to the caudal part in fully grown specimens. The same peculiar mode of affixion could also be proved to occur in adult specimens, and this cord therefore appears to be an integrant part of the genital apparatus of the female. MM. Giard and Bonnier have also seen a cord of this description in the specimen examined by them; but they have interpreted its significance in a very different manner, believing it to belong to a parasitic Copepod (*Aspidoccia Normani*) found by them attached to the same host (a species of the genus *Erythropis*) below the body of the *Aspidophryxus*, and according to their assumption, at the same time affixing itself by the aid of this cord to the Epicarid. This supposition is evidently quite wrong. For the above-named Copepod, which I have found not infrequently attached to different places of the body in specimens of *Erythropis*, has in reality nothing to do with the *Aspidophryxus*, and the apparent association of the 2 parasites, as observed by MM. Giard and Bonnier, has certainly been due to a mere accident.

Occurrence.—I have found this peculiar Epicarid not infrequently along the whole south and west coasts of Norway, and northwards at least to the Lofoten Islands, especially infesting species of the Mysidian genus *Erythropis*. Its

occurrence on the following 4 species of this genus has been proved—*E. Gœssi*, *pygmaea*, *serrata*, and *microphthalma*. I have, moreover, found it on *Parerythrops obesa*, and in a single case also on *Mysidopsis didelphys*. I have carefully compared specimens from all these different hosts, and have convinced myself that they all belong to one and the same species. The mode of affixion of the parasite is rather peculiar. As shown by the figure at the bottom of Pl. 96, it covers the dorsal face of the carapace of its host like a mantle, invariably turning its head backwards in relation to its host. The exact place where it attaches itself was not formerly sufficiently determined by me, but I am now fully able to confirm the statements of MM. Giard and Bonnier on this point. It is, indeed, the posterior incurved edge of the carapace, which exhibits the point of affixion for the parasite, not, as formerly supposed, the dorsal face of the last free segment of the mesosome. In one case only have I found it attached in a very different manner, viz., to the left peduncle of the superior antennæ in a specimen of *Mysidopsis didelphys*. The male, as above stated, is found within the ventral hollow of the caudal part of the female, and is generally curled up almost in a circle, always clinging to the above-mentioned fleshy cord issuing from the genital region of the female.

Out of Norway, this form has not yet been recorded, for the specimen examined by MM. Giard and Bonnier was found on an *Erythrops microphthalma* taken off the Norwegian coast by the Rev. A. M. Norman.

Fam. 3. Cryptoniscidæ.

Characters.—Body of adult female reduced to a simple sac filled with ova, though sometimes exhibiting slight traces of segmentation, but without any true limbs. Last larval stage resembling in its outward appearance that of the *Bopyridæ* and *Dajidæ*. Antennulæ with 2 flagella, and having the basal joint lamellarly expanded behind, the expansion being more generally divided into coarse teeth. Antennal flagellum 5-articulate. Oral cone simple, without any sucking disc. Coxal plates generally closely pectinate. The 2 first pairs of legs subequal, and much shorter and thicker than the others, which, as a rule, are very slender, with long setiform dactyli. Pleopoda with both rami well developed. Uropoda with the outer ramus, as a rule, much

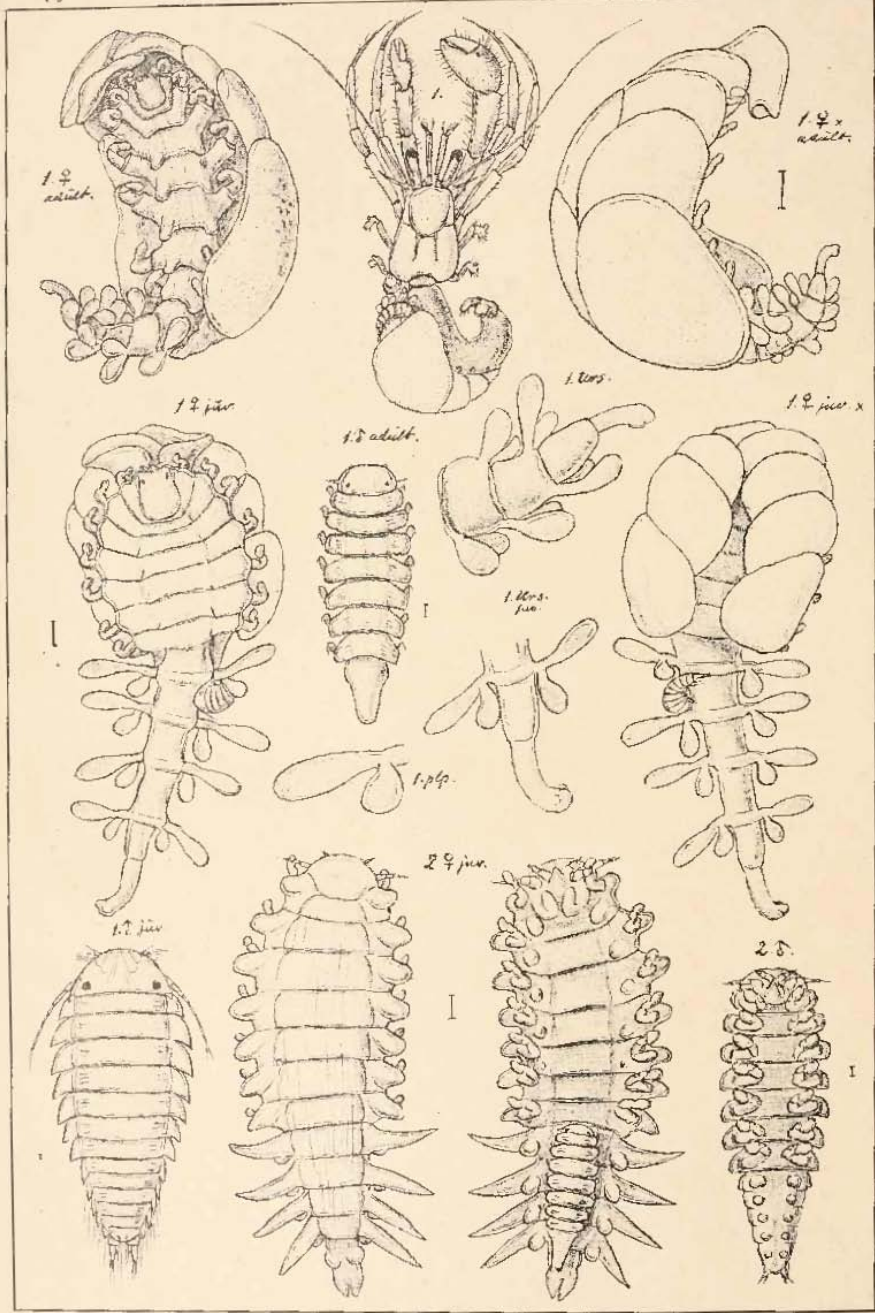
shorter than the inner. Male not passing beyond the last larval stage, and undistinguishable from the female larva, except by the presence of the male generative organs, which form 2 small bags within the last segment of mesosome. Ovaries of female sometimes fully developed even in the last larval stage. Parasitic on Crustacea of very different orders, more generally occurring within the marsupial cavity of their hosts.

Remarks.—Under this head I combine the four families, *Cyproniscidae*, *Cabiropsidae*, *Podasconulæ* and *Cryptoniscidae* of MM. Giard and Bonnier. The chief motive which has led the above mentioned authors to the establishment of these four families, seems to have been the occurrence of the parasites, each family containing only forms which are stated to infest one group of Crustacea. In my opinion, however, this circumstance cannot be regarded as a sufficient criterion for the distinction of separate families, unless there are also found very essential differences in the structural relations. This, indeed, seems, not to be the case, and the last larval stage in particular, as also the male, in all these forms is of a very uniform appearance, and easily distinguishable from that of the 2 above-described Bopyroid families.

The earliest known genus, from which the family has derived its name, is *Cyptoniscus*, established by Fritz Müller for a peculiar parasite found on a *Pellogaster* infesting a Brazilian Pagurid, and having in its adult state a perplexing resemblance to a *Planaria*, hence the specific name *planarioides*. Subsequently several other genera have been established, amounting to about 12 in all. Of these, 5 will be described below, of which 4 at least are stated to be represented in the fauna of Norway.

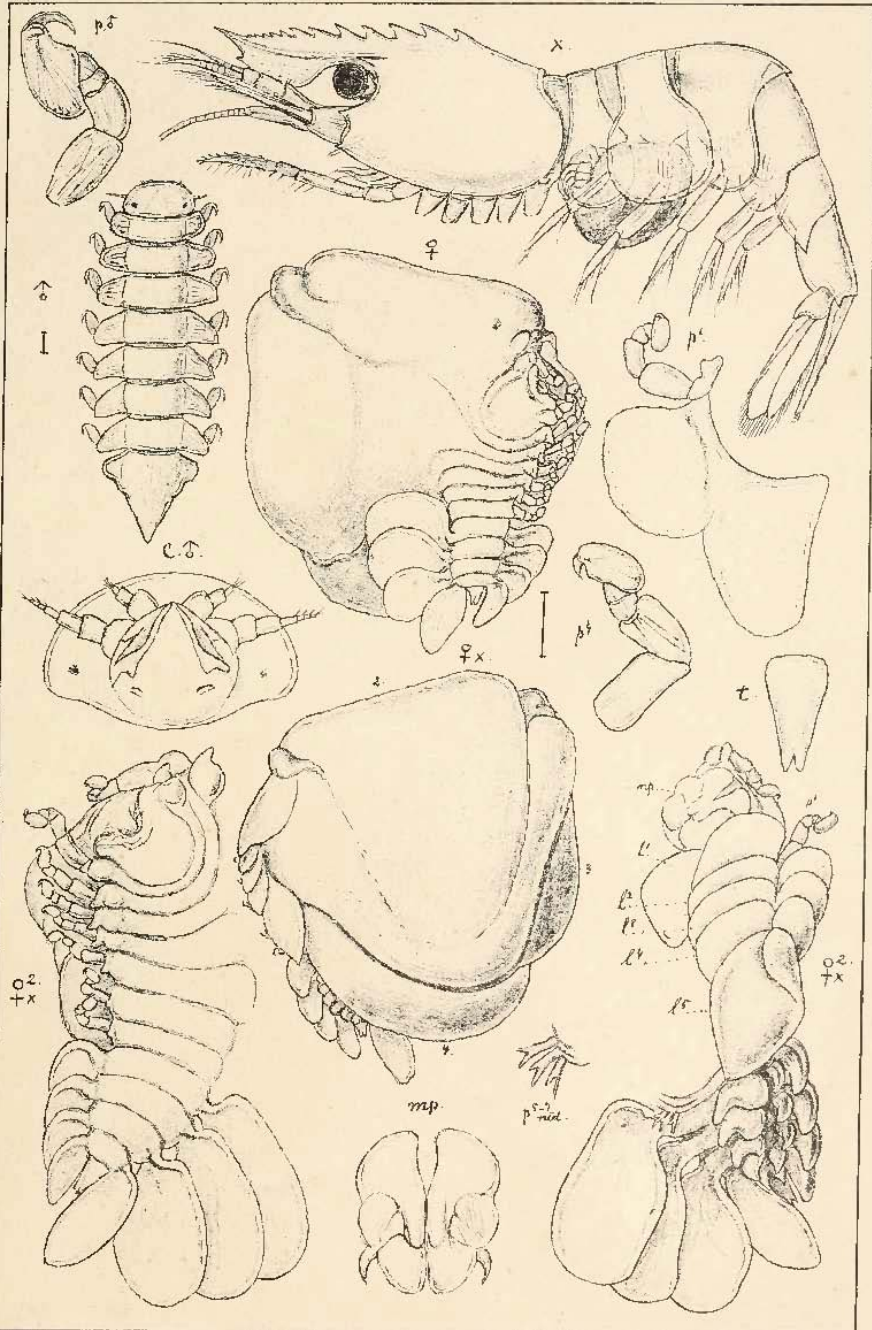
Gen. 1. *Cyproniscus*, Kossman, 1884.

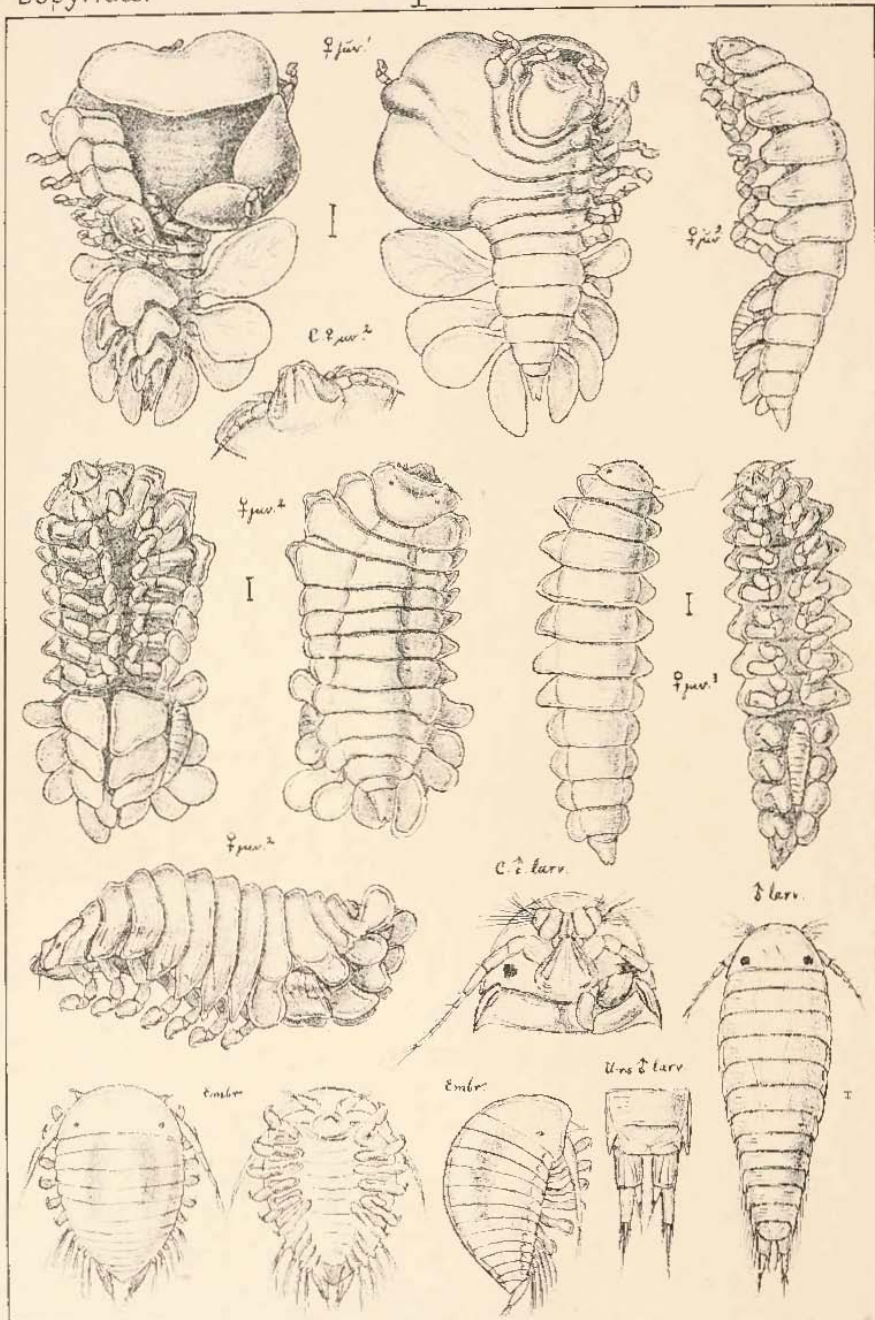
Generic Characters. Body of adult female forming an inert curved sac wholly filled with ova or embryos, and affixed to the host by the aid of a thin flexible chord; dorsal face convex and exhibiting distinct traces of segmentation, ventral face flattened, lateral parts expanded, anterior extremity broadly produced, posterior obtusely rounded and incurved. — Body of immature female sub-pyriiform, bluntly truncated in front, hind extremity narrowly exerted, lateral parts not distinctly defined. — Body of young female, immediately after the transformation, subfusiform, very faintly segmented, front part still enveloped by the



G.O. Sars, autogr.

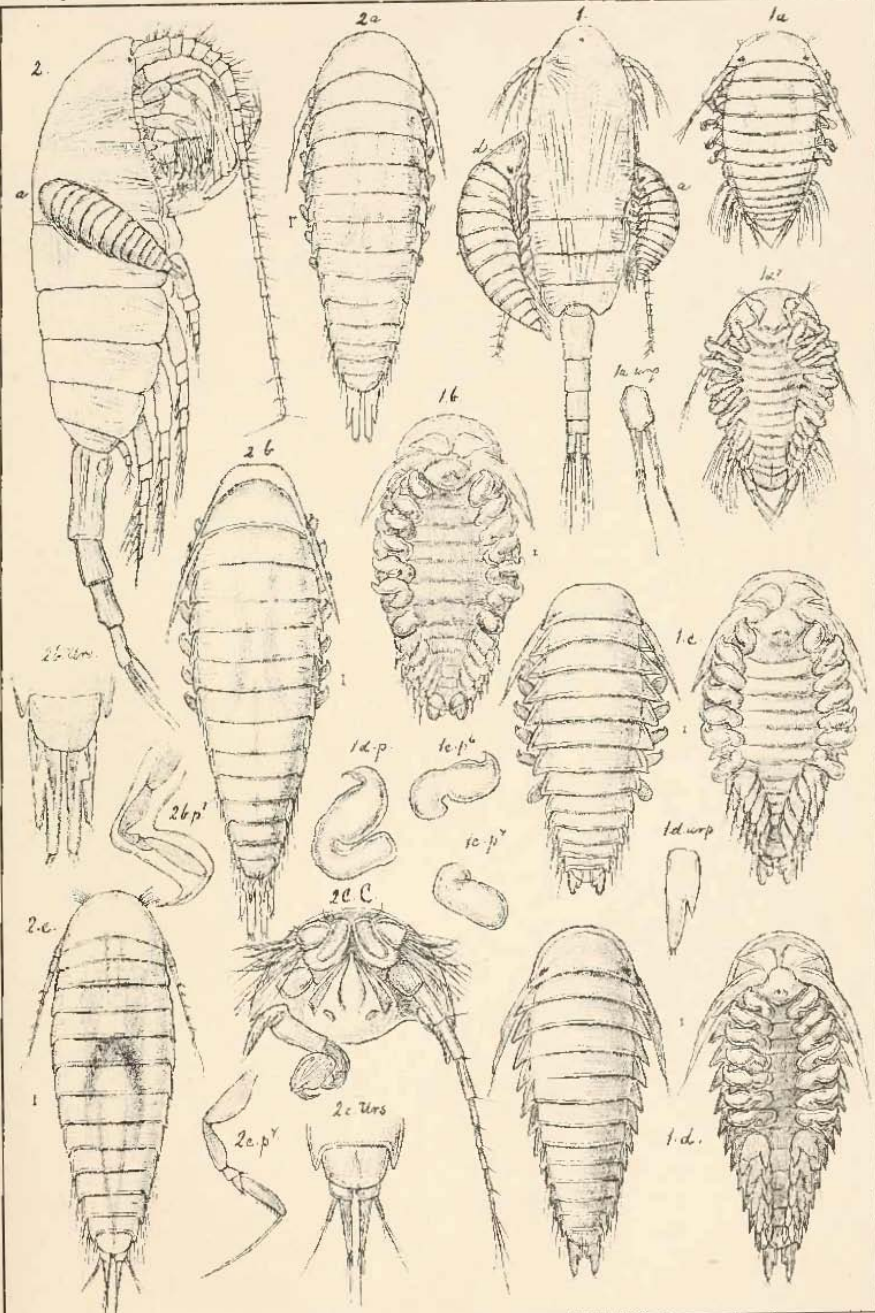
1. *Athelges tenuicaudis*, n. sp.
 2. *Athelges bilobus*, n. sp.



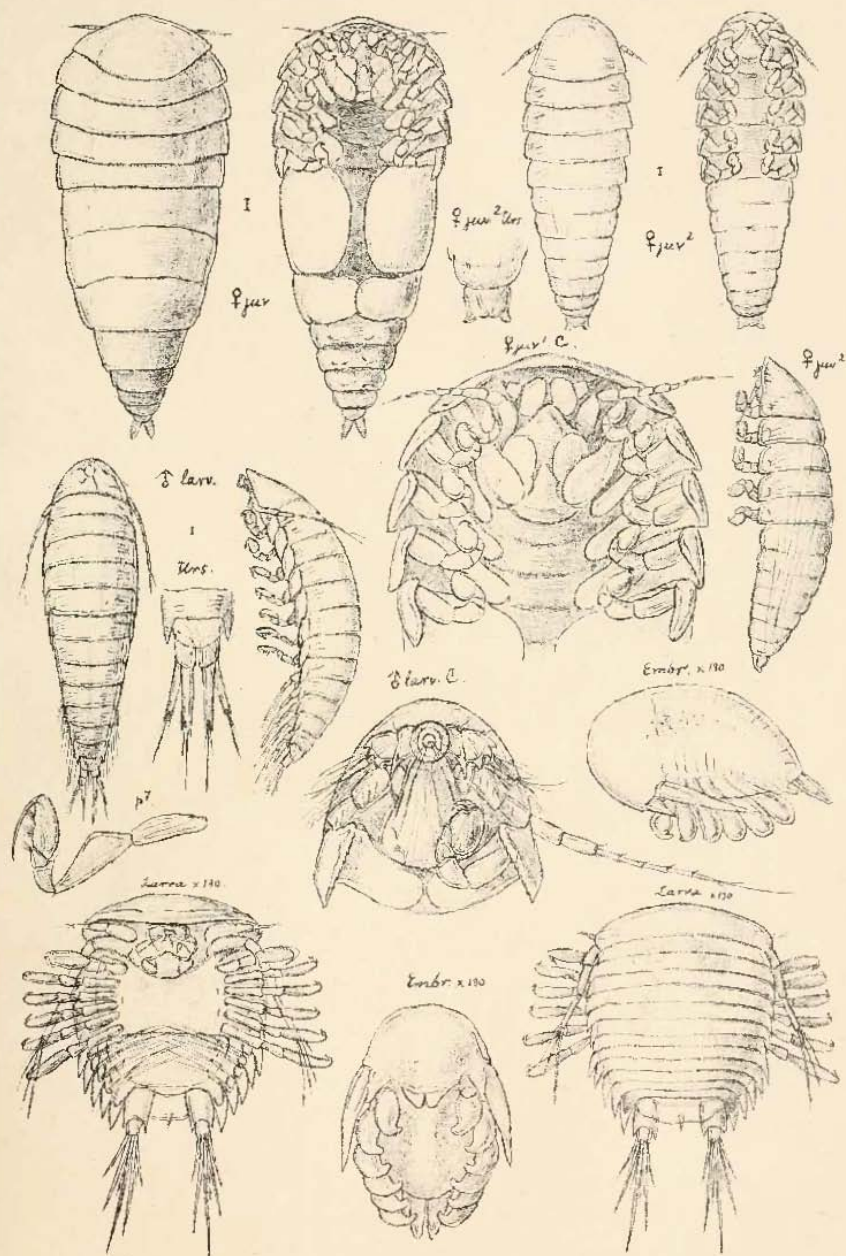


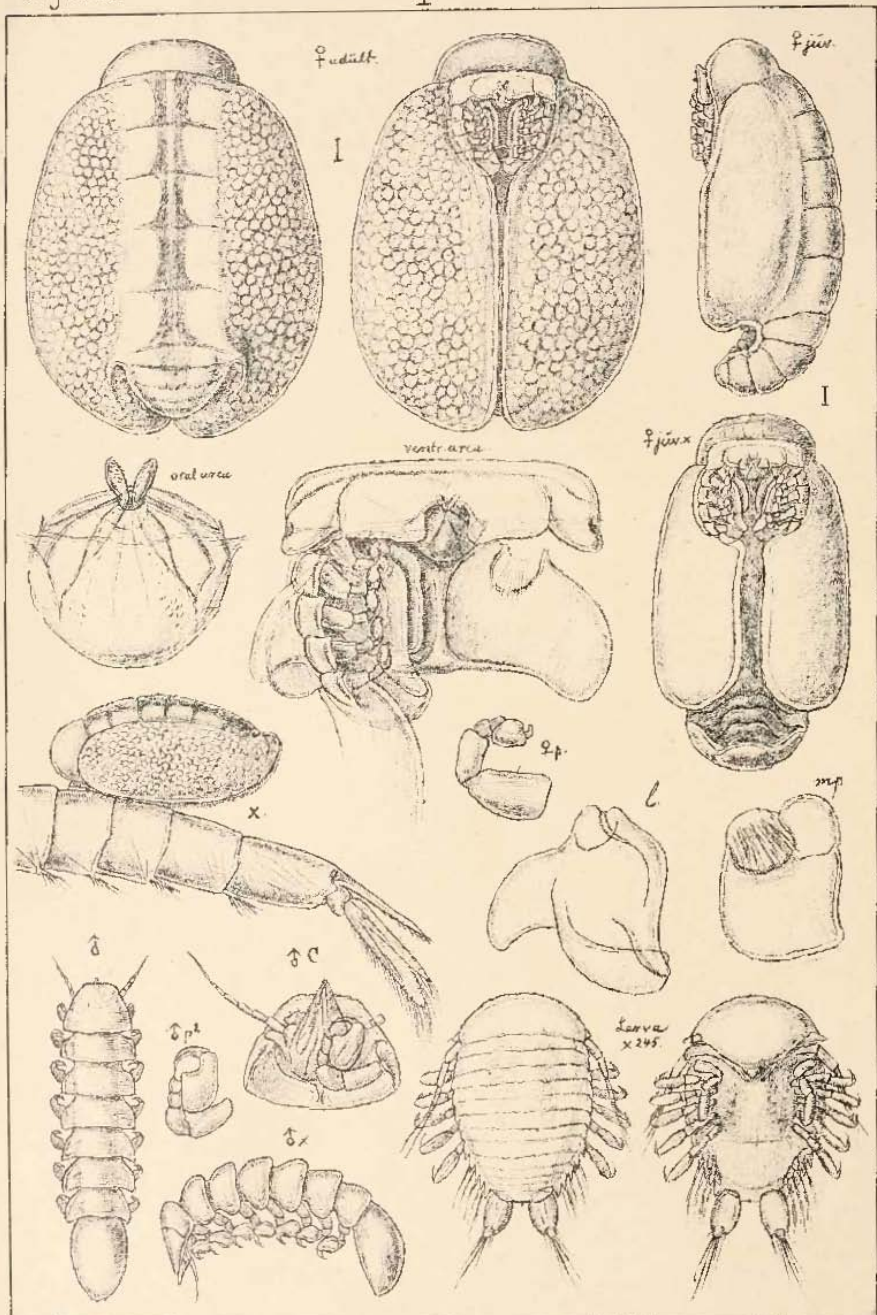
G.O. Sars, autogr.

Phryxus abdominalis, (Kröyer).
(continued).



G. O. Sars, autogr. *Microniscus* (transitory stage of Epicarida).
 1. Bopyrid. — 2. Cryptoniscid.





G. O. Sars, autogr.

Notophryxus ovoides, G. O. Sars.



larval skin, and deeply immersed within the body of the host, being anchored by a pair of long, flexuous, root-like processes. — Adult male exactly resembling the female larva of last stage, being rather slender, and without eyes; hind expansion of basal joint of antennulæ divided into a restricted number of teeth, coxal plates coarsely pectinate; outer ramus of uropoda much smaller than the inner. Parasitic on Ostracoda.

Remarks. — This genus was established in the year 1884 by Dr. Kossman, to include the peculiar parasite briefly described and figured by the present author in his „Oversigt“ as *Cryptothiria cypridinæ*. I now fully admit that this form ought to be regarded as the type of a distinct genus, but cannot, on the other hand, agree with MM. Giard and Bonnier, that the parasitism of this form on an Ostracod should make it necessary to place it even in a separate family. The structure of the male and the last larval stage of the female do not exhibit any essential differences from those found in other *Cyproniscida*. The genus comprises as yet only a single species, to be described below.

Cyproniscus cypridinæ, G. O. Sars.

(Pl. XCVII, Pl. XCVIII, fig. 1).

Cryptothiria cypridinæ, G. O. Sars. Oversigt af Norges Crustaceer 1, p. 13, Pl. 2, figs. 17—21.

Specific Characters. — Body of adult female almost semi-globular in shape, with the dorsal face greatly vaulted, the ventral one concave, anterior extremity, turning forward in relation to the host, subcordiform, posterior narrower and inflexed, obtuse at the tip. Dorsal part of body well defined from the lateral parts, and divided by distinct transversal lines into 7 segments, each forming an obtuse gibbosity; lateral parts moderately expanded and unsegmented. Integuments very thin and pellucid, without any obvious opaque area dorsally. — Immature female somewhat varying in form, more generally clavate, with the dorsal margin more or less deeply indented between the segments, posterior extremity narrowly exerted and deflexed, lateral parts not defined from the dorsal. — Still younger female, immediately after the transformation, fusiform, but slightly curved with the ventral face very convex in front, neck constricted and still covered by some of the anterior segments of the larval skin, cephalic part wholly immersed within the skin of the host and exhibiting in front a strongly denticulated recurved projection, root-like filaments long and flexuous. Male (and female in last larval stage) long and slender, sublinear, with the dorsal face finely striolate transversally. Cephalic segment evenly rounded in front;

anal segment obtusely produced behind. Basal expansion of antennule divided behind into 6 coarse teeth. Coxal plates very distinctly pectinate. Outer ramus of propoda extremely small, scarcely half as long as the inner. Colour whitish. Length of adult female 2.10 mm., of male 0.90 mm. — Parasitic on *Cypridina norvegica*, occupying the part of the shell-cavity otherwise destined to receive the ova and embryos of the host.

Remarks. — As above mentioned, this peculiar parasite was first described by the present author in his „Oversigt“ under the name of *Cryptothiriu cypridinae*. The description was only a preliminary one, and, after now having subjected this form to a closer investigation, I am in a position to complete this description, and at the same time to correct an essential error. The fusiform little creatures generally found associated with the adult female, firmly anchored to the *Cypridina* at one or both sides of the former, are not, as formerly opined, males, but likewise females, though in a very early stage of development, having lately undergone their transformation. The successive stages figured on Pl. 97 and marked ♀¹ to ♀⁶ show this fully. Shortly before the transformation the female larva burrows its head deeply into the skin of the host (see figs. ♀¹, ♀²), and from its anterior part the long, root-like filaments characteristic of the succeeding stages gradually grow out. Moreover, a highly chitinized reflexed plate, terminating in several strong denticles, develops from the extremity of the head, whereby the attachment becomes still firmer (see the figure at the bottom of the plate on left side). At the same time the fusiform body of the 1st post-larval stage may be distinctly traced within the larval skin, gradually retracting itself from the inner walls of the latter, so as at last only to occupy a part of its inner cavity (see fig. ♀³). The empty larval skin is thereupon shed gradually from behind forwards. In the earliest postlarval stage (see fig. ♀³) some of the anterior segments of the larval skin are generally seen still loosely covering the neck of the young female, with their appendages in a more or less complete state; but very soon they too are thrown off, and only the deeply immersed cephalic segment of the larva remains, constituting the means by which the female is attached to its host (see fig. ♀⁴). The neck of the latter now becomes gradually more and more constricted, and at last is converted into the narrow flexible string by which the female adheres to the host (see figs. ♀⁵, ♀⁶). The form of the body still looks rather different from that of the adult female; but all intermediate stages may be easily demonstrated by the examination of a sufficiently rich material. In the interior of the young female a large bag-shaped body, filled with yellowish contents, may be easily traced. This body, which appears wholly closed in front, and behind extends into the posterior, narrowly exerted

extremity, undoubtedly represents the alimentary cavity. Dorsally, at each side of the latter, a narrow bandlike body first makes its appearance, extending through the greater part of the body, and having its anterior extremity slightly dilated (see fig. ♀⁵). These bodies are converted in to the ovaries, which in a later stage (fig. ♀⁶), constitute 2 rather large lobular organs filled with numerous very small ovicells. In the lateral walls of the body several short muscles are seen passing from one segment to the next in succession, indicating that the body in these stages is capable of some slow vermiform movements. All these inner parts, however, at last wholly disappear, and the body of the fully-grown female is converted merely into an inert capsule filled with ova or embryos. It often happens that several young females are found attached to the same Cypridina; but of these only one becomes fully grown and ovigerous, and it is very probable that the others soon die off without reaching full maturity. The position of this parasite in relation to the body of its host is quite contrary to that advanced by MM. Giard and Bonnier as an unexceptional rule for all Epicarida, the fore-part of the body always turning the same way as that of the host.

The male is found creeping freely on the body of the Cypridina or on that of the female (see fig. ♀⁶). It is undistinguishable from the female in the last larval stage, except by the nature of the generative organs, and it is even not improbable that, after its function has been accomplished, it becomes converted into a female, and that this form accordingly is protandric in character, as has been suggested for some other Epicarida.

Occurrence.—I have not infrequently found this interesting form off the Lofoten Islands and at Bodö and Selsövig, infesting *Cypridina norvegica* Baird, an Ostracod occurring in great abundance on a muddy bottom in depths varying from 100 to 300 fathoms. The parasite, when fully developed, is easily observable through the semipellucid valves of the Cypridina, always occupying the place, where otherwise the ova and embryos of the latter are carried during their development. Occasionally the parasite also occurs on male Cypridinae; but in no instance have I found it in this case fully developed, and it is very probable that under such circumstances it does not ever reach maturity. Out of Norway this form has not yet been recorded.

Gen. 2. **Cryptothir**, Dana, 1852.Syn.: *Cryptothiria*, Sp. Bate (part)." *Hemioniscus*, Buchholz.

Generic Characters.—Body of adult female forming a broad, lobular sac, apparently without any distinct segmentation, but exhibiting in front, somewhat dorsally, a small conical projection, constituting the anterior larval part of the body still retaining its appendages, and serving for the attachment of the parasite. Young female *Praniza*-like, with the middle segments strongly tumefied. Male (and last larval stage of female) slender, with distinct, though small eyes, basal expansion of antennulæ spatulate, and coarsely dentate behind. Parasitic in the mantle-cavity of barnacles.

Remarks.—This genus was established by Dana in the year 1852, to include a small parasite, *C. minutum*, found off the Fiji Islands in the corallidomous barnacle *Creusia*. In 1860, Sp. Bate recorded, under the name of *Liviope balani*, another form, which is undoubtedly congeneric with Dana's species, and which also in the History of British sessile-eyed Crustacea was referred to that genus (here spelt *Cryptothiria*); in the same genus was, moreover, included a rather different form, viz., the *Liviope pygmaea* of Ratlke, which constitutes the type of a distinct and rather anomalous genus. The species of Sp. Bate was subsequently, in the year 1866, rather fully described by Dr. Buchholz as the type of a new genus, *Hemioniscus*, which name, however, must cede to that proposed by Dana. To the Norwegian fauna there belongs only a single species, to be described below.

Cryptothir balani, Sp. Bate.

(Pl. XCVIII, fig. 2).

Liviope balani, Sp. Bate, Brit. Assoc. Report 1860, p. 225.Syn.: *Hemioniscus balani*, Buchholz." *Cryptothiria balani*, Sp. Bate & Westwood.

Specific Characters.—Body of adult female short and broad, star-like, with 7 radiating lobes, the 2 anterior of which are less prominent, sometimes obsolete, posterior lobe more conical than the others. Anterior larval part of the body sharply defined, and consisting of the head and 3 anterior segments of mesosome, with their appendages exactly as in the larva in its last stage. The latter (and the male) oblong fusiform in shape, with the basal expansion of the antennulæ very broad, and divided into 7 or 8 strong teeth. Colour of adult female,

according to Buchholz, pale carneous. Length of adult female reaching to 8 mm. Parasitic on *Balanus balanoides* Lin.

Remarks.—As above stated, this form was first recorded by Sp. Bate as a species of the genus *Liriope* of Rathke. About the identity of Buchholz's *Hemioniscus balani* with Sp. Bate's species, there cannot, in my opinion, be any doubt. It is the only species of the genus found in northern latitudes.

Occurrence.—I have not myself found this form; but its occurrence in Norway is stated by Dr. Buchholz, who found it at Christiansand on the common littoral barnacle (*Balanus balanoides*). In all probability it is distributed along the greater part of the Norwegian coast, as is the barnacle on which it lives as a parasite. The figures here given are from a specimen kindly sent me by Dr. Buchholz.

Distribution.—British Isles (Sp. Bate).

Gen. 3. **Asconiscus**, G. O. Sars, n.

Generic Characters.—Body of adult female constituting a simple pouch, without any traces of segmentation or projecting lobes, affixed to the host only by the aid of the shed larval skin still adhering to the pouch. Male (and last larval stage of female) resembling in outward appearance that of the 2 preceding genera, but differing in the fact that the basal expansion of the antennulae and the coxal plates are not pectinate, as also in the fuller development of the outer ramus of the uropoda. Parasitic in the incubatory pouch of deep-water Mysidæ.

Remarks.—This new genus is founded upon an Epicarid, the retrograde development of which has attained its maximum, the adult female being reduced to a quite simple soft pouch containing the generative organs. The male, however, exhibits on the whole the usual structure, though differing in some particulars rather pronouncedly from that of the 2 preceding genera. In any case there cannot be any doubt that the present genus ought to be placed within the family *Cryptoniscidae*.

Asconiscus simplex, G. O. Sars, n. sp.

(Pl. XCVIII, fig. 3).

Specific Characters.—Body of adult female forming an oval pyriform, soft-skinned pouch hanging down from the empty larval skin, the posterior part of which is generally found to be thrown off; that of young female more fusiform or rather sigmoid in shape, with the posterior extremity conically produced and slightly wrinkled. Male (or female in the last larval stage) oblong oval, tapering both in front and behind, dorsal face finely striolate transversally. Cephalic segment narrowly rounded in front; anal segment almost transversally truncated behind. Eyes wanting. Basal joint of antennulæ produced behind to a narrow linguiform expansion pointing straight posteriorly, and tipped by 2 strong, unequal setæ. Antennæ rather elongate, extending to the end of the 5th pedigerous segment. Legs of about same structure as in the male of *Cypriniscus*. Uropoda with the outer ramus well developed, though shorter than the inner, which tapers to a very narrow point. Length of adult female $4\frac{1}{2}$ mm., of male about 2 mm. Parasitic on *Boreomysis arctica* (Krøyer).

Remarks.—This is the only as yet known species of the genus, and exhibits considerable interest on account of the extreme retrogression of the female, which, strictly speaking, represents nothing more than an ovarian pouch, its connexion with the larval individual being only a mechanical, not an organic one. Indeed, the larva from which the female is developed dies off completely, and it is only to the inside of the empty skin of the former that the female is connected. In all the specimens examined, both young and adult, the larval skin was incomplete, a great number of the posterior segments having been thrown off. The occurrence of this form under very similar conditions to those under which the species of the genus *Dajus*, belonging to a quite different family, are found, clearly shows that the principle of classification adopted by MM. Giard and Bonnier is quite unmaintainable.

Occurrence.—I have found this peculiar parasite occasionally within the incubatory pouch of the deep-water Mysidian *Boreomysis arctica*, Krøyer, taken partly in the Trondhjem Fjord partly in the Christiania Fjord. In all instances, unlike what is the case with Mysidæ infested by *Dajus*, the marsupial pouch of the host was fully developed, and it thus seems that the parasite must have entered the pouch immediately after the young of the host had escaped. Several male specimens were found associated with the female, and in one instance 2 or 3 females of different development were found in the same host. The male, or last larval stage, I have also found occasionally free in the sea.

Gen. 4. **Clypeoniscus**, Giard & Bonnier, 1895.

Generic Characters.—Body of adult female forming a somewhat flattened bag of oval form, without any distinct segmentation, but with the lateral parts slightly lobular, and both extremities briefly incised; dorsal face convex and exhibiting somewhat in front of the middle an opaque area, ventral flattened, with a longitudinal slit leading to the inner cavity, and admitting of being closed by a number of small valvular lamellæ defining it on each side. Within the bottom of the posterior incision an extremely small projection occurs, constituting the hind extremity of the animal. No distinct affixing apparatus present. — Male comparatively short and thick, with the basal expansion of the antennulæ very broad and densely pectinate. Coxal plates likewise distinctly pectinate. Antennæ comparatively short. Uropoda with the outer ramus much smaller than the inner. 1st larval stage distinguished by the presence of a broad operculiform plate covering the ventral face of the tail. Parasitic in the marsupial cavity of Isopoda belonging to the family *Idotheidæ*.

Remarks.—This genus, recently established by MM. Giard and Bonnier, is well distinguished from the other Cryptoniscian genera by the flattened cake-like shape of the adult female, as also by the peculiar shield-like plate occurring in the 1st larval stage beneath the tail. It is, indeed, the latter character which has given rise to the generic name proposed by the said authors. They record 2 different species, the distinctness of which, however, appears to me somewhat questionable, although they are from widely distant localities and have been found on different species.

Clypeoniscus Hanseni, Giard and Bonnier.

(Pl. XCIX, fig. 1).

Clypeoniscus Hanseni, Giard and Bonnier, Contributions à l'étude des Episcarides, in Bulletin scientifique de la France, T. XXV, p. 414, Pl. VII—X.

Specific Characters.—Body of adult female oval quadrangular in outline, with both extremities nearly alike, or the anterior very little narrower than the posterior, lateral parts divided into 5—6 rounded lobes, which, however, often appear less regular and sometimes are almost obsolete; dorsal opaque area not very distinctly defined, and oval in form; caudal prominence very small, clavi-form, briefly bilobed at the tip. — Male oval pyriform in outline, but little more than 3 times as long as it is broad; cephalic segment evenly curved in front;

anal segment rounded at the tip. Eyes wanting. Basal expansion of antennule very broad, and divided into 21 closely crowded teeth. Antennæ with the flagellum scarcely longer than the last 2 joints of the peduncle combined. Uropoda with the outer ramus about half as long as the inner. Length of adult female about $4\frac{1}{2}$ mm., of male 0.65 mm. Parasitic on *Isothea baltica*.

Remarks.—As above indicated, the differences between this form and the other species recorded by MM. Giard and Bonnier, *C. Meinerti*, are very slight, and it is, indeed, chiefly the occurrence of both forms that has led the said authors to regard them as 2 distinct species. It may be that a closer comparative examination of young females specimens, males and larvæ, might reveal better distinguishing characters; but the adult females, at least, of these 2 forms appear to me to be nearly undistinguishable from one another.

Occurrence.—This form has certainly not yet been recorded from Norway; but, as the species of Isopod, *Isothea baltica* Pallas, on which it is found parasitic, is very common along our whole coast, it is very probable that, on a closer investigation, it will in reality be found to exist also off the Norwegian coast. The figures here given are from Danish specimens kindly sent to me from the Museum of Copenhagen. In none of these were fully developed embryos found, and I have therefore not been able to give any figure of the characteristic 1st larval stage. The specimens examined by MM. Giard and Bonnier were likewise from the Danish coast, and this form has, indeed not yet been found in other places, unless the Greenland form, *C. Meinerti*, should prove to be the same species.

Gen. 5. **Munnoniscus**, Giard & Bonnier, 1895.

Generic Characters.—Body of adult female forming a thin-skinned sac of a somewhat irregular bilobed form, without any traces of segmentation, but exhibiting dorsally a well defined, though rather small opaque area; that of younger female more regular in form, with the opaque area occupying almost the whole dorsal face. No distinct affixing apparatus present. Male unknown. Parasitic in the incubatory pouch of Isopoda belonging to the family *Munnopsidae*.

Remarks.—This genus was proposed in the year 1895 by MM. Giard and Bonnier, to include the form previously recorded by the present author as *Cryptothiria marsupialis* and, indeed, with some doubt referred by him to Dana's genus. We only know at present of a single species, to be described below.

Munnoniscus marsupialis, G. O. Sars.

(Pl. XCIX, fig. 2.)

Cryptothiria marsupialis, G. O. Sars, *Oversigt over Norges Crustaceer* I. p. 74. Pl. 2, fig. 22—23.Syn: *Munnoniscus Sarsii*, Giard & Bonnier.

Specific Characters.—Body of adult female nearly as broad as it is long, somewhat narrower in front than behind, and divided behind into two lateral lobes of somewhat unequal size, the right lobe generally advancing beyond the left, from which it is defined by a deep and narrow incision, in front only by a slight sinus; dorsal area comparatively small, diamond-shaped. Younger female more symmetrical in form, regularly bilobed behind, and obscurely trilobate in front; dorsal face convex and slightly wrinkled, ventral flattened, with a slight groove along the middle. Length of adult female $2\frac{1}{2}$ mm. Parasitic on *Eurycope cornuta* G. O. Sars and *Ilyarachna longicornis* G. O. Sars.

Remarks.—As above mentioned, this is the only species of the genus as yet known, for the form named by MM. Giard and Bonnier *M. Sarsii* does not in reality differ in any respect from the type species, except by its occurrence on a different species of *Munnopsida*. The male and last larval stage I have not succeeded in finding; but the embryos (see fig. 2 emb.) are fully normal, exhibiting all the features found in other Epicarida.

Occurrence.—I have found this extremely degenerate parasite in the marsupial pouch of 2 different *Munnopsida*, viz., *Eurycope cornuta* G. O. Sars and *Ilyarachna longicornis* G. O. Sars, more frequently in the former than in the latter. In both instances the incubatory lamellæ of the host were fully developed, and the parasite must accordingly have entered the marsupium immediately after the young of the host had escaped.

Gen. 6. **Liriopsis**, Mac Schultze, 1859.Syn.: *Liriopse*, Rathke." *Cryptothiria*, Sp. Bate (part).

Generic Characters.—Body of adult female consisting of two very sharply defined sections connected by a narrow neck, the anterior deeply immersed within the body of the host, the posterior freely exposed, the former showing traces of segmentation, the latter quite simple. No trace of any appendages or affixing

apparatus present. — Male (or last larval stage) resembling in outward appearance that of other *Cryptoniscidæ*, though distinguished by the presence of well-developed eyes, the want of teeth on the basal expansion of the antennulæ, and by the poor development of the last 2 pairs of legs. Parasitic on rizocephalic Cirripedia.

Remarks.—This genus was established as early as in the year 1843 by H. Rathke, to include a small Crustacean, which he erroneously referred to the Amphipoda, but which has turned out to be the male (or last larval stage) of a parasitic Isopod. The female was only detected many years afterwards (1858) by Prof. Lilljeborg, who at first made out the life-history of this peculiar Crustacean. As the generic name *Liriope* proposed by H. Rathke has been appropriated by Lesson to designate a genus of Medusæ, Dr. Mac Schultze has changed it to *Liriopsis*. Though evidently belonging to the family *Cryptoniscidæ*, this genus differs in several points rather markedly from the other forms, both as regards the structure of the female and that of the male. Besides the northern species described below, a 2nd nearly-allied form has been recorded by Dr. Fraisse from the gulf of Naples under the name of *L. monophthalma*.

Liriopsis pygmæa (Rathke).

(Pl. XCIX, fig. 3, Pl. C., fig. 1).

Liriope pygmaea, H. Rathke Beitr. z. Fauna Norwegens, p. 60, Pl. 1, figs. 8—12 (male).

Liriope pygmæa, Lilljeborg, Les genres *Liriope* et *Peltogaster*, p. 6, Pl. 1 (female).

Syn: *Cryptothiria pygmæa*, Sp. Bate & Westwood.

Specific Characters.— Anterior immersed section of the body securiformly expanded, or almost semilunar in form, convex above and plane below, consisting of 4 segments, the defining lines being well distinguishable on the dorsal side; posterior exposed section globular in form, with a groove along the middle of the ventral face. — Male (or last larval stage) moderately slender, gradually narrowed behind, dorsal face smooth and shining. Cephalic segment evenly arcuate in front; anal segment rounded behind. Eyes very distinct, each consisting of a dark pigment within which is imbedded a single rather large, refractive lenticular body. Antennulæ comparatively robust, 1st joint of the peduncle projecting in front to a strong denticle, and forming behind a very large linguiform expansion without any traces of teeth or setæ, 2nd joint with the front edge divided into 2 small denticles. Antennæ well developed, extending to the end of the 4th pedigerous segment. Coxal plates not pectinate. The 5 anterior pairs of legs of the usual structure; the last 2 pairs, on the other hand, very small,

with the propodos almost globular and the dactylus straight, styliform. Uropoda with the outer ramus very small, scarcely attaining half the length of the inner. Colour of female whitish, of male pale yellow, with a bistre-brown assemblage of pigment on the anterior part of the dorsal face. Length of adult female nearly 5 mm., of male 1.35 mm. Parasitic on *Peltogaster paguri* Rathke.

Remarks.—This is the typical species, the female of which is well distinguished from that of the Mediterranean form, *L. monophthalma*, by the different shape of the exposed section of the body, which is always globular, whereas this part is stated to be cylindrical in the Mediterranean species. As to the male or last larval stage, it may be noted, that the figure given in Sp. Bate and Westwood's work, p. 261, does not belong to this form, but is apparently a larva of *Phryxus abdominalis* or any other Bopyrid, as is easily seen from the structure of the legs and uropoda.

Occurrence.—Rathke found 8 specimens of the male, or more properly last larval stage, of this form within the body-cavity of a *Peltogaster paguri* found attached to the tail of a *Eupagurus bernhardus* taken at Christiansund, and Prof. Lilljeborg observed the adult female at Molde and Bergen, likewise on *Peltogaster paguri*, which in this instance was attached to another species of *Eupagurus*, viz., *E. pubescens* Kröyer. I have myself not yet succeeded in finding the female, but males, or larvæ in the last stage, I have several times taken, partly from the body cavity of *Peltogaster paguri*, partly free in the sea. The figures of the female here given are from a specimen kindly sent to me from the Museum of Copenhagen. It is here represented both in its natural connexion with the *Peltogaster* and isolated from it. Together with this specimen was also sent me, in a separate tube, 3 larvæ labelled *Liriopsis pygmaea* ♂. Though in all probability they were found associated with the female *Liriopsis*, they all, on a closer examination, turned out to be Bopyrid larvæ. Indeed, I have myself occasionally found such larvæ in the body-cavity of *Peltogaster*; but there cannot be any doubt that they did not have any true relation either to the *Peltogaster* or to the female *Liriopsis*, but might, by a mere accident, have entered the cavity of the former.

Distribution. Coast of Denmark (Copenh. Museum), Black Sea (Czerniawsky).

I add below the description of 2 different forms of *Cryptoniscidæ*, the exact relation of which to other *Cryptoniscian* genera it is, however, impossible

at present to state, as they are both only known in the last larval stage. One of the forms has already been recorded at an earlier date, whereas the other is new. They are here simply designated as No. 1 and No. 2.

Cryptoniscid No. 1.

(Pl. C, fig. 2).

Podascon (?) Stebbingi, Giard & Bonnier.

Characters.—Body comparatively robust, oblong oval in form, with the greatest width rather behind the middle. Cephalic segment semilunar, with the frontal edge evenly curved; anal segment angularly produced behind. Eyes wanting. Basal expansion of antennulæ short and broad, with the posterior edge divided into 8 short, and somewhat irregular, blunt teeth. Antennæ rather elongated, extending almost to the end of the 4th pedigerous segment, flagellum fully as long as the peduncle. Coxal plates distinctly pectinate. Legs of the usual structure, dactylus of the posterior pairs bidentate at the tip. Uropoda with the outer ramus very small, scarcely exceeding half the length of the inner, both having the extremity simple, and tipped with 3 slender bristles, the middle of which is the longest. Colour not yet determined. Length of body 1.70 mm. Found occasionally in the incubatory pouch of *Onesimus plantus*, Kröyer.

Remarks.—This form is undoubtedly identical with the parasite recorded, but without any name, by the Rev. Th. Stebbing in his account of the Amphipoda of the Barents Expedition, and for which MM. Giard and Bonnier have proposed the name *Podascon* (?) *Stebbingi*. The specific name ought certainly to be retained, as this form has been described and figured by that distinguished author in a very recognizable manner; but, on the other hand, I regard it as very questionable, whether it can be adduced to the genus *Podascon* of MM. Giard and Bonnier, or even to the family *Podasconidae* of those authors. We do not know the last larval stage of either of the 2 species of the genus *Podascon* recorded, and of course are not in a position to institute any comparison. Indeed, the only motive for referring the present animal to that genus is based upon the fact that it has been found on an Amphipod, belonging, however, to a rather different genus. But, in my opinion, this coincidence is far from giving full evidence of its true relationship. Thus, as above stated, we find in the marsupial cavity of Mysidæ 2 very different types of Epicaridæ belonging to quite different families, viz. a *Dajid* (*Dajus*) and a *Cryptoniscid* (*Asconiscus*), and moreover, not seldom a Clonostomatid, *Mysidion*, belonging even to quite a

different order. Furthermore, on the very same species of *Spirontocaris* (Hippolyte), *S. securifrons*, and at about the same place, below the anterior part of the tail, may be found sometimes a Bopyrid (*Phryzus*), sometimes a rhizocephalic Cirriped (*Sylon*), and the same species is very often found to be infested by another Bopyrid (*Bopyroides*). A similar case is also shown in our common hermit crab, *Eupagurus bernhardus*. It may be found infested by a *Pseudione* under its carapace, or it may carry on the dorsal face of its tail a very different Bopyrid, *Athelges*, and the place of the latter is not infrequently occupied by a rhizocephalic Cirriped *Peltogaster*, to which again sometimes a *Liriopsis* is found attached. There is nothing that forbids the assumption, that the Amphipoda may also be infested by parasites of very different nature, and indeed Dr. Hansen has shown that they not infrequently contain in their marsupium *Choniostomatidae* belonging to 2 different genera, *Stenothocheres* and *Sphoronella*. As to the Cryptoniscid in question, there is a circumstance, which makes it rather improbable that it should be transformed to a *Podascon*. One of the specimens, the one here figured, was found, on a closer examination, to be provided with very fully developed ovaries in the form of 2 dark-coloured bags extending through the greater part of the mesosome, and containing a restricted number of comparatively large ovarian eggs. In no other instance have I found the ovaries in this stage developed to such a degree, and this seems to indicate that the metamorphosis of the present form might be far less complete than in other Epicarids. Perhaps we even have here an instance of the female retaining its larval characters also in the adult state. In this connexion it is worthy of note that the present form is of considerably larger size than any other larval stage of Epicarida with which I am acquainted.

Occurrence.—The specimen examined by the Rev. Th. Stebbing was found among the ova in the marsupical pouch of an *Onesimus plantus* Kröyer, taken in the Barents Sea. I have myself found it under altogether similar circumstances, and on the very same host at Bodö, and have also occasionally taken it off the Nordland coast free in the sea by the aid of the tow-net. The same form also occurred in some Plankton-proofs taken during Nansen's Polar Expedition in the glacial sea, north of Siberia.

From the above mentioned finding-places, it seems to be a true arctic form.

Cryptoniscid No. 2.

(Pl. C, fig. 3).

Characters.—Body, as seen from above, oblong fusiform in outline, broadest in the middle, and tapering to almost an equal extent both anteriorly and posteriorly. Cephalic segment considerably narrowed in front, with the extremity narrowly rounded; anal segment forming behind a rounded lamellar expansion divided into 7 coarse teeth. Eyes inconspicuous. Basal joint of antennulæ forming behind a very large laminar expansion divided into 9 closely crowded acute teeth; the 2 succeeding joints densely covered in front with small denticles. Antennæ comparatively short, scarcely extending beyond the 2nd pedigerous segment, flagellum much shorter than the peduncle. Coxal plates distinctly pectinate. Legs of normal structure, the posterior pairs rather slender, with the dactylus simple. Uropoda somewhat resembling in structure those in the corresponding stage of the *Dajidæ*, the rami being linear in form and terminating in several denticles, outer ramus, however, considerably shorter than the inner. Length of body 0.90 mm. Found attached beneath the anal segment of *Æga ventrosa* M. Sars.

Remarks.—This form somewhat resembles in its outward appearance some of the *Dajid* larvæ figured by Dr. Hansen in his account of the Isopoda of the German Plankton Expedition, and the structure of the uropoda likewise approaches that found in the larvæ belonging to that family; but the structure of the antennulæ is essentially different, and agrees with that in the *Cryptoniscid* larvæ, and the oral cone lacks all trace of the sucking disc so characteristic of the *Dajid* larvæ. On account of these 2 latter characters and also of the structure of the legs, this form ought certainly to be referred to the family *Cryptoniscidæ*; but at present it is impossible to recognise its relationship to the several genera comprised within that family.

Occurrence.—All the specimens examined by me were taken from the same species of *Æga*, viz., *Æ. ventrosa* M. Sars, and were invariably found firmly attached to the lower face of the anal segment or telson, near the anal opening, sometimes but a single specimen, sometimes 2 such in each *Æga*. The latter were collected by the aid of the dredge from a depth of 60—100 fathoms off the Nordland coast.

APPENDIX.

Page 7. *Apseudes spinosus*.

Distribution.—Kattegat and Skagerak (Meinert).

Page 12. *Tanais tomentosus*.

Distribution.—Azores (Barrois).

Page 27. *Leptognathia longiremis*.

Distribution.—Coast of Scotland (Th. Scott).

Page 28. *Leptognathia breviremis*.

Distribution.—Coast of Scotland (Th. Scott).

Page 29. *Leptognathia brevimana*.

Distribution.—Coast of Scotland (Th. Scott).

Page 32. *Tanaopsis laticaudata*.

Distribution.—Cumbrae (Robertson).

Page 40. *Pseudotanaeis foreipatus*.

Distribution.—Coast of Scotland (Th. Scott).

Page 46. *Calathura brachiata*.

Distribution.—The Barents Sea (Hoek).

Page 67. *Syscenus infelix*.

(Suppl. Pl. I).

Remarks.—Of this form, previously observed by me only in immature specimens, I have recently had the opportunity of examining 2 specimens in a

much more advanced stage, the one from the Norwegian coast, the other taken from a fisher's boat at Skagen (Denmark), and kindly sent to me for examination from the Museum of Copenhagen. The habitus-figure given on the accompanying plate is from the latter specimen, whereas the detail-figures have been made from dissections of the other specimen, which was in rather a bad state of preservation, though it admitted of an exact examination of all the appendages. This specimen was taken off the south coast of Norway (the exact locality not being stated), and measured 24 mm. in length. It was accordingly of about the same size as that described by Dr. Bovallius under the name of *Rocinela Lilljeborgii*, and agreed with it in all respects. The Danish specimen was considerably larger, measuring in length 29 mm., and had the anal segment somewhat broader in proportion to its length, though otherwise it agreed very closely with the Norwegian specimen. In both, the 7th pair of legs were well developed, and of exactly the same structure as the preceding pair, though not quite so long, at least in the Norwegian specimen. In fully grown individuals this pair are, in all probability, the longest of all. I can see no essential differences between the European and American forms, and am still of opinion that they belong to the very same species. The only difference is that the legs, according to the detail-figures given by O. Harger, are somewhat more spiny in the American form than in the Norwegian form; but the number of spines in all probability increases with age, and some of the American specimens are of very considerable size, reaching to no less than 44 mm. in length. The slight difference in the relative length of the anterior and posterior divisions of the body, found on comparing the habitus-figure given by O. Harger with that of the accompanying plate, may arise from the different sex of the 2 specimens, the one here figured being a female, whereas that figured by O. Harger is a male. As to the form of the anal segment, it may also vary to some extent; it was, indeed, in the Norwegian specimen, more like that of the American form than it is in the Danish specimen.

Page 70. *Cirolana borealis*.

Distribution.—The Barents Sea (Hock).

Page 81. *Idothea pelagica*.

Occurrence.—Some well-marked specimens of this form were sent to me for examination by Mr. Schneider, who took them at Vadsö. It has also been collected in the Trondhjem Fjord by Curator Storm, and I found it myself last summer at Christiansund. In all 3 cases it occurred close to the shore among algae.

Page 82. *Idothea granulosa*.

Remarks.—Mr. Walker is of opinion that this species is identical with *I. phosphorea* of Harger, and, indeed, at first sight both are somewhat similar; but the American form is of much larger size, attaining a length of 25 mm.

Occurrence.—This form also has been found by Mr. Schneider in the arctic region of Norway, both at Tromsø and at Vardö.

Distribution.—West coast of Ireland (Walker).

Page 83. *Idothea viridis*.

Distribution.—West coast of Ireland (Walker).

Page 85. *Idothea emarginata*.

Distribution.—Coast of France (Dollfus), Mediterranean (Chevreux).

Page 102. *Ianiropsis breviremis*.

Distribution.—West coast of Ireland (Walker).

Page 107. *Munna Boeckii*.

Distribution.—Coast of Scotland (Th. Scott).

Page 109. *Munna Krøyeri*.

Distribution.—Greenland (Hansen).

Page 112. *Paramunna bilobata*.

Distribution.—Coast of Scotland (Th. Scott).

Page 113. *Pleurogonium rubieundum*.

Distribution.—Coast of Scotland (Th. Scott).

Page 119. *Nannoniscus oblongus*.

* *Remarks*.—Dr. Hansen is of the opinion that the form recorded by the present author as the male of this species, and figured on Pl. 50, is a female belonging to a distinct species. It is, however, stated in the text, that the generative organs exhibited all the characters of testes, and not of ovaries, and it was chiefly on this account that I held it to be the male of *N. oblongus*. Not having any more specimen at my disposal, I am prevented from renewing my investigation upon this point.

Page 122. Add the following species:

Macrostylis longiremis (Meinert).

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

Vana longiremis, Meinert, Crustacea malacostraca (from the cruise of the steamer „Hauch“),
p. 195, Pl. II, figs. 63—73.

Specific Characters.—Very like *M. spinifera*, but, on a closer examination, easily distinguishable by the somewhat different shape of the caudal segment, which is not nearly so much produced at the end, between the insertion of the uropoda. The 3rd pair of legs with the ischial spine less curved, and distinctly bidentate at the tip. The 3 posterior pairs of legs comparatively less slender than in the type species. Uropoda not attaining the length of the caudal segment, and having the distal joint nearly half as long as the proximal one. Length of adult female $2\frac{1}{2}$ mm.

Remarks.—It is Dr. Hansen who has called my attention to the fact that the form described by Prof. Meinert as *Vana longiremis* does not exactly agree with *Macrostylis spinifera*, to which I have formerly adduced it as a synonym. Through the kindness of that distinguished zoologist, I have received several specimens of the Danish form, and a closer examination of these has indeed convinced me that it ought to be regarded as a distinct, though very closely allied species. The differences between the 2 species may be easily seen on a comparison of the figures given on the accompanying plate, with those on Pl. 51.

Occurrence.—This species has certainly not yet been found off the Norwegian coast; but as it occurred rather frequently in one Station (460) lying in the Skagerak at rather a long distance north of Skagen, it may with almost equal right be referred to the Norwegian fauna as to the Danish. In all probability it will, on a closer investigation, be found to exist off the coasts of both countries.

Page 127. Add another species:

Desmosoma angustum, Hansen, MS.

(Suppl. Pl. II, fig. 2, Pl. IV, fig. 2).

Specific Characters.—Body of female very slender and narrow, being more than 6 times as long as it is broad, and somewhat moniliform, with the segments sharply marked off from each other. Cephalon of moderate size, distinctly notched

on each side, and having the frontal edge broadly rounded. The 3 anterior segments of mesosome of nearly same size and shape, with the lateral parts slightly expanded and curved anteriorly, each terminating in a blunt corner; 4th segment considerably narrower, subquadrate in outline, and somewhat constricted in the middle. Posterior section of mesosome exceeding the anterior in length, its 1st segment much longer than any of the other segments, but rather narrow, with the anterior corners rounded off. Caudal segment narrow oblong, without any lateral notch, tip narrowly rounded. Inferior antennae comparatively short, not attaining the length of the anterior division of the body, flagellum somewhat exceeding half the length of the peduncle, and composed of 9 articulations. 1st pair of legs rather strong, meral and carpal joints dilated, and each armed inside with 3 strong spines, propodos narrow, sublinear, unarmed; 2nd pair still larger and of a very similar structure, carpal joint armed inside with 4 strong spines, meral one with only 2 such spines; the 2 succeeding pairs rapidly decreasing in size, and likewise spinous inside. The 3 posterior pairs comparatively feeble and imperfectly natatory, carpal joint but slightly dilated, and carrying inside only 2 or 3 slender spines. Uropoda scarcely attaining half the length of the caudal segment, and of the structure characteristic of the genus.—Adult male somewhat less slender than the female, and having the frontal part of the cephalon considerably more produced, and distinctly insinuated at the tip. The 4 anterior segments of mesosome each with the lateral parts produced to a short incurved spine. Posterior section of mesosome comparatively broader than in the female, its 1st segment nearly quadrate in outline, with the anterior corners tipped by a small denticle. Caudal segment likewise broader than in female, and more evenly rounded at the tip. Length of female about 2 mm., of male 1½ mm.

Remarks.—This is a very distinct species, easily recognizable from any of the other known species of the genus, both by the general form of the body and by the structure of its several appendages. It has been provisionally named by Dr. Hansen as above, and the specimens were kindly sent me for examination and description.

Occurrence.—The specimens were taken during the Danish Expedition in the very same place (Stat. 460) where *Macrostylis longiramis* occurred, the depth being 125 fathoms.

Page 129. Add the 3 following species:

Eugerdia globiceps, Meinert.

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

Eugerdia globiceps, Meinert, Crust. malacostraca, p. 194, Pl. II, figs. 53-62.

Specific Characters.—Body of female resembling that of *E. tenuimana*, but of considerably smaller size, and perhaps also somewhat less slender. Anterior and posterior sections of mesosome of nearly equal length, and defined by a well-marked constriction, the former somewhat broader than the latter; 1st segment well developed, though considerably smaller than the 2 succeeding ones, 4th segment broader, but scarcely longer than the 1st, anterior corners of all 4 segments obtusely produced. 5th segment regularly quadrangular in outline, somewhat broader than it is long, and having the lateral edges straight. Caudal segment rounded oval, without any lateral notches, tip narrowly rounded. Superior antennæ 5-articulate. Inferior antennæ less slender than in *E. tenuimana*, scarcely exceeding $\frac{1}{2}$ of the length of the body, flagellum shorter than the peduncle, and composed of only 6 articulations. 1st pair of legs rather feeble, though not nearly to such a degree as in *E. tenuimana*; the 3 succeeding pairs with a much smaller number of spiniform bristles; the 3 posterior pairs likewise poorly provided with setæ, and scarcely at all adapted for swimming. Uropoda of almost exactly the same structure as in *E. tenuimana*. Length of adult female scarcely exceeding $2\frac{1}{2}$ mm.

Remarks.—This form is certainly very closely allied to *E. tenuimana*, and I was thereby led to consider it as the very same species. Dr. Hansen however, has found on a closer examination, that the Danish form in reality differs in some points rather pronouncedly, and should thus more properly be regarded as specifically distinct; and, in order that I might convince myself thereof, he has kindly placed at my disposal the material upon which Prof. Meinert founded his species. Indeed, the figures here given, which have been made from Danish specimens, leave no doubt that Dr. Hansen is quite right in his supposition, and I am glad to be able to give full evidence of the validity of Prof. Meinert's species. On the other hand, Dr. Hansen is of opinion, that the genus *Eugerdia* proposed by Prof. Meinert is quite unmaintainable, and must be regarded as only a synonym to *Desmosoma* of the present author. Indeed, the 2 new species described below would seem to support such an opinion, since the feeble structure of the 1st pair of legs cannot be regarded as a distinguishing character of that genus; but there still remains a character, viz. the very obvious biramous nature of the

uropoda, by which the 2 genera may be easily distinguished, and for this reason I have thought it right to retain the genus of Prof. Meinert, though I must allow that it is far from being a well defined one.

Occurrence.—This form was taken during the Danish Expedition in 4 different places, 3 of which lie in the Skagerak, NE of the Skagen light-house, the 4th in the Kattegat. It has not yet been found off the Norwegian coast; but I regard it as very probable that, on a closer investigation, it will be found to occur there, at least off the southern part of the country.

Eugerda coarctata (Hansen).

(Suppl. Pl. III, fig. 2, Pl. IV, fig. 3).

Desmosoma coarctatum, Hansen, MS.

Specific Characters.—Body of female not very slender, with the anterior and posterior divisions of the body of about equal length. Cephalon rather large, with the frontal edge evenly rounded. The 3 anterior segments of mesosome of about same size and appearance, having the lateral parts curved anteriorly and terminating in an obtuse point; 4th segment considerably broader in front than behind and transversely truncated at the extremity; 5th segment rather broad, irregularly quadrangular in shape, and very distinctly contracted in the middle, anterior corners obtusely produced. Caudal segment oval in form, and distinctly notched on each side of the obtusely rounded extremity, the notch being defined in front by a tooth-like projection. 1st pair of legs very strongly built, with the joints considerably dilated, meral joint with 2, carpal joint with 3 strong spines inside, propodos oblong oval, finely denticulate inside; the 3 succeeding pairs more slender, and successively decreasing in size, carpal joint with a restricted number of spiniform bristles arranged in a double row, propodal one rather narrow, dactylus comparatively strong. The 3 posterior pairs of legs, as in *E. globiceps*, imperfectly natatory. Uropoda with the outer ramus very small, though well defined.—Male resembling in outward appearance the female, and, like the latter, having the frontal part of the cephalon evenly rounded; posterior section of mesosome scarcely more fully developed than in the female, its 1st segment being even somewhat narrower, with the anterior corners less produced. Length of female 2 mm., of male 1½ mm.

Remarks.—This species is easily distinguishable from the preceding one by the fuller development of the 1st segment of the mesosome, and by the different form of the 4th and 5th segments, as also by the distinct notches occurring at

the end of the caudal segment. Moreover, some well-marked differences are found in the structure of the several appendages, the 1st pair of legs in particular, being very different, exhibiting a similar robust form to that found in *Desmosoma armatum*. The male is less different from the female, than is usually the case in the species of *Eugerda* and *Desmosoma*. In all the specimens examined the inferior antennæ were broken off, and I have thus been prevented from examining the structure of these appendages.

Occurrence.—This form was also taken during the Danish Expedition, and in the very same place, where *Macrostylis longiremis* and *Desmosoma angustum* occurred.

Eugerda lateralis (Hansen).

(Suppl. Pl. IV, fig. 1).

Desmosoma laterale, Hansen MS.

Specific Characters.—Body of female rather slender and elongated, resembling that of *E. tenuimana*, though having the posterior division of mesosome less fully developed. Cephalon of the usual form. 1st segment of mesosome well developed, and, like the 2 succeeding ones, having the lateral parts curved anteriorly and obtusely pointed; 4th segment considerably narrower than the preceding ones, and transversely truncated at the extremity; 5th segment quadrangular in form, nearly twice as broad as it is long, and having the anterior corners obtuse. Caudal segment comparatively large, oval pyriform, with a small tooth-like projection on each side beyond the middle, tip narrowly rounded. Inferior antennæ not much elongated, scarcely exceeding in length the cephalon and 2 anterior segments of mesosome combined, flagellum shorter than the peduncle, and composed of 6 articulations only. 1st pair of legs very strongly built, with the joints considerably dilated, meral joint with one, carpal joint with 2 very strong spines inside, propodus oblong, tapering distally, with a row of very small spinules inside; the 3 succeeding pairs rapidly decreasing in size, carpal joint moderately expanded and carrying inside 4 slender spines, outside 3 bristles. The 3 posterior pairs of legs rather poorly developed, and of a structure similar to that in the 2 preceding species. Uropoda with the outer ramus somewhat larger than in *E. coarctata*, though scarcely attaining half the length of the inner. Length of adult female about 2 mm.

Remarks.—This is another new species, first recognised as such by Dr. Hansen, and referred by him, like the preceding species, to the genus *Desmosoma*.

It is easily distinguished from the 2 preceding species both by the general form of the body, and by the structure of the legs.

Occurrence.—Only 2 or 3 specimens of this form were found during the Danish Expedition, and on the very same place (Stat. 460), where the preceding species occurred.

Page 143. *Pseudarachna hirsuta*.

Distribution.—Moray Firth (Th. Scott).

Page 145. *Eurycope cornuta*.

Distribution.—Greenland (Hansen), the Kara Sea (Stuxberg).

Page 146. *Eurycope phallangium*.

Distribution.—Coast of Scotland (Th. Scott), Skagerak, Stat. 460 (Mus. of Copenhagen).

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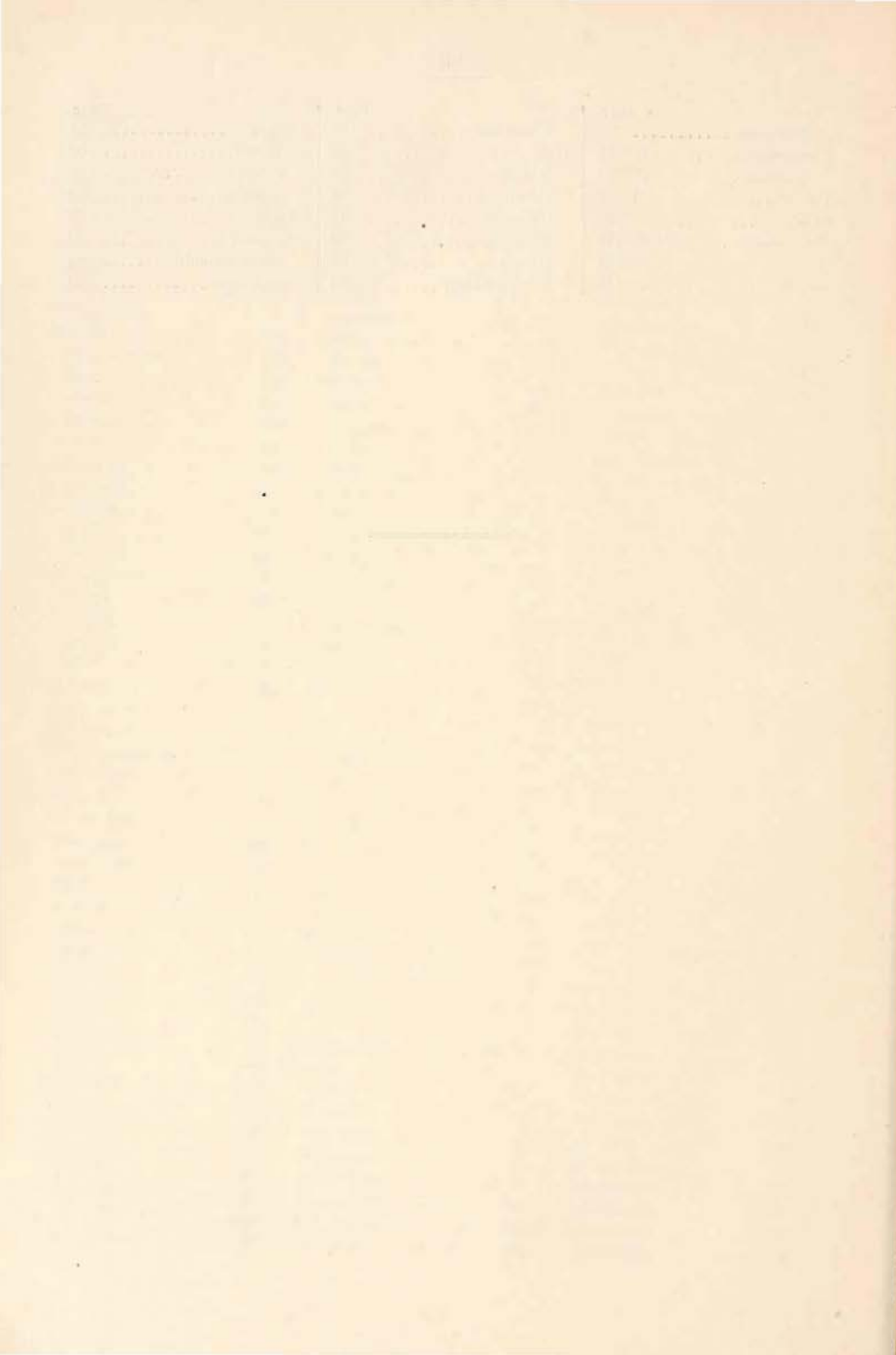
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Remarks.—The figures, as far as possible, have been marked in accordance with those belonging to the 1st Volume (Amphipoda).

The following are the chief markings, with their significations:

♀ female, ♂ male, *larv.* larva, *embr.* embryo, *C.* Cephalon, *sgm.* 1—7 1st to 7th segment of mesosome, *Mts.* (Urs.) tail, *T.* anal segment (telson), *r.* rostrum, *cx.pl.* (cp.) coxal plate, *a¹.* superior antenna, *a².* inferior antenna, *or.* *ar.* oral area, *L.* anterior lip, *l.* posterior lip, *M.* mandible. *Mp.* mandibular palp, *m¹.* anterior maxilla, *m².* posterior maxilla, *mp.* maxilliped, *p¹—p⁷* legs of 1st to 7th pairs, *pen.* outer sexual appendage of male, *plp.* pleopod, *oprc.* operculum in Asellota, *urp.* uropod.

Of plates 84—100, illustrating the *Epicarida*, a detailed explanation is given below, because these plates contain several figures not corresponding to those on the other plates.

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- Pl. 63.
Pseudarachna hirsuta, G. O. Sars.
- Pl. 64.
Eurycope cornuta, G. O. Sars.
- Pl. 65.
Eurycope producta, G. O. Sars.
- Pl. 66.
Eurycope phallangium, G. O. Sars.
- Pl. 67.
 1. *Eurycope latirostris*, G. O. Sars.
 2. — *furcata*, G. O. Sars.
- Pl. 68.
 1. *Eurycope mutica*, G. O. Sars.
 2. — *pygmæa*, G. O. Sars.
- Pl. 69.
Eurycope megalura, G. O. Sars.
- Pl. 70.
Ligia oceanica (Lin.).
- Pl. 71.
Ligidium hypnorum (Cuv.).
- Pl. 72.
 1. *Trichonisus pusillus*, Brandt.
 2. — *pygmæus*, G. O. Sars.
- Pl. 73.
 1. *Trichonisus roseus* (Koch).
 2. *Trichoniscoides albidus* (B.-Lund).
- Pl. 74.
 1. *Haplophthalmus Mengii* (Zaddach).
 2. — *danicus*, B.-Lund.
- Pl. 75.
Oniscus asellus, Lin.
- Pl. 76.
 1. *Philoscia muscorum* (Scopoli).
 2. *Platyarthrus Hoffmannseggi*, Brandt.
- Pl. 77.
 1. *Porcellio scaber*, Latr.
 2. — var. *marmorata*.
- Pl. 78.
 1. *Porcellio pictus*, Brandt.
 2. — *dilatatus*, Brandt.
- Pl. 79.
 1. *Porcellio Rathkei*, Brandt.
 2. — *lævis*, Latr.
- Pl. 80.
 1. *Porcellio Ratzeburgi*, Brandt.
 2. *Metoponorthus pruinosis* (Brandt).
- Pl. 81.
Cylisticus convexus (de Geer).
- Pl. 82.
Armadillidium vulgare (Latr.).
- Pl. 83.
 1. *Armadillidium opacum* (Koch).
 2. — *pictum*, Brandt.
 3. — *pulehellum*, Brandt.

Pl. 84.

1. *Bopyrus squillarum* (Latr.)
 ♀. Adult, dextrorsal female, dorsal view.
 ♀¹. Same, ventral view.
 ♂. Male (copied from Sp. Bate and Westwood's work), dorsal view.
 C. Anterior part of cephalon, viewed from below (left maxilliped removed).
 mp. Left maxilliped.
 mp*. Terminal part of same.
 p. Leg.
 l¹. 1st incubatory plate.

2. *Bopyroides hippolytes* (Kröyer).

- ×. Anterior part of a specimen of *Spirontocaris polaris* infested with this parasite; dorsal view.
 ♀. Adult, sinistrorsal female, dorsal view.
 ♀¹. Same, with attached male; ventral view.
 ♂. Male, dorsal view.
 C. Anterior part of cephalon of female, ventral view.
 mp. Left maxilliped.
 mp*. Terminal part of same.
 l¹. 1st incubatory plate.
 p. Leg.
 C♂. Cephalon and 1st pedigerous segment of male, with the corresponding appendages; ventral view.

Pl. 85.

1. *Pseudione affinis*, G. O. Sars.
 ♀. Adult, sinistrorsal female, dorsal view.
 ♀¹. Same, with attached male; ventral view.
 ♂. Male, dorsal view.
 C♀. Part of cephalon of female, from below.
 mp. Left maxilliped.
 mp*. Terminal part of same.
 l¹. 1st incubatory plate.
 p♀. Leg.
 C♂. Cephalon and 1st pedigerous segment of male, viewed from below (1st pair of legs omitted).
 p♂. Leg. of male.
2. *Pseudione Hyndmanni* (Bate & Westw.)
 ♀. Adult, dextrorsal female, dorsal view.
 ♀¹. Same, with attached male; ventral view.
 mp. Left maxilliped.
 mp*. Terminal part of same.
 l¹. 1st incubatory plate.
 ♂. Male, dorsal view.
 C♂. Cephalon of same, from below.
 Urs. ♂. Outer part of tail of same; dorsal view.

Pl. 86.

1. *Pseudione crenulata*, G. O. Sars.
 ♀. Adult, sinistrorsal female, dorsal view.
 ♀¹. Same, with attached male; ventral view.
 C♀. Same, anterior part of cephalon, ventral view (1st incubatory plate on left side removed).
 mp. Maxilliped.
 l¹. 1st incubatory plate.
 p. Leg.
 ♂. Male, dorsal view.
 C♂. Cephalon of same, from below.
2. *Pleurocrypta longibranchiata* (Bate & Westw.)
 ♀. Adult, sinistrorsal female, dorsal view.
 ♀¹. Same, with attached male, ventral view.
 C. Part of cephalon, from below.
 mp. Maxilliped.
 mp*. Terminal part of same.
 l¹. 1st incubatory plate.
 p. Leg.
 plp. Pleopod.
 ♂. Male, dorsal view.

Pl. 87.

1. *Pleurocrypta marginata*, G. O. Sars.
 ♀. Adult, dextrorsal female; dorsal view.
 ♀¹. Same, with attached male; ventral view.
 ♀juv. Young female, with the incubatory plates in process of formation; dorsal and ventral views.
 C♀juv. Same, cephalon and 1st segment of mesosome, from below.
 Urs. Extremity of tail of same specimen.
 ♂. Male, dorsal view.
2. *Pleurocrypta microbranchiata*, G. O. Sars.
 ×. A specimen of *Golathca intermedia* infested by this parasite; dorsal view (legs of the host omitted).
 ♀. Adult, dextrorsal female, dorsale view.
 ♀¹. Same, with attached male; ventral view.
 p⁷. Leg of 7th pair.
 Urs. Extremity of tail, dorsal view.
 ♂. Male, dorsal view.

Pl. 88.

Athelges paguri (Rathke).

- ♀ad. Adult female, with attached male; ventral view.
 ♀ad*. Same, dorsal view.
 ♂. Male, dorsal view.
 ♂(c). Same, cephalon and 1st pedigerous segment, from below (left leg of 1st pair omitted).

- ♀juv. Young female, with not yet fully developed incubatory plates; dorsal view.
- ♀juv*. Same, ventral view.
- C.♀juv. Same, anterior part of body, dorsal view.
- ♀mp. Maxilliped of adult female.
- ♀p. Leg of same.
- ♀plp. Pleopod.
- ♀t. Terminal piece of tail, ventral and lateral views.
- ♀pull. Very young female, immediately after the transformation; dorsal view.
- ♀pull*. Same, ventral view.
- C.♀pull. Same, cephalon and adjacent parts, from below.

Pl. 89.

1. *Athelges tenuicaudis*, G. O. Sars.

- ×. A specimen of *Spiropagurus chiroacanthus* infested with this parasite; dorsal view.
- ♀ad. Adult female, ventral view.
- ♀ad*. Same, viewed from right side.
- ♀juv. Young female, with attached larval male; dorsal view.
- ♀juv*. Same, ventral view.
- Urs. Extremity of tail of adult female; dorsal view.
- Urs.juv. Same part of a young specimen.
- Plp. Pleopod.
- ♂ad. Adult male, dorsal view.
- ♂juv. Young male in last larval stage; dorsal view.

Pl. 90.

2. *Athelges bilobus*, G. O. Sars.

- ♀juv. Immature female, with attached male; dorsal and ventral views.
- ♂. Male, ventral view.

Pl. 90.

Phryxus abdominalis (Kröyer).

- ×. A specimen of *Spirotaecaris securifrons* infested with this parasite, viewed from left side (legs of the host omitted).
- ♀. Adult, dextrorsal female; ventral view.
- ♀*. Same, with attached male; dorsal view.
- ♀². Right part of body of another, sinistrorsal specimen; dorsal view.
- ♀²*. Same part from below, showing the 5 densely crowded incubatory plate on right side, as also the oral area, and the inner lamellæ of the pleopoda.
- t. Terminal piece of tail.
- mp. Maxillipeds.
- p¹. Leg of 1st pair with pertaining incubatory plate.

- p⁴. Leg of 4th pair.
- p⁴⁻⁷?. Small rudiments of the 3 posterior legs found on right side within the angle between trunk and tail (see fig. ♀²*).
- ♂. Adult male, dorsal view.
- C♂. Cephalon of same, ventral view.
- p♂. Leg of same.

Pl. 91.

Phryxus abdominalis (contin.)

- ♀juv¹. Young, dextrorsal female, with the incubatory plates not fully developed, and having still the full number of legs on both sides; ventral and dorsal views.
- ♀juv². Immature female, with attached larval male, and exhibiting incipient dextrorsal torsion; ventral, dorsal and lateral views.
- C♀juv². Same, front part of cephalon from below.
- ♀juv³. Very young, vermiform female, with attached larval male; lateral, dorsal and ventral views.
- ♂larv. Young male in last larval stage; dorsal view.
- C♂larv. Same, cephalon and 1st pedigerous segment from below (left antennal flagellum and right 1st leg omitted).
- Urs.♂larv. Same, extremity of tail, dorsal view.
- Embr. Embryo in last stage, dorsal, ventral and lateral views.

Pl. 92.

Microniscus-stages.

1. A specimen of *Pseudocalanus elongatus* infested with 2 *Microniscus* of different development; dorsal view.
- 1a. Youngest stage observed, dorsal view.
- 1a*. Same, ventral view.
- 1a.urp. Same, uropod.
- 1b. Subsequent stage, exhibiting the first trace of the 7th pair of legs; ventral view.
- 1c. More advanced stage, dorsal and ventral views.
- 1c.p⁶. Same, leg of 6th pair.
- 1c.p⁷. Same, leg of 7th pair, in process of formation.
- 1d. Last *Microniscus*-stage, dorsal and ventral views.
- 1d.p. Same, leg of 7th pair.
- 1d.urp. Same, uropod.
2. A specimen of *Metridia longa* infested by another form of *Microniscus*; viewed from right side.
- 2a. The *Microniscus* isolated, and viewed from above.
- 2b. Another specimen just about to cast off its skin; dorsal view.

- 2b. p⁷. Same, leg of 7th pair, exhibiting in its interior the corresponding Cryptoniscid leg.
- 2b. mrs. Same, extremity of tail, showing the Cryptoniscid uropoda in process of formation within the Microniscid uropoda.
- 2c. Cryptoniscid larva in last stage, supposed to have developed from the Microniscus 2a, b; dorsal view.
- 2c. C. Same, cephalon and 1st pedigerous segment from below (right inferior antenna and left 1st leg omitted).
- 2c. p⁷. Same, leg of 7th pair.
- 2c. Urs. Same, extremity of tail, dorsal view.

Pl. 93.

Dajus mysidis Kröyer.

- Mysis. Anterior part of a specimen of *Mysis mixta* infested with this parasite, viewed from left side (antennae, eyes and legs of the host omitted).
- ♀ad. Adult, ovigerous female, with attached male; ventral view.
- ♀ad*. Same, dorsal view.
- Or. ar. Oral area, with the sternal plate; ventral view (right maxilliped removed).
- Lat. ar. Right part of the postoral area, with the corresponding 5 legs and incubatory plates; ventral view.
- mp. Maxilliped.
- p. Leg.
- ♀urp. Extremity of tail, with the uropoda. Adult male, dorsal view.
- ♂*. Same, viewed from left side.
- ♂C. Same, cephalon and 1st pedigerous segment, from below (right 1st leg omitted).
- ♂urp. Same, extremity of tail, with the rudimentary uropoda; dorsal view.
- ♀juv. Young female, with the incubatory cavities not yet developed; dorsal and ventral views.
- ♀juv*. Same, viewed from left side.
- ♀juv*. Same, more highly magnified, from below (extremity of tail not drawn).

Pl. 94.

Dajus mysidis (continued).

- ♀juv¹. Immature female, dorsal and ventral views.
- ♀juv¹. C. Same, anterior part of body from below.
- ♀juv². Very young female, immediately after the transformation; dorsal and ventral views.
- ♀juv²*. Same, viewed from left side.
- ♀juv². Urs. Same, extremity of tail.
- ♂larv. Young male in last larval stage, dorsal and lateral views.

- ♂larv. C. Same, cephalon and 1st pedigerous segment, from below (right inferior antennae and right 1st leg omitted).
- p⁷. Same, leg of the pair.
- Urs. Same, extremity of tail, dorsal view.
- Embr. Embryo in an advanced stage, ventral and lateral views.
- Larv. 1st free larval stage, taken during Nansen's Polar Expedition, and supposed to belong to this species; ventral and dorsal views.

Pl. 95.

Notophryxus ovoides, G. O. Sars.

- ×. Posterior part of body of a specimen of *Amblyops abbreviata* infested with this parasite, viewed from left side.
- ♀ad. Adult, ovigerous female, dorsal and ventral views.
- ♀juv. Younger female, viewed from left side.
- ♀juv. Same, ventral view.
- Ventr. ar. Anterior part of ventral face of an adult female, exhibiting on right side the corresponding maxilliped, incubatory plate, legs and coxal plates. On left side all these parts are removed, in order to show the underlying large sternal plate.
- Or. ar. Oral cone, with the projecting ends of the mandibles.
- mp. Maxilliped.
- l. Left incubatory plate, from the upper face.
- ♂p. Leg.
- ♂*. Adult male, dorsal view.
- ♂*. Same, viewed from left side.
- ♂C. Same, cephalon and 1st pedigerous segment from below (right inferior antenna and left 1st leg omitted).
- ♂p*. Same, leg of 2nd pair.
- Larv. 1st larval stage found in one of the incubatory cavities of a female which had discharged the greater part of its brood; dorsal and ventral views.

Pl. 96.

Aspidophryxus peltatus, G. O. Sars.

- ×. Anterior part of a specimen of *Erythrops Gøssii* infested with this parasite, viewed from left side (legs of the host omitted).
- ♂ad. Adult, ovigerous female, dorsal view.
- ♂ad*. Same, with attached male; ventral view.
- Ventr. ar. Median part of ventral face of an adult female, exhibiting anteriorly the large frontal shield, succeeded by the rounded postoral

area, on the sides of which project the single pair of incubatory plates, and behind the latter the long occluding folds of the incubatory cavities.

- ♀Ventr. ar. Anterior part of ventral face, more highly magnified. On left side the legs and coxal plates are removed, in order to show more distinctly the underlying left incubatory plate.
- mp. Maxilliped.
- Strn. Sternal plate.
- ♀p⁵. Leg of 5th pair.
- ♀juv. Very young female, with attached larval male; dorsal and ventral views.
- ♂ad. Adult male, dorsal view.
- ♂ad*. Same, viewed from left side.
- ♂C. Same, cephalon and 1st pedigerous segment from below.
- ♂Urs. Same, extremity of tail, with the rudimentary urópoda.
- ♂larv. Young male in last larval stage; dorsal view.
- ♂larv.C. Same, cephalon and 1st pedigerous segment from below (right inferior antenna and left 1st leg omitted).
- ♂larv.p⁶. Same, leg of 6th pair.
- ♂larv.p⁷. Same, leg of 7th pair.
- ♂larv.Urs. Same, extremity of tail, dorsal view.

Pl. 97.

Cydroneisus eydrinæ, G. O. Sars.

- Central fig. A female specimen of *Cypridina norvegica* infested with this parasite, viewed from right side, the right valve being removed. Besides the fully grown female, occupying the incubatory cavity of the host, another very young female is seen attached laterally to the skin of the *Cypridina*.
- ♀ad. Adult; ovigerous female, dorsal and ventral views, magnified to the same scale as the preceding figure.
- tub. an. Same, anal tubercles, highly magnified.
- ♀1. Femal larva, immediately after it has attached itself to the host; dorsal view.
- ♀2. Another recently attached female larva, which is about to shed its skin. Within the latter the characteristic fusiform body of the next stage is distinctly traced.
- ♀3. Young female in the 1st postlarval stage, ventral view.
- ♀3*. Another female in same stage, viewed from right side. In both specimens the neck is still covered by some of the anterior empty larval segments, with their appendages in a more or less complete

state, whereas the head with its root-like filaments is deeply buried into the skin of the host.

- ♀juv. Anterior extremity of body in about this stage, viewed from below (only the bases of the root-like filaments drawn).
- ♀1. Somewhat more advanced stage, dorsal view.
- ♀2. Immature female, after the neck has been converted to the affixing string; viewed from right side.
- ♀3. A somewhat more advanced female with attached male, viewed from right side.

Pl. 98.

1. *Cyproneisus cypridinæ* (contin.)

- ♂. Adult male, dorsal view.
- ♂. Same, anterior part of body from below (left inferior antenna and the 2 anterior legs on same side not drawn).
- cox. A coxal plate.
- p³. Leg of 3rd pair.
- p⁷. Leg of 7th pair.
- plp. Pleopod.
- Urs. Extremity of tail, dorsal view.

2. *Cryptothir balani* (Sp. Bate).

- ♀. Female (not fully grown), dorsal view.
- ♂. Anterior larval part of body, ventral view.

3. *Asconisus simplex*, G. O. Sars.

- ♀ad. Adult female with attached larval skin, viewed from left side.
- ♀juv. Young female, likewise with attached larval skin, viewed from right side.
- ♂. Adult male, dorsal view.
- ♂C. Same, cephalon and 1st pedigerous segment from below (left inferior antennae and right 1st leg not drawn).
- ♂p³. Same, leg of 3rd pair.
- ♂p⁷. Same, leg of 7th pair.
- ♂Urs. Same, extremity of tail dorsal view.

Pl. 99.

1. *Clypeoneisus Hanseni*, Giard & Bonn.

- ♀. Adult female, dorsal and ventral views.
- an. t. Caudal process (anal tubercle) of same, highly magnified.
- ♂. Male, dorsal view.
- ♂C. Same, anterior part of body from below (left inferior antenna and right 1st and 2nd legs not drawn).

- ♂p³. Same, leg of 3rd pair.
 ♂p⁷. Same, leg of 7th pair.
 ♂Urp. Same, uropod.
2. *Munnoniscus marsupialis*, G. O. Sars.
 ♀ad. Adult, ovigerous female, dorsal view.
 ♀juv. Young female, dorsal and ventral views.
 emb. Embryo in an advanced stage of development, viewed from right side.

3. *Liriopsis pygmæa* (Rathke).

- ♀*. A specimen of *Peltogaster paguri* infested with this parasite; dorsal and ventral views.
 ♀. The female *Liriopsis* isolated, ventral and dorsal views.

Pl. 100.

1. *Liriopsis pygmæa* (contin).

- ♂. Adult male, taken from the body cavity of a *Peltogaster paguri*: dorsal view.
 C. Same, cephalon and 1st pedigerous segment from below (right inferior antenna and 1st pair of legs not drawn).
 p¹. Same, leg of 1st pair.
 p³. Same, leg of 3rd pair.
 p⁵. Same, leg of 5th pair.
 p⁶. Same, leg of 6th pair.
 p⁷. Same, leg of 7th pair.
 plp. Same, pleopod.
 Urs. Same, extremity of tail, dorsal view.

2. Cryptoniscid No. 1.

- ♀. Larval female, with fully developed ovaries, dorsal view.

- C. Cephalon and 1st pedigerous segment of same from below (inferior antenna and 1st leg on right side not drawn).
 a¹. Right antennula, from below.
 p². Leg of 2nd pair.
 p³. Leg of 3rd pair.
 p⁶. Leg of 6th pair.
 p^{6*}. Extremity of dactylus of same.
 p⁷. Leg of 7th pair.
 Urs. Extremity of tail, dorsal view.

3. Cryptoniscid No 2.

- ♂. Larva in last stage, dorsal view.
 C. Anterior part of body from below (right inferior antenna and left 2nd leg not drawn).
 p⁵. Leg of 5th pair.
 p⁷. Leg of 7th pair.
 Urs. Extremity of tail, dorsal view.

Suppl. Pl. I.

Sysecenus infelix Harger. Adult female.

Suppl. Pl. II.

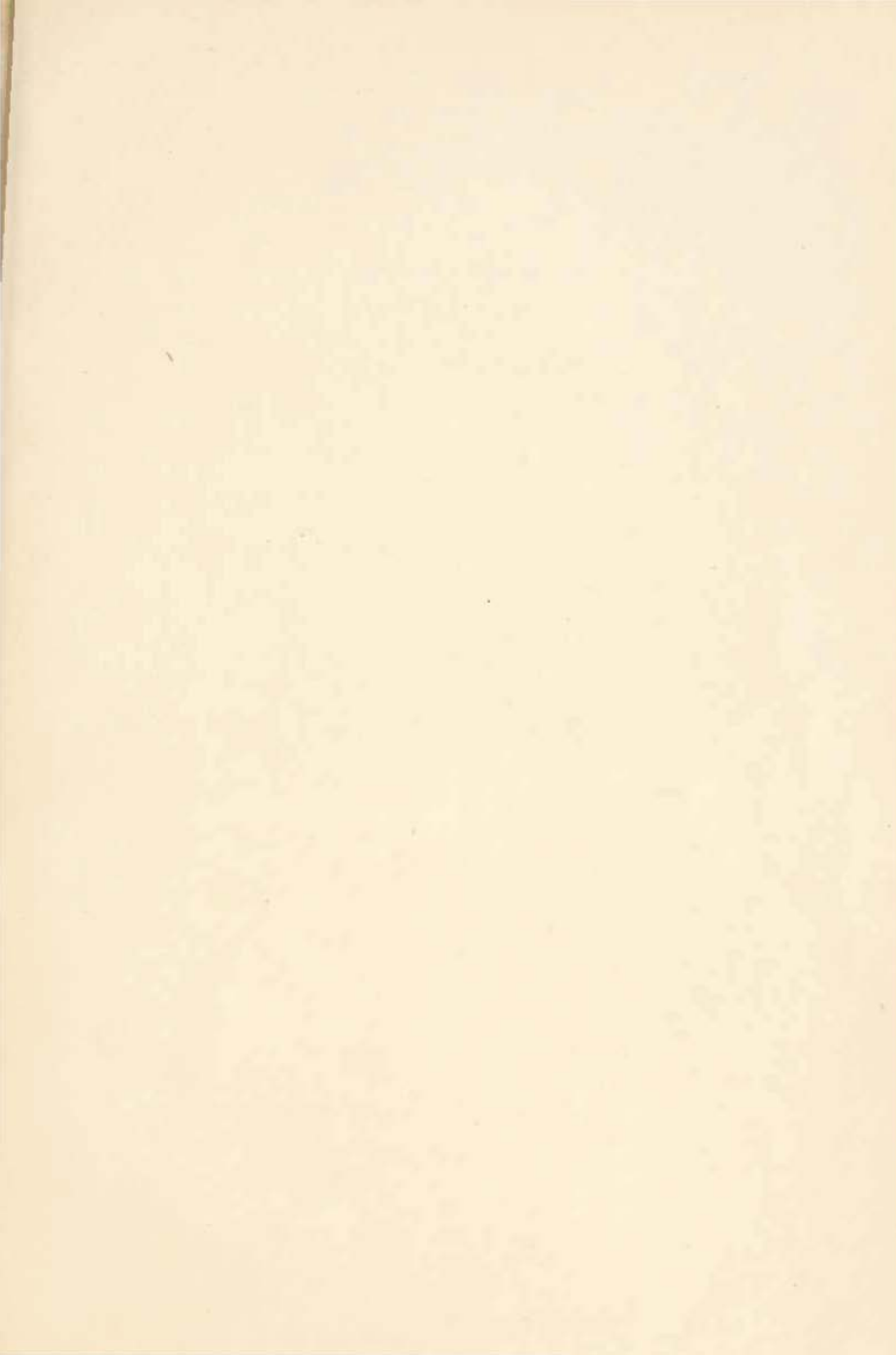
1. *Macrostylis longiremisa*, Meinert.
2. *Desmosoma angustum*, Hansen.

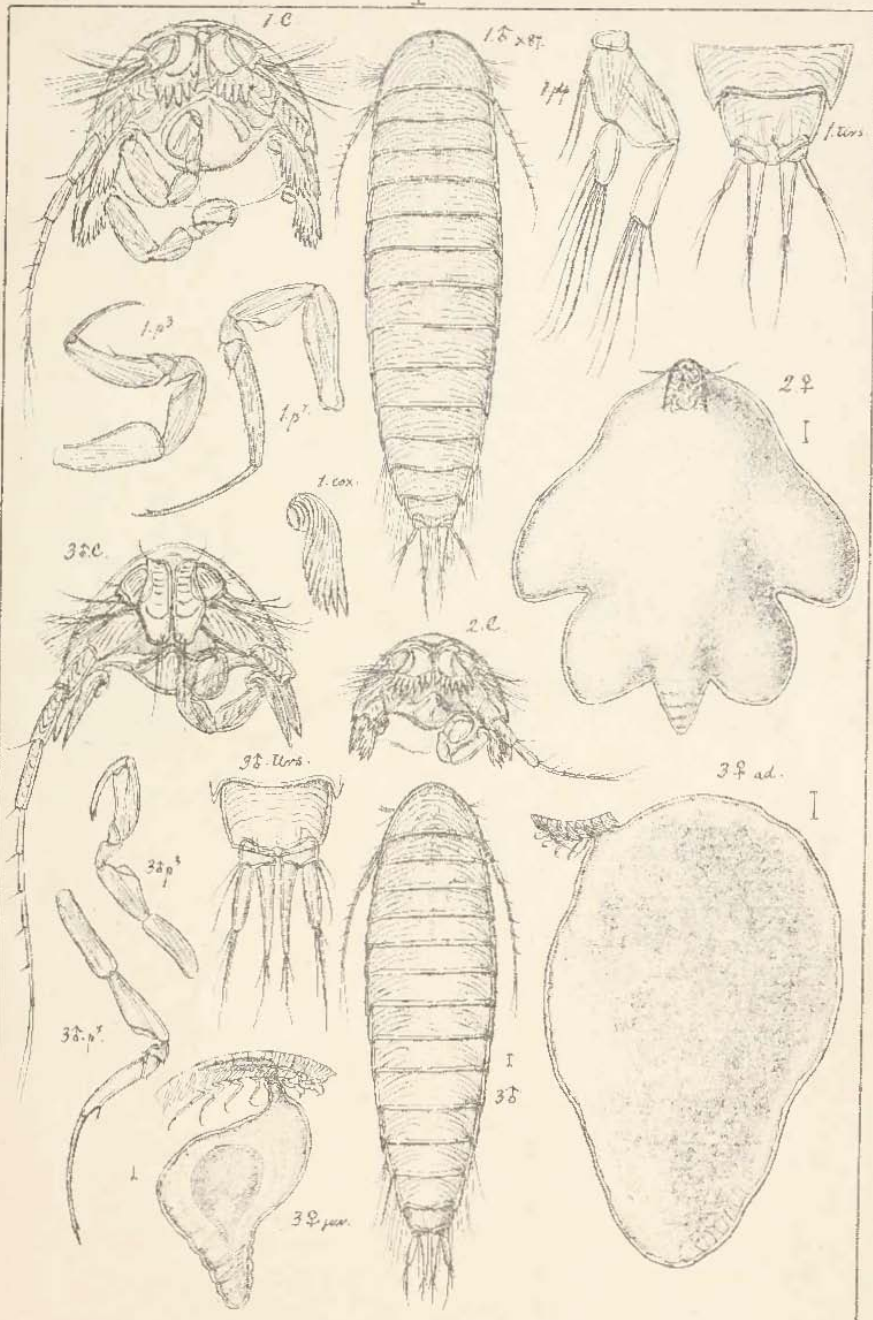
Suppl. Pl. III.

1. *Eugerdia globiceps*, Meinert.
2. — *coarctata* (Hansen).

Suppl. Pl. IV.

1. *Eugerdia lateralis* (Hansen).
2. *Desmosoma angustum*, Hansen ♂.
3. *Eugerdia coarctata* (Hansen) ♂.

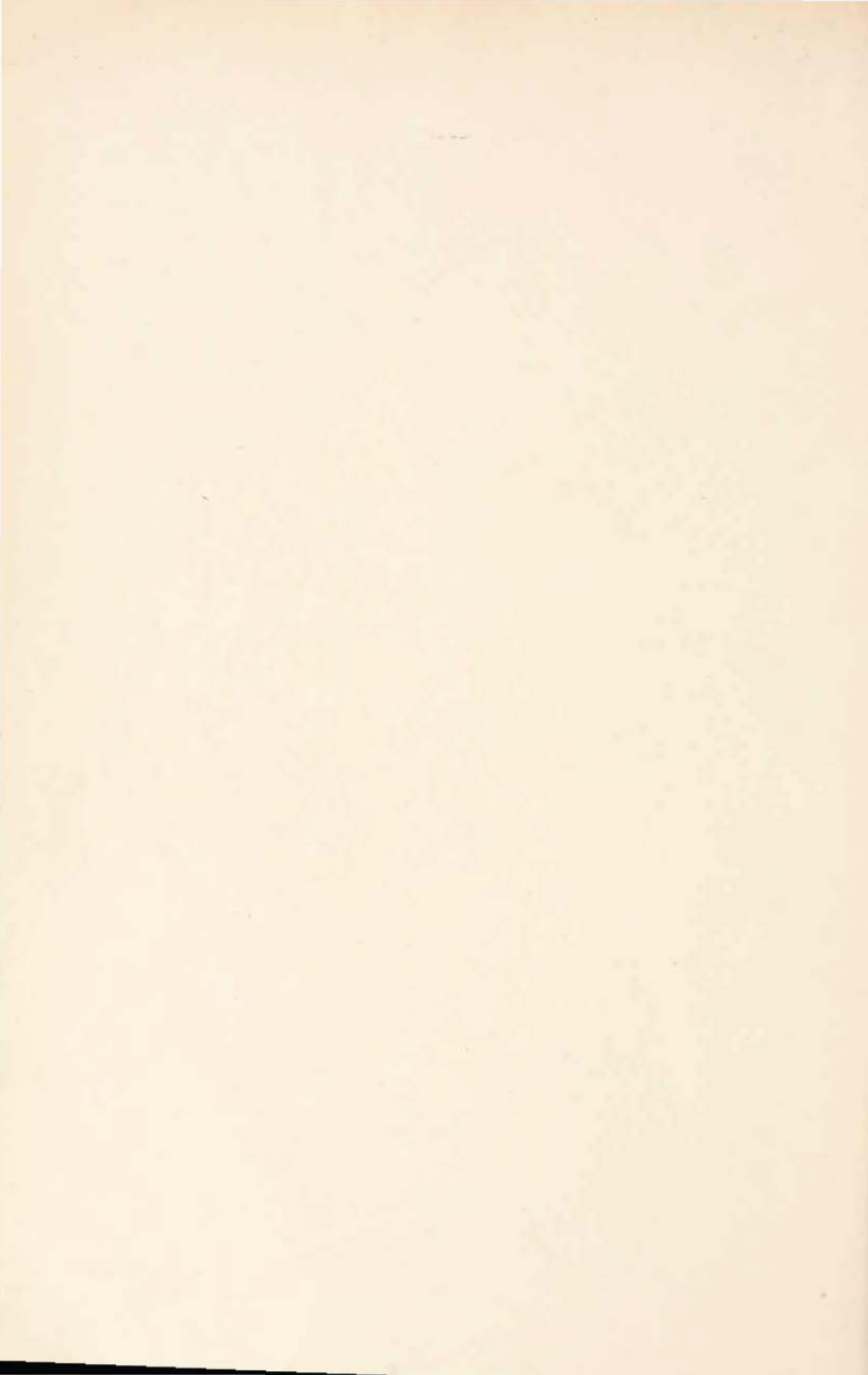




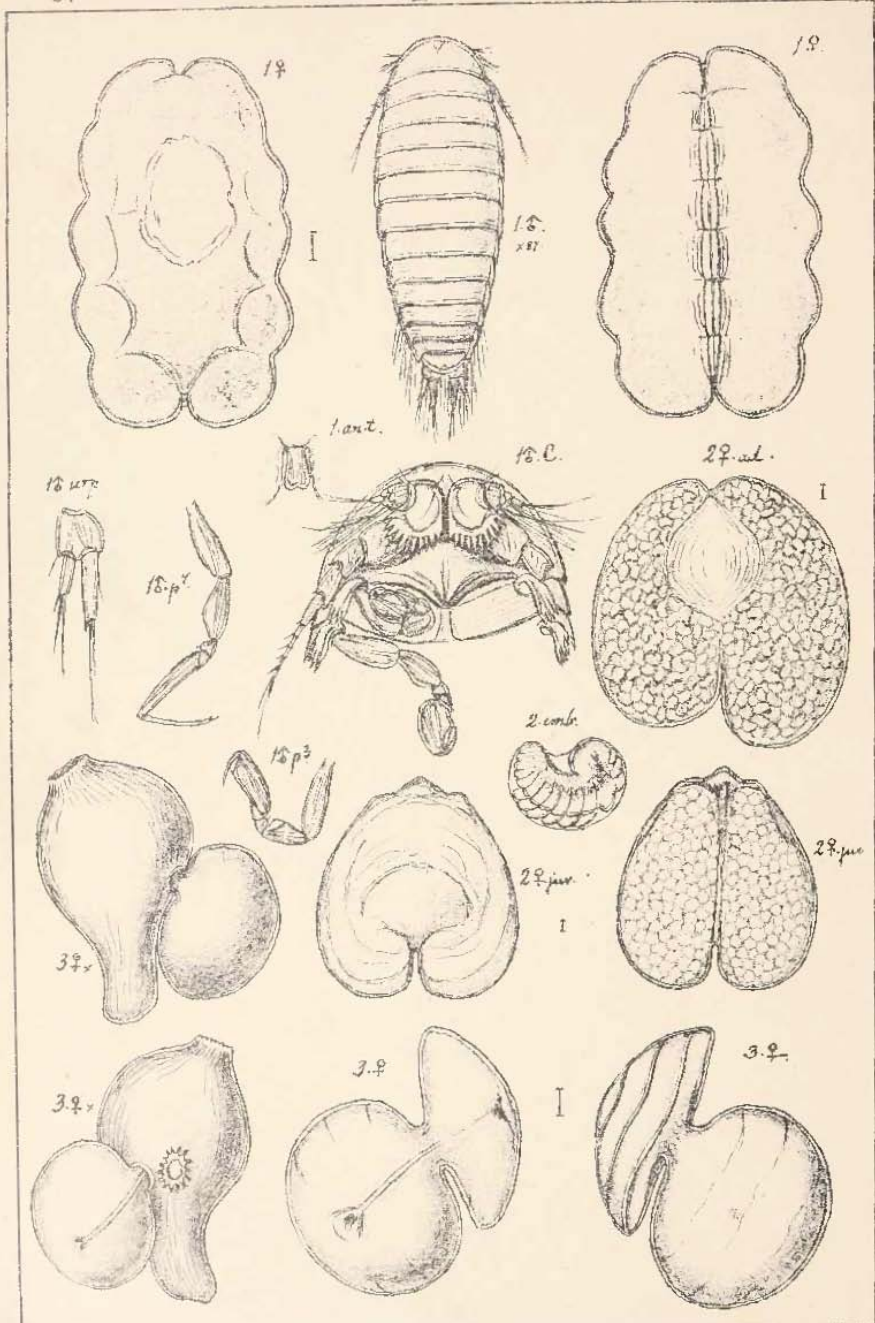
G. O. Sars, autogr.

1. *Cyproniscus cypridinæ*, G. O. Sars, ♂.

2. *Cyptoniscus balani*, (Sp. Bate).



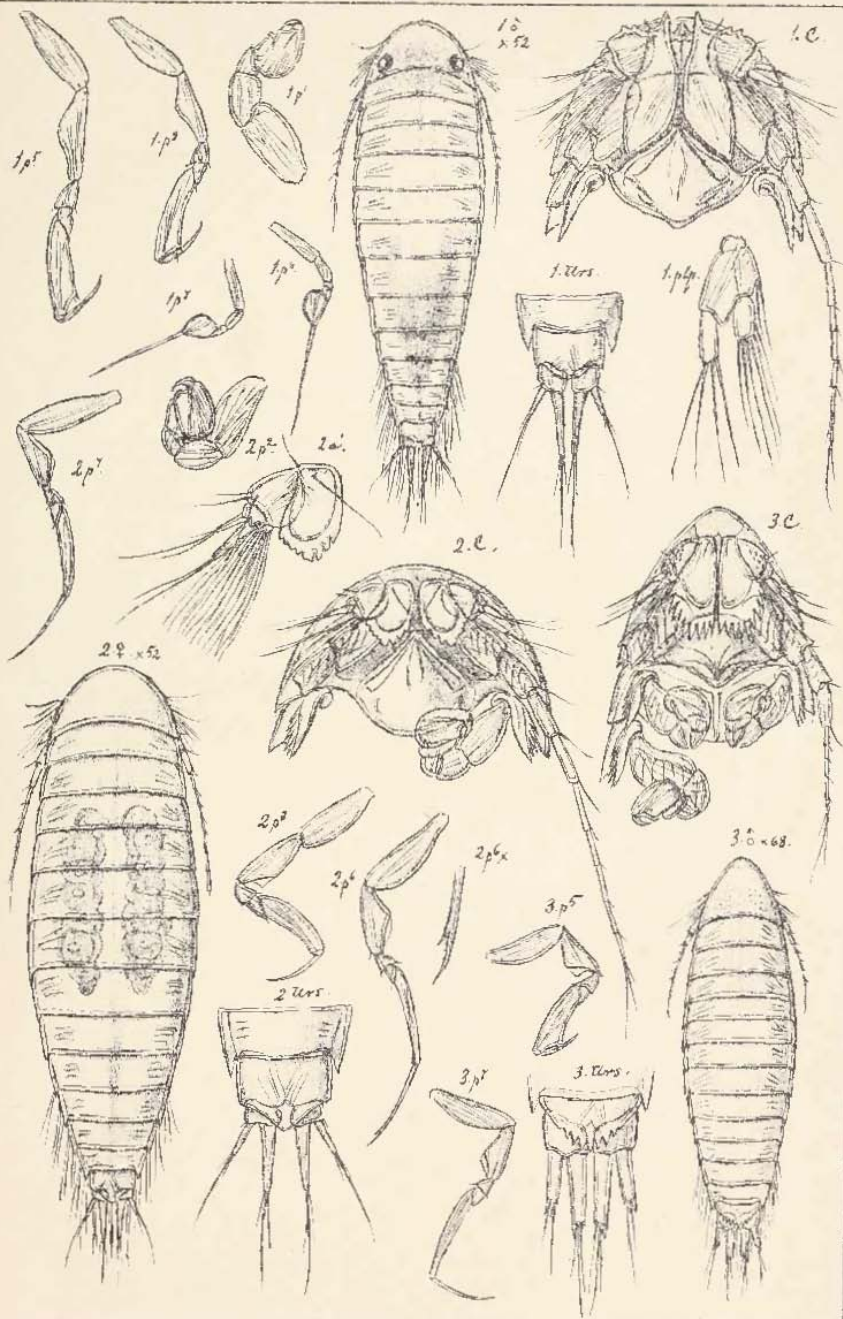




G.O. Sars, autogr.

1. Clypeoniscus Hanseni, Giard & Bonnier.

2. Munnoniscus marsupialis, G.O. Sars.

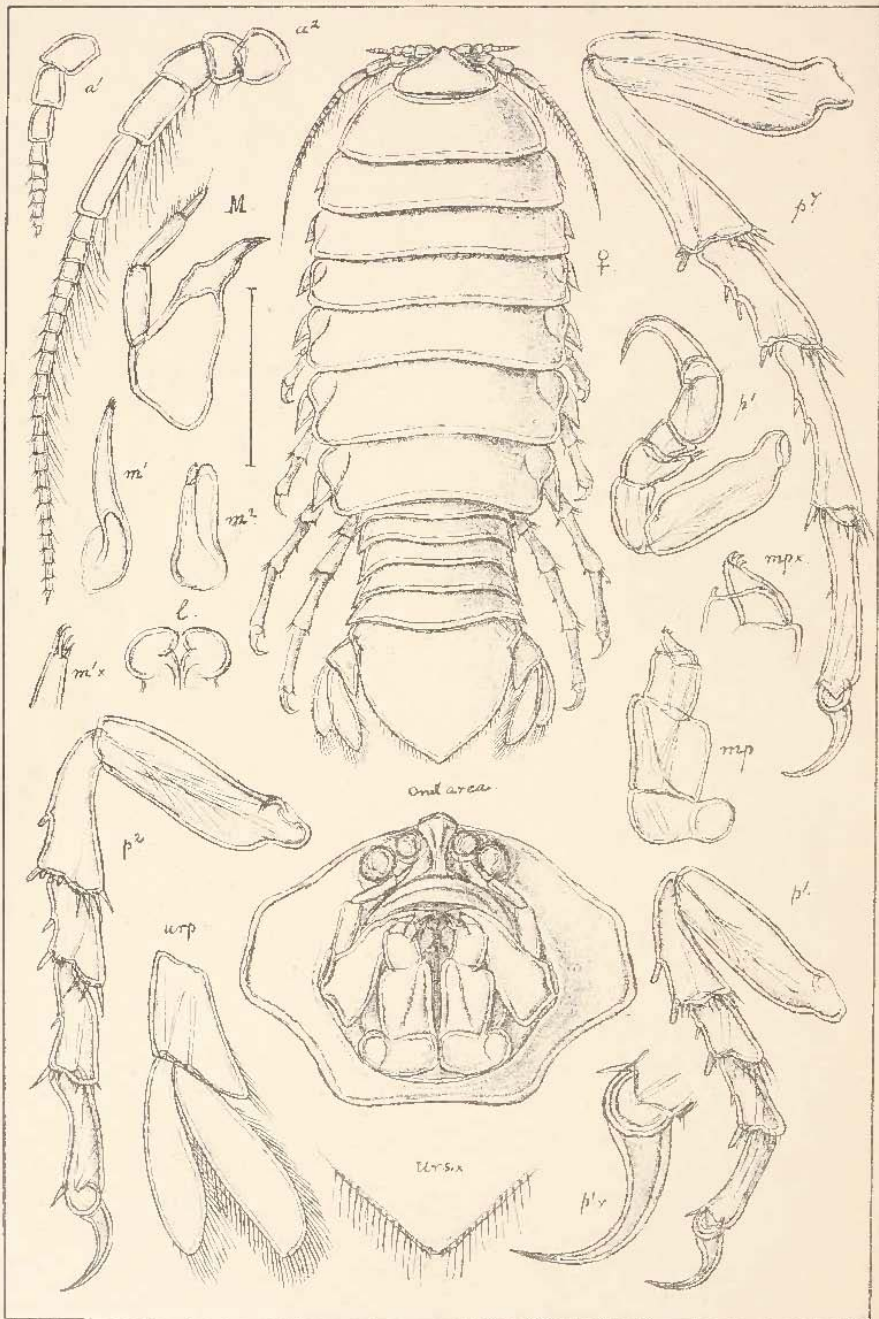


G O Sars, autogr.

1. *Liriopsis pygmæa*, (Rathke) ♂.

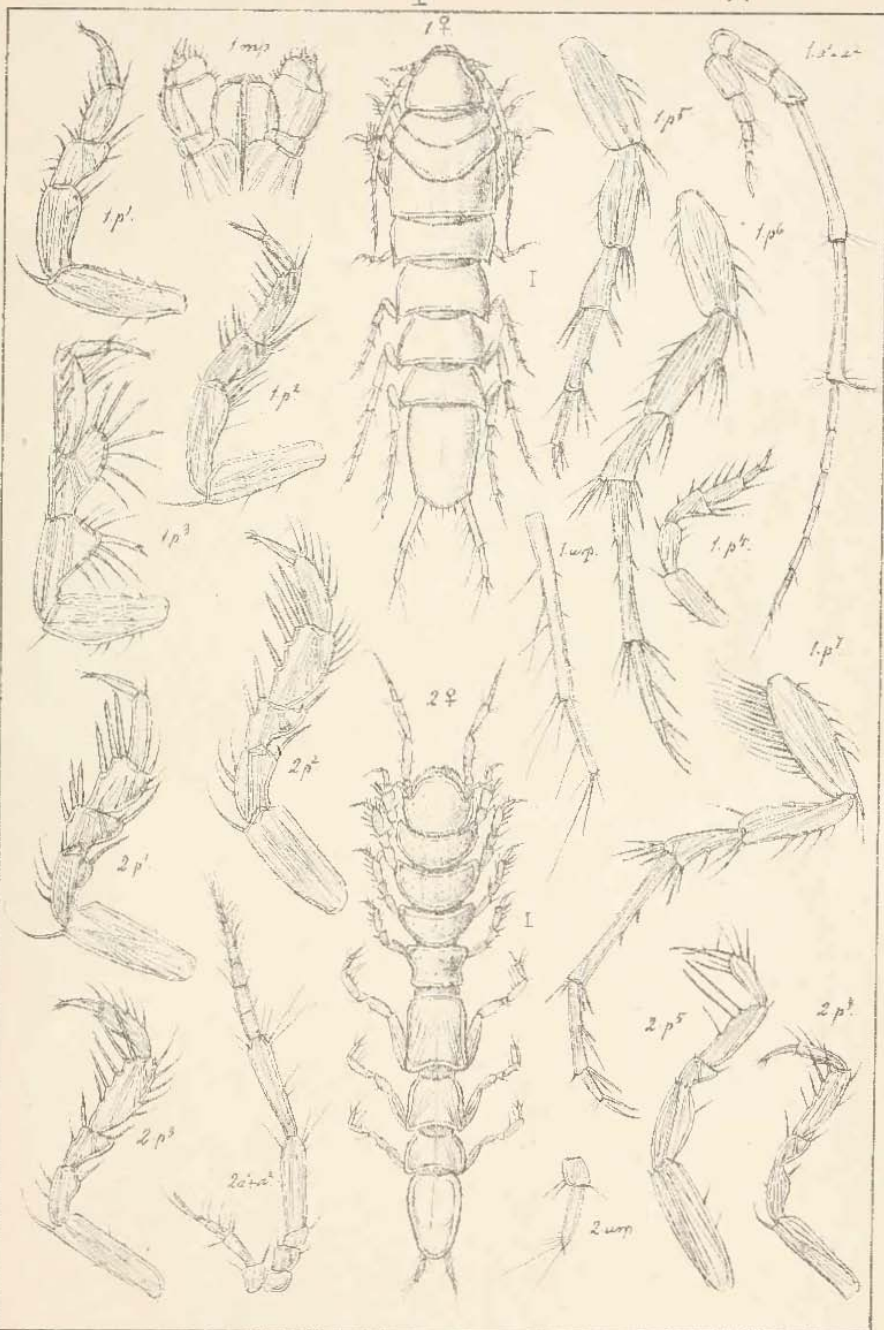
2. *Cryptoniscoid* 1.

3. *Cryptoniscoid* 2.



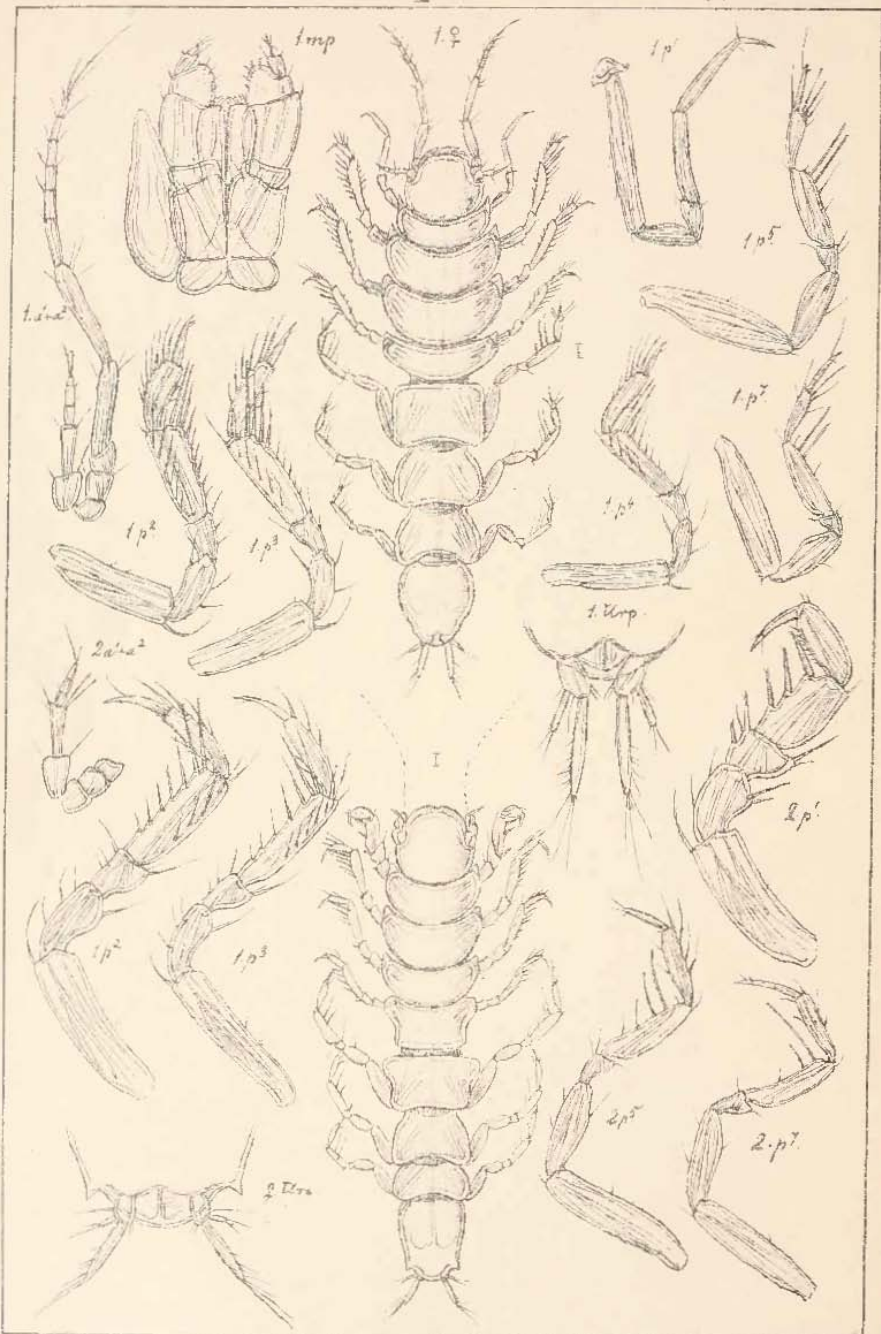
G.O Sars, autogr.

Sycenus infelix, Harger.



1. *Macrostyliis longiremis*, (Meinert).
2. *Desmosoma angustum*, Hansen.

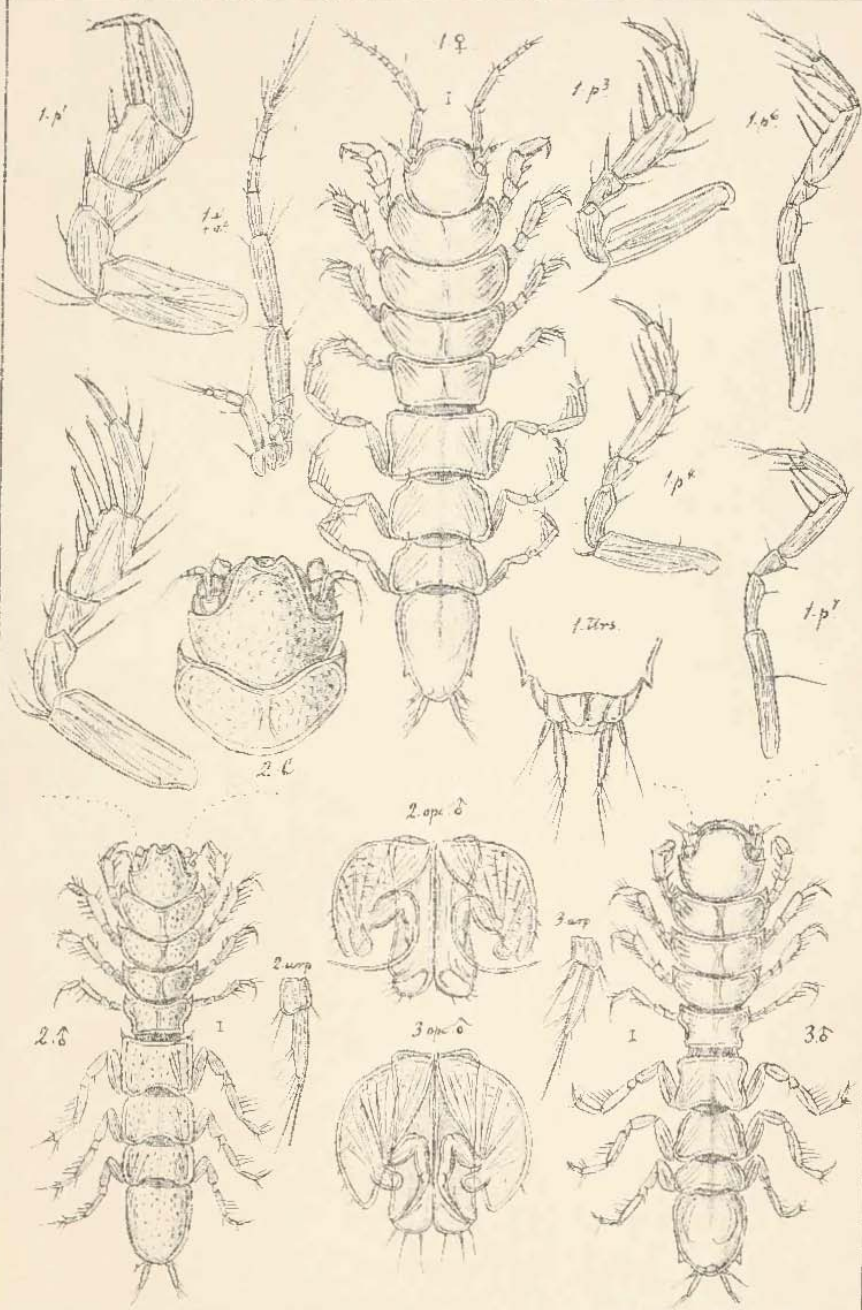




G.O. Sars, zutogr.

1. *Eugerda globiceps*, Meinert.

2. *Eugerda coarctata*, (Hansen).



60 Sars, autogr.

1. *Eugerda lateralis*, (Hansen).
2. *Desmosoma angustum*, Hansen ♂.
3. *Eugerda coarctata*, (Hansen) ♂.

AN ACCOUNT
OF THE
CRUSTACEA
OF
NORWAY

WITH SHORT DESCRIPTIONS AND FIGURES OF ALL THE SPECIES

BY

G. O. SARS

VOL. II.

ISOPODA

PART I. II.

APSEUDIDÆ, TANAIDÆ



BERGEN

PUBLISHED BY THE BERGEN MUSEUM

SOLD BY

ALB. CAMMERMEYER'S FORLAG, CHRISTIANIA

1886

An Account

of

The Crustacea of Norway.

Under the above title Prof. G. O. SARS of the University of Christiania, who has for many years been specially engaged in the study of the various groups of Crustacea, will publish a complete work on the Crustacea of Norway. The author will characterize, as concisely as possible, all the Norwegian species hitherto known, and, what is of great importance, the descriptions will be accompanied by carefully drawn figures of all the forms. The lack of good plates has hitherto made the study of this interesting class of animals very difficult, and, in many cases, has caused sad confusion in the synonymy. It is the author's intention to try to make the species belonging to the fauna of Norway easily recognizable and definable, which, much better than by the most elaborate descriptions, may undoubtedly be brought about by good drawings, representing the whole animal and, on a greatly enlarged scale, the most characteristic details.

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The second volume, comprising the order **Isopoda**, will consist of about 240 pages with 80 plates.

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VOL. I. 3
ISOPODA

PART III, IV.
ANTHURIDÆ, GNATHIIDÆ, ÆGIDÆ, CIROLANIDÆ, LIMNORIIDÆ



BERGEN
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VOL. II.
ISOPODA

PART V, VI.

IDOTHEIDÆ, ARCTHURIDÆ, ASELLIDÆ, IANIRIDÆ, MUNNIDÆ



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