BRITISH MUSEUM (NATURAL HISTORY).

BRITISH ANTARCTIC ("TERRA NOVA") EXPEDITION, 1910.

NATURAL HISTORY REPORTS.

ZOOLOGY. VOL. III.

ARTHROPODA

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PYCNOGONIDA.

BY

W. T. CALMAN, D.Sc.

(*Assistant in the Department of Zoology, British Museum (Natural History)*)

WITH TWENTY-TWO FIGURES IN THE TEXT.

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PAGE

I.—INTRODUCTION.

THE collection of Pycnogonida obtained by the "Terra Nova" Expedition far exceeds in extent that of any Antarctic expedition yet reported on. It comprises no fewer than forty-four species,* all from the Ross Sea area, with the exception of one species (*Colossendeis megalonyx*, Hoek) represented by a solitary specimen dredged near the Falkland Islands. Eleven species are described as new, while five others are identified with species only very recently described in Mr. Hodgson's (1914–15)† preliminary report on the Pycnogonida of the German South Polar Expedition. While none of the new species can be compared, in point of morphological or systematic interest, with the discoveries of earlier expeditions, they serve to accentuate

* It may be of interest to give the numbers for some other Antarctic expeditions. Excluding names subsequently withdrawn by their authors, or definitely placed as synonyms in the present report, the "Discovery" obtained twenty-six species, the "Français" seven, the "Scotia" fifteen, the "Pourquoi Pas?" twenty-four, and the "Gauss" twenty-nine.

† The numbers enclosed within brackets refer to the list of papers at the end of the Report.

the remarkable richness of the Antarctic pycnogonidan fauna; and, at the same time, the fact that one species in every four in this collection has to be described as new helps to remind us how incomplete our knowledge of this fauna still is.

I wish to acknowledge the assistance that I have received from Mr. T. V. Hodgson, who has very kindly made available to me much of the unpublished results of his study of the "Gauss" collection, and has allowed me to borrow for examination the types of many of his new species. I am also under particular obligations to Prof. E. L. Bouvier, of Paris, for the generous way in which he has invariably responded to my requests for information and for specimens. I shall have, in the course of this report, to differ from Prof. Bouvier on several minor points and one or two major ones. It is the more fitting, therefore, that I should acknowledge here my great indebtedness to his illuminating report on the Pycnogonida of the "Pourquoi Pas?"

The figures illustrating this report have been prepared by Miss Gertrude M. Woodward.

II.—LIST OF STATIONS AT WHICH PYCNOGONIDA WERE OBTAINED.

Subantarctic Zone.

Station 38.—13th April, 1913, Lat. 52° 23′ S., Long. 63° 50′ W. (W. of Falkland Islands). Depth, 125 fathoms. Agassiz trawl.

Antarctic Zone.

Station 194.—22nd February, 1911, Lat. 69° 43′ S., Long. 163° 24′ E. (off Oates Land). Depth, 180–200 fathoms. Agassiz trawl.

Station 220.—3rd January, 1912. Off Cape Adare, mouth of Robertson's Bay. Depth, 45–50 fathoms. Agassiz trawl.

Station 294.—15th January, 1913. Lat. 74° 25′ S., Long. 179° 3′ E. (Ross Sea). Depth, 158 fathoms. Agassiz trawl.

Station 295.—27th January, 1913. Lat. 73° 51′ S., Long. 172° 57′ E. (Ross Sea) Depth, 190 fathoms. Agassiz trawl.

Station 314.—23rd January, 1911. Five miles north of Inaccessible Island, McMurdo Sound. 222–241 fathoms. Agassiz trawl.

Station 318.—13th June to 16th September, 1911. Hole in ice between Cape Evans and Inaccessible Island. Depth, 130–180 metres. Traps and tangles on bottom.

Station 321.—13th–17th August, 1911. In contraction-crack between Inaccessible Island and Barne Glacier. Depth, 180–309 metres.

Station 322.—3rd–4th September, 1911. In contraction-crack between Inaccessible Island and Barne Glacier. Depth, 20 metres. Fish-trap, dredge.

Station 331.—14th January, 1912. Off Cape Bird Peninsula, entrance to McMurdo Sound. Depth, 250 fathoms. Dredge.

Station 338.—23rd January, 1912. Lat. 77° 13′ S., Long. 164° 18′ E. (entrance to McMurdo Sound). Depth, 207 fathoms. Agassiz trawl.

Station 339.—24th January, 1912. Lat. 77° 5′ S., Long. 164° 17′ E. (entrance to McMurdo Sound). Depth 140 fathoms. Agassiz trawl.

Station 340.—25th January, 1912. Lat. 76° 56′ S., Long. 164° 12′ E. (off Granite Harbour). Depth, 160 fathoms. Agassiz trawl.

Station 349.—15th February, 1912. Off Butter Point, western shore of McMurdo Sound. Depth, 80 fathoms. Agassiz trawl.

Station 355.—20th January, 1913. Lat. 77° 46′ S., Long. 166° 8′ E. (McMurdo Sound). Depth, 300 fathoms. Agassiz trawl.

Station 356.—22nd January, 1913. Off Granite Harbour, entrance to McMurdo Sound. Depth, 50 fathoms. Agassiz trawl.

III.—LIST OF SPECIES.

Family COLOSSENDEIDÆ.

Colossendeis scotti, sp. n.
,, *australis*, Hodgson.
,, *megalonyx*, Hoek.
,, *rugosa*, Hodgson.
,, *frigida*, Hodgson.
,, *wilsoni*, sp. n.
,, *glacialis*, Hodgson.
,, *drakei*, sp. n.
,, *robusta*, Hoek.
,, *lilliei*, sp. n.

Family NYMPHONIDÆ.

Pentanymphon antarcticum, Hodgson.
Nymphon charcoti, Bouvier.
,, *gracillimum*, sp. n.
,, *hiemale*, Hodgson.
,, *adareanum*, Hodgson.
,, *proximum*, sp. n.
,, *biarticulatum* (Hodgson) (?).
,, *mendosum* (Hodgson).
,, *australe*, Hodgson.

FAMILY PHOXICHILIDÆ (PALLENIDÆ).

Austropallene cornigera (Möbius).
,, *brachyura* (Bouvier).
,, *tibicina*, sp. n.

FAMILY PHOXICHILIDIIDÆ.

Pallenopsis glabra (Möbius).
,, *pilosa* (Hoek).
,, *vanhöffeni*, Hodgson.
,, *spicata*, Hodgson.
Phoxichilidium australe, Hodgson.

FAMILY ENDEIDÆ.

Endeis australis (Hodgson).

FAMILY AMMOTHEIDÆ.

Ammothea glacialis (Hodgson).
,, *gibbosa* (Möbius).
,, *spinosa* (Hodgson).
,, *minor* (Hodgson).
,, *australis* (Hodgson).
,, *meridionalis*, Hodgson.
,, *striata* (Möbius) (?).
Achelia spicata (Hodgson).
,, *intermedia*, sp. n.
,, *brucei*, sp. n.
Austroraptus polaris, Hodgson.
,, *juvenilis*, sp. n.
,, *præcox*, sp. n.
Austrodecus glaciale, Hodgson.
Rhynchothorax australis, Hodgson.

FAMILY PYCNOGONIDÆ.

Pycnogonum gaini, Bouvier.

IV.—NOTES ON OCCURRENCE AND DISTRIBUTION.

Prof. Bouvier has remarked (1913, p. 18) on the growing preponderance of the Antarctic pycnogonidan fauna, as revealed by successive expeditions, over that of the Arctic regions, hitherto regarded as the special headquarters of the group. He states the number of Arctic and Antarctic species as 62 and 82 respectively. While these numbers may be subject to some modification according to the limits assigned to the geographical areas on the one hand, and to the specific groups on the other, it is at least clear that, with some 14 species to be added to the Antarctic list from the "Gauss" collection and 11 here described, the Antarctic seas are already known to be far richer in species of Pycnogonida than any similar area of the oceans.

As regards the numbers of individual specimens, it is to be noted that, out of a total of about 600 in the present collection, no fewer than 240 belong to a single species, *Nymphon australe,* and that, of these, 200 were obtained at a single station, and presumably at a single haul of the trawl. Again, the three closely allied species of *Achelia* (which are, perhaps, not more than forms of a single species) are together represented by more than a hundred specimens, of which all except three were taken together at a single station. Twenty-four species were obtained only at a single station each, and mostly in very small numbers. Against this we have *Ammothea glacialis* from nine stations (25 specimens), *Nymphon mendosum* from eight (37 specimens), and *Colossendeis frigida* and *Pentanymphon antarcticum* each from seven stations (16 and 38 specimens respectively).

The depths at which Pycnogonida were obtained range from 11 to 300 fathoms. Within these limits there are no clear indications of any marked change in the fauna.

The high proportion of new species that Antarctic collections continue to yield, and the large number of species that are known only from one or a few occurrences, show that our knowledge of the Pycnogonid fauna of this region is still a very long way from approaching completeness. While it would be useless, for this reason, to attempt a detailed analysis of the distribution of the various species within the area, or of their relations to other species outside it, the following facts seem deserving of attention. Of the 48 species of Pycnogonida obtained from the Ross Sea area (off the coasts of Victoria Land) by the "Southern Cross" (Hodgson, 1902), "Discovery" (Hodgson, 1907), and "Terra Nova" expeditions, 15 are on the list of the "Gauss" (Hodgson, 1914–15) from Wilhelm Land, and 17 were obtained in the region of Graham Land (including the South Orkneys and South Shetlands) by the French (Bouvier, 1907 and 1913) and Scottish (Hodgson, 1908) expeditions. Five species are common to all three regions, and for these, at all events, a circumpolar distribution may be taken as proved, while it is at least highly probable in the cases of the other 12 species common to Graham Land and Victoria Land, and of the one (*Austropallene cristata* (Bouvier)) recorded from Graham Land and Wilhelm Land only. On the other hand, the absence of *Decolopoda* from the extensive Ross Sea collections points to a restricted area of distribution for this genus, the two species of which have hitherto been taken only at the South Shetlands, South Orkneys, and Graham Land. A similarly limited range is more or less probable for several less conspicuous species, but cannot be regarded as established until a great deal more collecting has been done.

V.—VARIATION AND SPECIFIC CHARACTERS.

Prof. G. H. Carpenter (1907, p. 95) writes: "Recent systematic work on the Pycnogonida has brought home to students that a great plasticity of structure characterises this group, and that in large genera it becomes increasingly difficult with advancing knowledge to form definite specific diagnoses. The publication of new specific names is therefore attended with more than usual risk, but the very fact that variation is so wide makes the careful study of forms from any new locality of special obligation and interest to the naturalist." Prof. Carpenter's words have special weight as coming from a zoologist experienced in the systematic study of many widely different groups of Arthropoda; nevertheless, it may be doubted whether, in this respect, the Pycnogonida differ so greatly from other large groups of marine arthropods as these words seem to suggest. The general impression gained from the study of such a collection as the present is much the same that would result from examination of many groups of Crustacea, for instance. Certain genera and families present large numbers of minutely separated species, the distinguishing characters of which have at least the appearance of inconstancy; while other groups are composed of few species easily and sharply defined by characters that are relatively invariable. To the first category plainly belong many of the species of *Colossendeis*, *Nymphon*, and *Achelia* discussed below. On the other hand, we have such forms as *Pycnogonum gaini*, the sole representative of its genus in the Antarctic, which ranges from Graham Land to the Ross Sea and Wilhelm Land without perceptible variation in its specific characters.

The question, however, deserves further study, since there are some reasons for expecting the Pycnogonida to be especially inclined to specific instability. Döderlein (1902) attributes great importance, among the factors favouring the development of local races, varieties, and species in any group of animals, to the lack of "Vagilität" or power of wandering, and Doflein has attempted to show how this "Döderleinsche Prinzip" applies to the case of the deep-sea Brachyura. Now, there are probably few groups of marine Arthropoda that are less "vagile" on the whole than the Pycnogonida. Although some species have the power of swimming in the adult state, their efforts seem to be awkward and inefficient, and none of the larvæ are better adapted for locomotion. Whatever may be the result in comparison with other Arthropoda, the application of the principle does not meet with very encouraging results when the Pycnogonida are compared with one another. Of all Pycnogonida hardly any can be less "vagile," as adults or as larvæ, than the species of *Pycnogonum*; yet not only *P. gaini* mentioned above, but also the common *P. littorale* of our own coasts, show that the species may combine a very wide geographical range with a great constancy of specific characters.

VI.—THE SIGNIFICANCE OF THE DECAPODOUS PYCNOGONS.

Although the present collection contains no species that throws new light on the major problems connected with the morphology and phylogeny of the Pycnogonida, it may not be out of place here to make a few observations on points raised in Prof. Bouvier's Report on the Pycnogonida of the "Pourquoi Pas?"

Prof. Bouvier pays the compliment of serious criticism to a little essay (1909), in which I supported the view (first put forward by Prof. G. H. Carpenter) that the decapodous condition among Pycnogons is not a primitive survival but a recent specialisation. The argument on which I chiefly relied was based on the fact that *Decolopoda* and *Pentanymphon*, the only decapodous genera then known, are by no means nearly related to one another, but exhibit the closest affinity respectively with *Colossendeis* and *Nymphon*, two of the normal octopodous genera. This argument was greatly strengthened, as I have elsewhere pointed out (1910), by Prof. Bouvier's discovery of *Pentapycnon*, a decapodous genus widely removed from the other two, but approximating very closely indeed to *Pycnogonum*; and, while *Decolopoda* and *Pentanymphon* can, without much difficulty, be admitted as reasonably primitive forms, *Pycnogonum* and, with it, *Pentapycnon*, can only be regarded as among the most highly specialised of existing Pycnogons. On the other hand, the support which my contention seemed to draw from the fact that all three decapodous genera occurred only within a restricted geographical area has been quite destroyed by Prof. Bouvier's later discovery of a species of *Pentapycnon* on the coast of French Guiana—one of the last places in the world where one would look for a fauna with antarctic affinities.

Prof. Bouvier's argument for the primitive nature of the decapodous forms depends, in the first place, on the admitted fact that *Decolopoda* is, in one respect (apart from the number of somites), less specialised than its relative *Colossendeis*; it retains, in the adult state, the chelophores with a biarticulate scape that are present only in the young stages in the last-named genus. Now it may be conceded that, if *Decolopoda* stood alone, it might be "simpler and perfectly logical" to suppose that *Colossendeis* had been derived from it by the loss of two primitive characters, the chelophores and the posterior pair of legs; but when we have to extend a similar supposition to *Pentanymphon* and, still more, to *Pentapycnon*, the argument, though still logical and simple, becomes inadequate to support the weighty conclusions that must be based on it.

At this point Prof. Bouvier attributes to Prof. Carpenter and myself an opinion that I, at least, do not hold. He writes: "Au surplus si, comme le pensent M. Carpenter et M. Calman, la paire de pattes postérieures est une paire surajoutée dans les types décapodes, les orifices sexuels des *Pentapycnon* devraient se trouver à la même place que chez les *Pycnogonum*, à savoir sur les pattes de la quatrième paire, alors qu'ils sont situés sur la cinquième." He proceeds to argue that the somite which has disappeared in the octopodous forms is not the fifth but the fourth, on the ground that the dorsal tubercle corresponding to this somite in *Pentapycnon* persists in *Pycnogonum* although the somite itself has disappeared. Clearly, however, this evidence might be read in another way. Instead of assuming a transference of the dorsal tubercle from the penultimate somite of *Pentapycnon* to the last somite of *Pycnogonum*, we might take the fourth pedigerous somite as homologous in the two genera, and assume a transference of the genital apertures from the fifth somite to the fourth. As a matter of fact, however, there is no evidence at all for the existence of individual homologies between the somites of the two genera. Bateson pointed out long ago the fallacy of the assumption that in variation the individuality of each member of a meristic series is always respected. In writing of "an additional pair of legs" I had not in mind any particular one of the five pairs. There is nothing to prevent us from regarding the series of somites as having been remodelled as a whole in passing from one genus to the other.

In support of the contention that "the constancy in the number of somites and appendages throughout the comparatively wide range of structure presented by the eight-legged Pycnogons strongly suggests that this is the deep-seated and, so to speak, 'normal' plan of structure of the group" from which the ten-legged condition is a secondary departure, I called attention to the parallel case of *Polyartemia* among the Branchiopod Crustacea. *Polyartemia* differs from the normal type of the Order Anostraca, to which it belongs, in having nineteen instead of eleven pre-genital trunk somites; and since the number appears to be constantly ten or eleven in the other Orders of Branchiopoda (excluding the abbreviated Cladocera), there seems to be good ground for suggesting that the increased number in this case is due to secondary specialisation. Prof. Bouvier quotes against me the authority of Dr. E. von Daday (1910, p. 411), who considers *Polyartemia* to be the most primitive of the Anostraca. I find nothing in Daday's discussion of the question to lead me to change my opinion. He makes no mention of the position of the genital opening in comparing the Anostraca with the other Orders of Branchiopoda; and his reference to the supposed persistence of a vestige of the mandibular palp in *Polyartemia* overlooks entirely the fact that the palp is in all cases present in the nauplius.

It would be easy to multiply parallel instances from other groups of the animal kingdom, but, as Bouvier reminds us, "il ne convient pas d'étendre à un groupe les considérations phylogénétiques applicables à un autre." I only refer, therefore, to one case among fishes, to which Mr. C. Tate Regan has called my attention, where the parallel seems unusually simple and complete. Until recently, the only Selachians known to have more than five pairs of branchial arches were the Notidanoid sharks, and as these are, in other respects, generalised and ancient types, the increased number of arches may, not unreasonably, be regarded as a primitive character. Mr. Regan (1906, p. 1), however, has described under the name *Pliotrema* a Pristiophorid shark which has six arches. There can be no question that this is a very highly specialised form, and that it has been derived from some form like *Pristiophorus* with the normal number of branchial arches. The parallel between *Pliotrema* and *Pentapycnon* in their relations to *Pristiophorus* and *Pycnogonum* respectively seems to me very striking, and it is hard to believe that arguments regarded as conclusive in one case can be without value in the other.

VII.—NOMENCLATURE AND TERMINOLOGY.

In this report certain nomenclatorial changes suggested by recent authors have been adopted, although they involve the rejection of long-established names or even their transference in a manner against which I have elsewhere ineffectually protested. They are adopted because they appear to comply with the only code of rules that commands any general assent at the present time; and because when once such changes have been introduced in works of authority it is hopeless to try to prevent their ultimate adoption.

The terms used for the parts of the animal in the descriptions are, in the main, those adopted by Prof. D'Arcy W. Thompson (1909) with some modifications that do not call for special explanation. In the measurements, the "length of trunk" is taken from the frontal margin of the head above the proboscis in the middle line to the base of the abdomen, or the anterior margin of its socket if it is articulated; the "cephalon" is regarded as extending from the frontal margin to the base of the first pair of lateral processes; the "cephalic segment" is measured from the frontal margin to the line of articulation between the first and second pairs of lateral processes.

VIII.—SYSTEMATIC NOTES AND DESCRIPTIONS OF NEW SPECIES.

Genus COLOSSENDEIS, Jarzynsky.

Mr. Hodgson has described, from the collections of the "Gauss," a species which he makes the type of a new genus under the name of *Notoendeis germanica*. I have not seen the type-specimen, but, to judge from the preliminary account, the genus would seem to be of doubtful validity. The only characters mentioned that are in any way distinctive are the "perfectly-segmented" body and the "nine-jointed" palps.* The first character is shared by two species of *Colossendeis*, *C. articulata* and *C. dofleini* of Loman (1908, p. 22, and 1911, p. 4). As regards the second character, *N. germanica* agrees in this, but, apparently, in no other respect, with the species described below as *C. wilsoni*. If the genus were to be retained it would be hard to decide whether it should include *C. articulata* and *C. dofleini* on the one hand or *C. wilsoni* on the other; it could not embrace all three.

A large number of species of *Colossendeis* have been described, most of them from a very small number of specimens. They are distinguished mainly by proportional differences of measurement, and there is reason to believe that some of them would not survive a critical revision based on adequate collections. In the absence of such a revision it is necessary, before venturing to describe any additional species, to attempt to reduce to some sort of order those already known. Bouvier has made a beginning by dividing the species into two groups according to the relative lengths of the distal segments of the legs. In the first or "longitarsal" group the carpus, propodus, and claw together measure at least three-quarters of the length of the second tibia; in the "brevitarsal" group the proportion is always very much less. Proceeding on these lines, the following key may be offered for the "longitarsal" group, which includes all the Antarctic species.

Key to the "Longitarsal" species of Colossendeis.

a. Sixth segment of palp more than three times as long as thick. Proboscis distinctly longer than trunk.	
a'. Trunk segmented	*C. articulata*, Loman
b'. Trunk not segmented.	
a''. Lateral processes in contact.	
a'''. Seventh segment of palp longer than eighth. Eyes absent .	*C. proboscidea* (Sabine)
b'''. Seventh segment of palp shorter than eighth. Eyes present .	*C. scotti*, sp. n.
b''. Lateral processes separated.	
a'''. Seventh segment of palp equal to eighth	*C. australis*, Hodgson
	C. media, Hoek † / *C. brevipes*, Hoek
b'''. Seventh segment of palp distinctly shorter than eighth.	
a''''. Eyes absent.	
a'''''. Proboscis dilated distally	*C. orcadensis*, Hodgson
b'''''. Proboscis dilated in middle	*C. angusta*, G. O. Sars † / *C. gracilis*, Hoek

* I learn from Mr. Hodgson that he does not accept the view of Bouvier (1913, p. 37), according to which only nine segments are counted in the palp of normal species of *Colossendeis*. Bouvier, no doubt rightly, excludes from the enumeration the "saillie basilaire" of the palps, which is generally counted as a segment, although it is precisely similar to the process (never reckoned as a segment) that lies alongside it and carries the oviger. Loman is said by Bouvier to have been the first to call attention to this point, but I cannot discover the passage in which he did so.

† *C. media* and *C. brevipes* were described by Hoek as doubtfully distinct from *C. gracilis*, which again is identified by Möbius with *C. angusta*. Meinert's observation (1899, p. 59) as to the differences in form of the palpal segments in immature and fully adult specimens of the last-named species deserves to be noted as having possibly a wider application.

b''''. Eyes present.
a'''''. Claw nearly equal to propodus . . . . . . *C. megalonyx*, Hoek
b'''''. Claw not more than two-thirds of propodus.*
Legs spiny . . . . *C. rugosa*, Hodgson
Legs smooth . . . . *C. frigida*, Hodgson
b. Sixth segment of palp not more than twice as long as thick. Proboscis, at most, hardly longer than trunk.
a'. Lateral processes in contact . . . . *C. wilsoni*, sp. n.
b'. Lateral processes separated.
a''. Femur longer than second tibia.
a'''. Sixth segment of palp longer than seventh . . . . *C. glacialis*, Hodgson (*C. gracilipes*, Bouvier)
b'''. Sixth segment of palp shorter than seventh . . . . *C. drakei*, sp. n.
b''. Femur not longer than second tibia.
a'''. Lateral processes separated by their own diameter . . . *C. robusta*, Hoek
b'''. Lateral processes separated by less than their own diameter . *C. lilliei*, sp. n.

C. patagonica, Hodgson, described from an imperfect specimen and not figured, appears to be allied to *C. glacialis*, Hodgson.

It may be worth while here to give the names of the species included in the "brevitarsal" group as far as I have been able to collect them. They are *C. gigas*, *leptorhynchus*, *minuta*, and *japonica* of Hoek, *colossea* and *macerrima* of Wilson, *clavata*, Meinert, *bicincta* and *subminuta*, Schimkewitsch, *cucurbita*, Cole, *gardineri*, Carpenter, *dofleini*, Loman, and *michaelsarsii*, Olsen.

Colossendeis scotti, sp. n. (Text-fig. 1).

Occurrence.—Station 294, Ross Sea, 158 fathoms; 1 ♂ (Holotype), 1 ♀.

Description.—*Trunk* compact, its greatest width across the first pair of lateral processes more than two-thirds of its length; lateral processes almost or quite in contact with each other except the third and fourth pairs, which are separated by a small interval; inter-segmental lines very indistinct. Ocular tubercle bluntly conical or rounded at the tip, not occupying more than one-third of width of cephalic segment; eyes dark, sharply defined, anterior pair hardly larger than posterior. On dorsal surface behind ocular tubercle is a convex area defined posteriorly by a crescentic groove; no anterior tubercles on cephalon.

Proboscis decurved, more than twice as long as trunk, narrow and cylindrical for the first quarter of its length, then expanding to nearly twice the width at about the middle, narrowing again to a slight terminal dilatation where it measures about five-sixths of its greatest width. Mouth-opening conspicuously wide, the labial teeth apparently smaller, or at least capable of further retraction than in allied species.

Abdomen shorter than greatest diameter of proboscis, decurved, cylindrical, blunt.

Palp with second segment a little less than twice as long as fourth; sixth longer than fifth and nearly four times as long as thick; seventh shorter than its width and

* But see remarks on *C. rugosa* below.

less than half as long as eighth; ninth longer than eighth and, together with it, equal to sixth. The whole palp beset with spinules, most numerous on distal segments.

Oviger with fourth segment equal to sixth. Special spines of the distal segments in four rows with some additional spines irregularly placed. At the distal end of last segment is a large curved spine opposed to the claw and forming with it a sub-chelate termination to the limb (Text-fig. 1D). All the segments of the oviger are hispid.

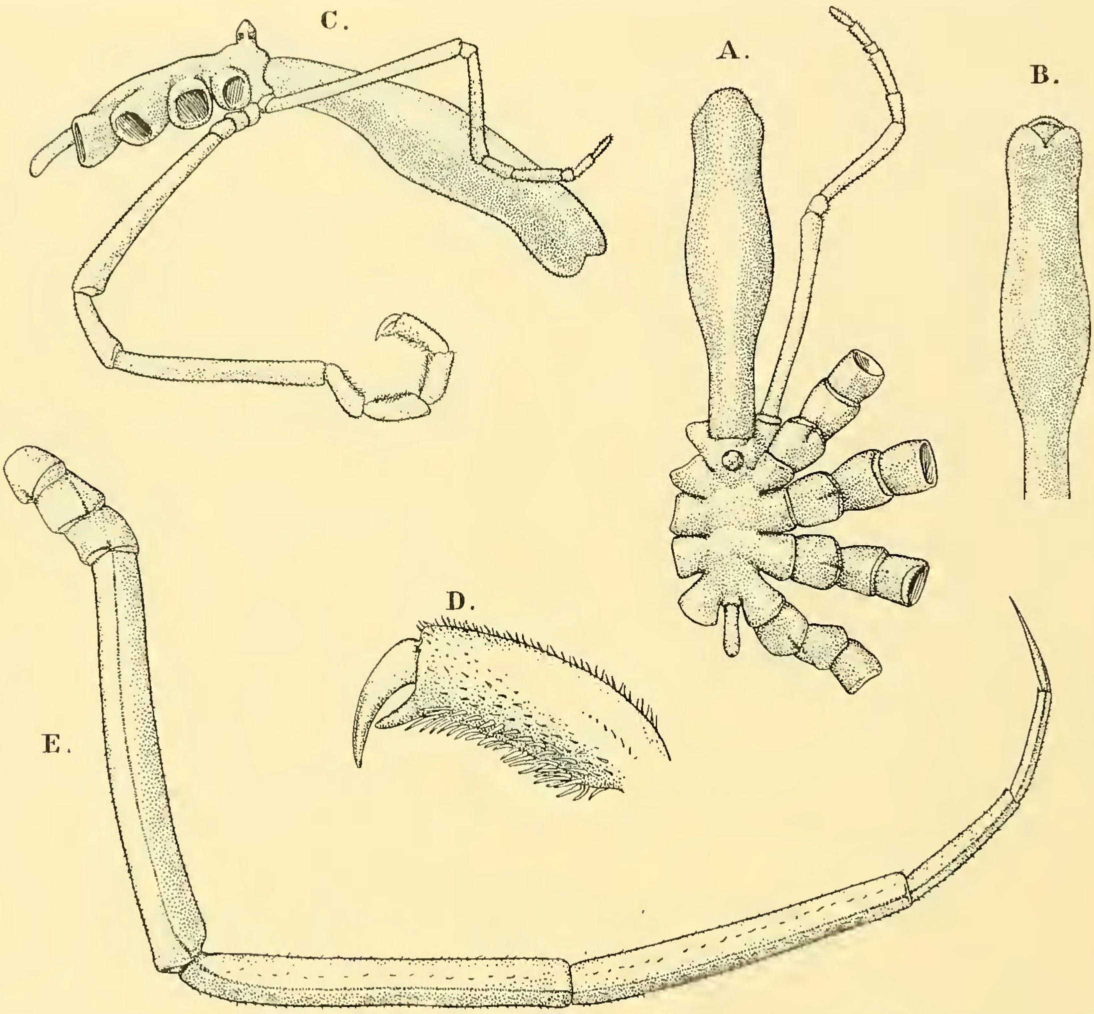

FIG. 1.—*Colossendeis scotti*, sp. n., Male. A. Dorsal view of body with palp and coxæ of one side. B. Ventral view of proboscis. C. Lateral view of body with palp and oviger. D. Terminal segment of oviger, further enlarged. E. Third leg of right side.

Legs rather stout, femur not more than nine times as long as thick. Femur and first and second tibiæ successively decreasing in length. Tarsus a little longer than, and claw nearly equal to, propodus.

Surface of body nearly smooth, proboscis with scattered setæ becoming more numerous at the tip, legs set with very short spinules, which are more numerous, and arranged in rows, on the distal segments.

Measurements, in mm.—

	(Holotype.) ♂	♀
Length of proboscis	31·0	35·25
Greatest diameter of proboscis	6·25	7·0
Length of trunk	13·75	16·25
Width across first lateral processes	10·0	11·5
Length of abdomen	5·75	6·0
Third right leg—		
Coxæ	10·5	12·0
Femur	33·5	40·0
First tibia	31·0	37·5
Second tibia	28·25	32·5
Tarsus	11·0	12·0
Propodus	9·5	9·0
Claw	9·0	7·5
Palp—		
Second segment	16·25	19·5
Third ,,	1·28	2·0
Fourth ,,	8·8	11·2
Fifth ,,	3·2	4·0
Sixth ,,	4·24	5·2
Seventh ,,	·8	1·12
Eighth ,,	2·0	2·4
Ninth ,,	2·24	2·8

Remarks.—In the relative lengths of the distal segments of the palp this species approaches the group of species related to *C. angusta*, but it differs widely from these not only in the much greater size of the proboscis, but also in the approximation of the lateral processes, in which respect it differs from all the "longitarsal" species except *C. proboscidea* and the new form described below as *C. wilsoni*. Among the species of this genus the curious chelate termination of the ovigers is only paralleled, so far as I know, in *C. australis*, but a similar condition is found in *Böhmia chelata* (Böhm) and *Rhopalorhynchus tenuissimus* (Haswell). The labial teeth are found in various degrees of retraction in preserved specimens of other species, and the widely gaping mouth of the specimens described above is partly due to this condition; but I think that the teeth themselves are unusually small and the triangular mouth-frame is relatively larger than in any species with which I have compared it.

The name of this, one of the largest species of Pycnogonida yet brought from Antarctic seas, is chosen to commemorate the heroic and ill-fated Leader of the Expedition by which it was obtained.

Colossendeis australis, Hodgson.

C. australis, Hodgson, 1907, p. 59, Pl. ix, fig. 1, Pl. x, figs. 1 and 2; Bouvier, 1913, p. 63, text-figs. 20 and 21.

Occurrence.—Station 294, Ross Sea, 158 fathoms; 1 ♂. Station 314, McMurdo Sound, 222–241 fathoms; 2 immature.

Measurements, in mm.—

	"Terra Nova." Stn. 294. ♂	"Discovery." Holotype. ♂	"Discovery." Paratype. ♀
Length of proboscis	34·0	32·0	34·0
Greatest diameter of proboscis	7·5	6·5	8·0
Length of trunk	20·0	19·0	20·5
Width between first and second lateral processes	4·5	3·8	5·0
Width across second lateral processes	12·0	11·5	12·75
Length of abdomen	5·0	4·5	5·75
Third right leg—			
Coxæ	10·5	10·25	11·75
Femur	30·0	27·0	27·25
First tibia	30·5	28·5	27·75
Second tibia	31·25	28·5	26·75
Tarsus	12·25	12·5	11·25
Propodus	7·4	7·25	7·0
Claw	3·5	3·0	2·5
Palp—			
Second segment	22·0	—	20·25
Third ,,	2·0	—	2·0
Fourth ,,	11·25	—	10·0
Fifth ,,	2·5	—	2·75
Sixth ,,	4·5	—	4·5
Seventh ,,	2·5	—	2·75
Eighth ,,	2·5	—	2·75
Ninth ,,	3·25	—	3·5

Remarks.—The figure of this species in Hodgson's memoir (Pl. IX., fig. 1) shows the lateral processes much too near together. In reality the constricted bases of the second and third pairs are separated by a space about equal to their own diameter. Bouvier's figure of the lateral aspect possibly errs somewhat in the opposite direction. In the more slender terminal segments of the palp the adult male in the present collection agrees better with the male upon which Hodgson's description was based (and which may be regarded as the holotype) than with the female paratype. The other differences noticed by Hodgson between his two specimens do not seem to be of importance. Bouvier's measurements of his single specimen show some differences of proportion, the proboscis in particular being a little longer and noticeably more slender, especially in the distal third.

The adult male in the "Terra Nova" collection shows a very well-developed sub-chelate termination of the ovigers like that described above in *C. scotti*. In the type-specimens from the "Discovery" the spines of the ovigers are very much worn (in the male only the sockets are left), and the enlargement of the distal spine to form a "thumb" is not so easily seen. In the immature "Terra Nova" specimens the distal spine is not enlarged.

The dorsal gland-openings of the second coxæ, not visible in Bouvier's specimen, are easily seen in our adult specimens of both sexes.

Colossendeis megalonyx, Hoek.

C. megalonyx, Hoek, 1881, p. 67, Pl. ix, figs. 1–3.

Occurrence.—Station 38, near Falkland Islands, 125 fathoms; 1 ♂.

Measurements, in mm.—

	"Terra Nova." ♂	"Challenger." Holotype. ♂
Length of proboscis	21·0	20·0
Greatest diameter of proboscis	3·36	3·28
Length of trunk	12·0	11·0
Width between first and second lateral processes	2·62	2·5
Width across second lateral processes	8·25	7·5
Length of abdomen	3·08	2·8
Third right leg—		
Coxæ	8·0	7·0
Femur	27·25	22·75
First tibia	24·75	21·0
Second tibia	21·5	17·75
Tarsus	12·0	10·25
Propodus	9·5	8·0
Claw	7·75	7·0
Palp—		
Second segment	10·64	9·36
Third ,,	·96	·8
Fourth ,,	7·6	6·56
Fifth ,,	2·4	2·24
Sixth ,,	2·96	2·72
Seventh ,,	·8	·72
Eighth ,,	1·6	1·6
Ninth ,,	1·6	1·6

Remarks.—The only specimens of this species remaining in the "Challenger" collection are five from Station 313 (East coast of Patagonia). The largest of these, a male, is that of which measurements are given by Hoek and supplemented above, and it may be selected as the holotype.

The specimen obtained by the "Terra Nova" is in close agreement with the holotype, and, like it, differs from specimens of *C. frigida* not only in the greater relative length of the claws, but also in the form of the proboscis, the distal part of which is nearly cylindrical, with hardly a trace of a sub-terminal constriction.

It is to be noted, however, that the specimens accompanying the holotype in the "Challenger" collection are by no means exactly like it or like one another. The three smallest specimens (regarded by Hoek as immature, but having distinct genital openings) have the proboscis, at most, only a little longer than the trunk and distinctly contracted beyond the proximal dilatation. One specimen, in which the proboscis is only equal in length to the trunk, and the legs distinctly shorter and stouter than in any of the others, is further remarkable in having the tarsus actually shorter than the propodus. Another specimen has the seventh palpal segment no longer than wide.

These differences, if the specimens are correctly referred to a single species, imply a range of variability that must throw doubt on the validity of other closely-related species in the genus.

It is much to be regretted that the specimen from Kerguelen, referred by Hoek to this species, is no longer in the "Challenger" collection.

Colossendeis rugosa, Hodgson.

C. rugosa, Hodgson, 1907, p. 64, Pl. ix, fig. 4, Pl. x, fig. 7.

Occurrence.—Station 294, Ross Sea, 158 fathoms; 1 ♂.

Measurements, in mm.—

	"Terra Nova." ♂	"Discovery." Holotype. ♂
Length of proboscis	21·0	13·25
Greatest diameter of proboscis	3·1	2·0
Length of trunk	9·8	8·5
Width between first and second lateral processes	2·25	1·6
Width across second lateral processes	6·5	5·6
Length of abdomen	2·3	1·52
Third right leg—		
Coxæ	5·5	5·5
Femur	26·0	23·6
First tibia	22·0	19·0
Second tibia	21·0	18·0
Tarsus	12·0	7·76
Propodus	8·5	6·5
Claw	6·0	5·5

Palp—	"Terra Nova." ♂	"Discovery." Holotype. ♂
Second segment	10·64	7·2
Third ,,	·96	·72
Fourth ,,	7·68	4·88
Fifth ,,	2·16	1·76
Sixth ,,	2·8	2·72
Seventh ,,	·4	·64
Eighth ,,	1·52	1·6
Ninth ,,	1·84	2·16

Remarks.—The specimen that I record under this name agrees with the holotype of *C. rugosa*, and differs from the specimens included under *C. frigida* in the combination of the following characters:—

(1) The legs are distinctly, though minutely, spiny, and traces of a median row of spines can be discovered on the proboscis.

(2) The seventh segment of the palp is not longer than wide.

(3) The distal contraction of the proboscis is rather more marked.

On the other hand, it is to be noted that the legs of *C. frigida* are never entirely devoid of minute spinules, and the present specimen is not so conspicuously spiny as the holotype of *C. rugosa*; that in one or two of the specimens referred to *C. frigida*, the seventh palpal segment is hardly longer than wide, and that, in the present specimen, the claw is no longer relatively to the propodus than in certain specimens referred to *C. frigida*, while in the holotype of *C. rugosa* it nearly reaches the proportions found in *C. megalonyx*.

In view of the wide range of variation attributed to *C. frigida*, it seems likely that *C. rugosa* will prove to be only a spinose form of that species.

Colossendeis frigida, Hodgson.

C. frigida, Hodgson, 1907, p. 63, Pl. ix, fig. 3, Pl. x, figs. 5 and 6.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 1 ♂, 1 ♀. Station 294, Ross Sea, 158 fathoms; 1 ♀ (?), 2 ♂ (?). Station 314, McMurdo Sound, 222–241 fathoms; 1 ♀. Station 331, Entrance to McMurdo Sound, 250 fathoms; 2 ♀. Station 338, Entrance to McMurdo Sound, 207 fathoms; 4 ♀, 1 ♂. Station 340, off Granite Harbour, 160 fathoms; 1 ♂. Station 349, McMurdo Sound, 80 fathoms; 1 ♀, 1 ♂.

Measurements, in mm.—	"Terra Nova."			"Discovery." Syntypes.	
	Stn. 349. ♂	Stn. 338. ♀	Stn. 220. ♂	5 fms. ♀	130 fms. ♂
Length of proboscis	19·25	14·75	16·75	19·2	19·75
Greatest diameter of proboscis	2·88	2·24	2·96	4·0	3·28

	"Terra Nova."			"Discovery." Syntypes.	
	Stn. 349. ♂	Stn. 338. ♀	Stn. 220. ♂	5 fms. ♀	130 fms. ♂
Length of trunk	9·25	7·0	9·0	11·0	9·75
Width between second and third lateral processes	2·4	1·52	2·56	2·8	2·72
Width across second lateral processes	7·0	7·3	7·0	8·8	8·0
Length of abdomen	2·0	1·84	2·24	2·48	2·4
Third leg (right or left)—					
Coxæ	7·0	5·25	6·75	8·2	7·5
Femur	26·2	21·0	20·5	23·5	24·0
First tibia	23·5	20·0	18·5	21·3	21·5
Second tibia	22·25	19·0	17·0	19·25	19·25
Tarsus	13·0	9·36	10·0	11·0	11·5
Propodus	9·2	6·0	8·75	8·5	9·6
Claw	4·88	4·24	4·0	4·15	5·44
Palp—					
Second segment	10·0	8·24	8·4	10·3	—
Third ,,	·8	·8	·96	·96	—
Fourth ,,	6·56	5·12	6·0	7·2	—
Fifth ,,	2·08	1·6	1·84	2·08	—
Sixth ,,	3·04	2·48	2·64	3·04	—
Seventh ,,	·88	·88	1·04	1·04	—
Eighth ,,	1·6	1·6	1·6	1·68	—
Ninth ,,	2·0	1·92	1·76	1·76	—

Remarks.—Following the example of Mr. Hodgson, I have included under this name a number of specimens showing marked divergences in the relative lengths of the proboscis and of the legs. The species appears to be the commonest of the genus in the Ross Sea area.

Colossendeis wilsoni, sp. n. (Text-fig. 2).

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 1 ♀ (Holotype).

Description.—*Trunk* very compact; its greatest width, across the first pair of lateral processes, little less than its length; lateral processes in contact except for a slit-like interval between the third and fourth pairs. Ocular tubercle very broad, transversely oval as seen from above, bluntly rounded; eyes dark, anterior pair (or at least their pigmented area) much larger than the posterior. On dorsal surface behind ocular tubercle is a strongly convex area defined posteriorly by a crescentic groove.

Proboscis decurved, a little longer than trunk, sub-cylindrical, slightly dilated about the middle and again at the tip.

Abdomen decurved, slightly dilated distally, bluntly rounded at the tip.

Palp consisting of eight segments only; second segment less than one and a half times as long as fourth; sixth a little longer than fifth or seventh, and about one and a half times as long as thick; eighth about two-thirds as long as seventh.

Oviger stout; fourth segment a little longer than sixth; spines (very much worn) set in about five rows; terminal claw rather long.

Legs short and stout, third pair not quite seven times as long as trunk. Femur not quite four times as long as its greatest diameter, slightly shorter than first tibia,

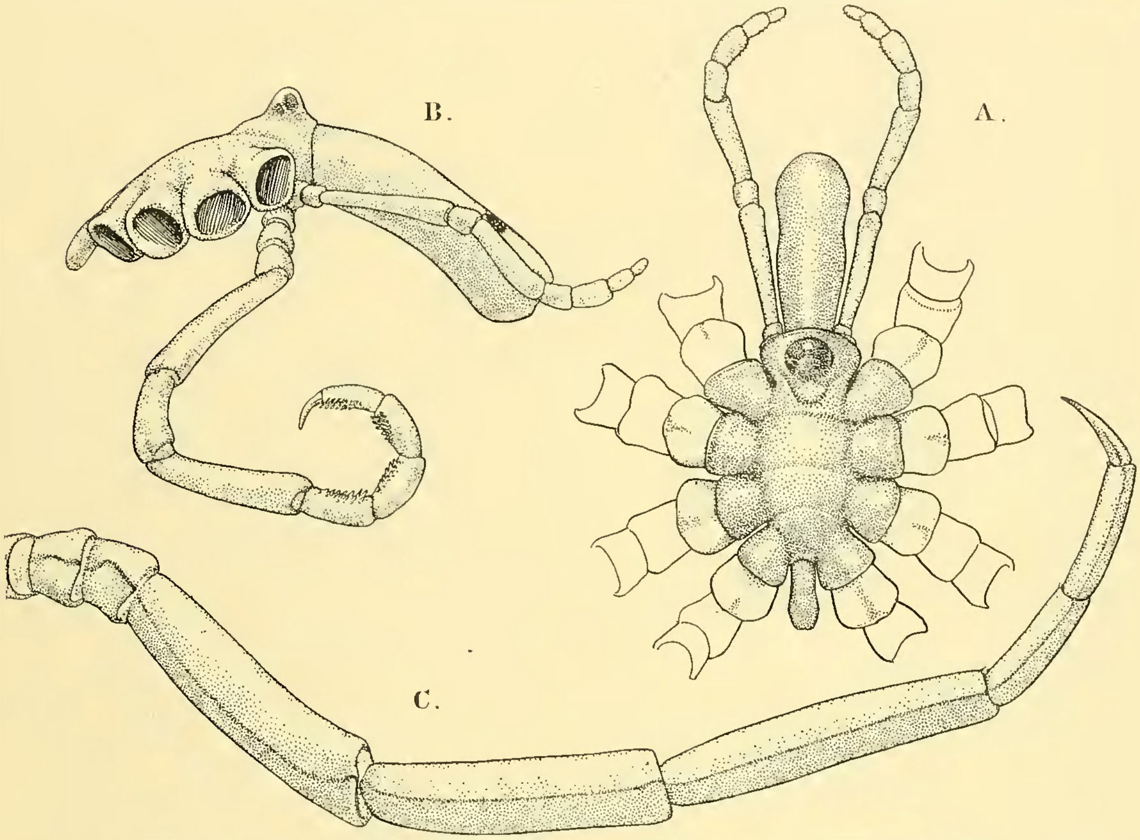

FIG. 2.—*Colossendeis wilsoni*, sp. n., Female. A. Dorsal view of body with palps and coxæ. B. Lateral view of body with palp and oviger. C. Third leg of right side.

which, again, is shorter than second. Tarsus a little shorter than propodus; claw stout and curved, about two-thirds as long as propodus.

Body and limbs very smooth and free from conspicuous setæ.

Measurements, in mm.—

	Holotype.
Length of proboscis	6·56
Greatest diameter of proboscis	1·84
Length of trunk	5·28
Width across first lateral processes	4·96
Length of abdomen	2·08

Third right leg (distal segments from fourth)—	Holotype.
Coxæ	3·75
Femur	6·8
First tibia	7·2
Second tibia	8·56
Tarsus	2·8
Propodus	3·2
Claw	2·08
Palp—	
Second segment	2·96
Third ,,	·64
Fourth ,,	2·08
Fifth ,,	·8
Sixth ,,	·96
Seventh ,,	·72
Eighth ,,	·48

Remarks.—The most noteworthy character of the specimen described above is the presence of only eight segments in the palp, as compared with the nine that are present in the other species of the genus. The condition of the palps in some specimens of *C. lilliei*, described below, suggests the possibility that the reduction may be the result of regeneration after injury, but the complete symmetry of the two palps in the present specimen is against this supposition. The relation of the species to Hodgson's "*Notoendeis*" has already been alluded to. Apart from the character of the palps, the species is sufficiently distinguished from all other species of the genus by the characters given in the key.

The species is named in memory of Dr. E. A. Wilson, the chief of the scientific staff of the expedition.

Colossendeis glacialis, Hodgson.

C. glacialis, Hodgson, 1907, p. 61, Pl. ix, fig. 2, Pl. x, figs. 3 and 4.
C. gracilipes, Bouvier, 1911, p. 1137; *id.*, 1913, p. 58, figs. 12–19.

Occurrence.—Station 194, off Oates Land, 180–200 fathoms; 1 ♂. Station 294, Ross Sea, 158 fathoms; 1 ♂. Station 314, McMurdo Sound, 222–241 fathoms; 1 ♂. Station 338, Entrance to McMurdo Sound, 207 fathoms; 1 ♀, 1 yg. Station 355, McMurdo Sound, 300 fathoms; 1 ♂.

Measurements, in mm.—

	"Terra Nova." Stn. 194. ♂	"Terra Nova." Stn. 338. ♀	"Discovery." Holotype. ♀
Length of proboscis	10·0	11·75	8·75
Greatest diameter of proboscis	2·5	2·5	2·0
Length of trunk	12·0	14·0	10·0

	"Terra Nova." Stn. 194. ♂	"Terra Nova." Stn. 338. ♀	"Discovery." Holotype. ♀
Width between first and second lateral processes	2·25	3·0	2·25
Width across second lateral processes	7·3	8·5	6·0
Length of abdomen	3·25	3·75	2·75
Third right leg—			
Coxæ	6·5	7·25	6·0
Femur	26·0	33·0	21·0
		left	22·0
First tibia	24·5	31·0	21·5
		left	20·0
Second tibia	22·5	29·0	16·0
Tarsus	9·2	11·0	7·0
Propodus	5·75	6·0	4·75
Claw	3·75	—	2·5
Palp—			
Second segment	6·0	—	4·2
Third ,,	·96	—	·68
Fourth ,,	4·4	—	2·88
Fifth ,,	1·68	—	1·12
Sixth ,,	2·08	—	1·6
Seventh ,,	1·6	—	1·12
Eighth ,,	1·44	—	1·12
Ninth ,,	1·6	—	1·12

Remarks.—According to the original description of this species the femur should be slightly shorter than the first tibia. This, however, is not always the case; even in a specimen labelled by Mr. Hodgson as "type," and here selected as holotype, the femur is a little longer than the tibia in the left leg, although shorter than it in the right leg of the third pair (see measurements above).

The smaller of the specimens in the "Terra Nova" collection do not differ in any important respect from the holotype. In particular, they agree with it in having only a median row of minute setæ on the dorsal surface of the trunk. The two largest specimens, however, of which measurements are given above, have the whole dorsal surface rough with short setæ and the legs rather more spiny. The general agreement in other respects leads me to regard these as only a spinose form of *C. glacialis*. The great length of the legs in the female from Station 338 is noteworthy.

It seems very likely that Bouvier's *C. gracilipes* will prove to be identical with this species. Almost the only definite characters in which they appear to diverge, according to Bouvier's account, are (1) the form of the proboscis, which in *C. gracilipes* is much narrower at the base, and (2) the terminal segment of the palp, which is much longer than either of the two preceding it. It is to be noted that the terminal segment in *C. glacialis* is not, in reality, so short and globular as it is represented in Hodgson's figure.

Colossendeis drakei, sp. n. (Text-fig. 3).

Occurrence.—Station 294, Ross Sea, 158 fathoms; 1 ♀ (Holotype). Station 356, off Granite Harbour, 50 fathoms; 1 ♂.

Description.—*Trunk* elongated, its greatest width, across second pair of lateral processes, two-thirds of its length or a little less; second and third pairs of lateral

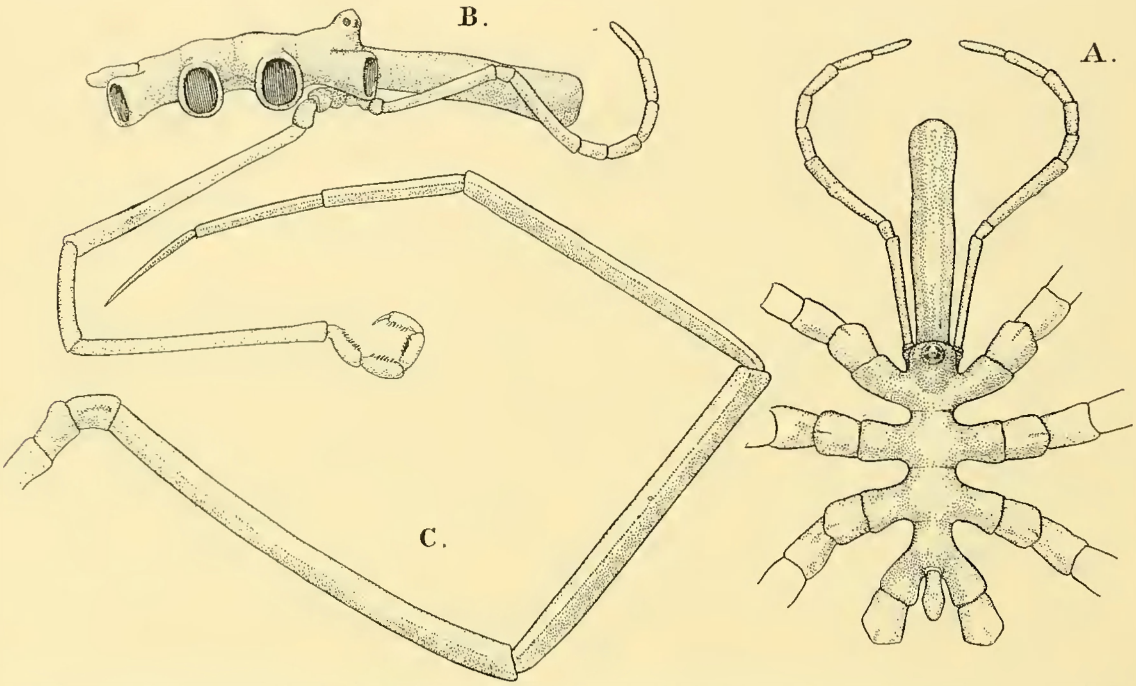

Fig. 3.—*Colossendeis drakei*, sp. n., Female. A. Dorsal view of body with palps and coxæ. B. Lateral view of body with palp and oviger. C. Third leg of right side.

processes separated by a little less than their diameter; inter-segmental suture-lines fairly distinct in female, less so in male. Ocular tubercle rounded or very obtusely pointed, inclined forwards; eyes dark, anterior pair slightly the larger. No anterior tubercles on cephalon.

Proboscis straight, equal in length to trunk, proximal dilatation slightly marked, not quite so wide as the tip.

Abdomen short, hardly longer than maximum diameter of proboscis, dilated, with the sides obtusely angled about the middle so that it appears trapezoidal in outline from above.

Palp slender, second segment a little longer than fourth, the five distal segments successively increasing in length, sixth about twice as long as thick; the surface almost devoid of setæ.

Oviger with fourth segment almost equal to sixth; distal segments with four rows of spines.

Legs slender, femur more than ten times as long as thick. Femur and first and second tibiæ successively decreasing in length. Tarsus and propodus subequal, claw little shorter than propodus.

Surface of body and limbs smooth, without conspicuous setæ or spinules.

Measurements, in mm.—

	(Holotype.) ♀	♂
Length of proboscis	7·5	7·04
Greatest diameter of proboscis	1·52	1·44
Length of trunk	7·6	6·72
Width between second and third lateral processes	1·44	1·36
Width across second lateral processes	5·2	4·72
Length of abdomen	1·84	1·6
Third right leg—		
Coxæ	4·4	4·0
Femur	16·1	12·6
First tibia	13·25	11·0
Second tibia	12·0	10·25
Tarsus	5·2	4·48
Propodus	4·96	4·32
Claw	4·4	4·0
Palp—		
Second segment	3·6	—
Third ,,	0·56	—
Fourth ,,	3·04	—
Fifth ,,	0·96	—
Sixth ,,	1·04	—
Seventh ,,	1·12	—
Eighth ,,	1·44	—
Ninth ,,	1·6	—

Remarks.—Among those of the longitarsal species that have the sixth segment of the palp not more than twice as long as thick, this species appears to be at once distinguishable by having the five distal segments of the palp successively increasing in length. The species is named after Staff-Paymaster Francis R. H. Drake, R.N., Secretary and Meteorologist on board the "Terra Nova," who gave much help in the work of the biological staff.

Colossendeis robusta, Hoek.

C. robusta, Hoek, 1881, p. 66, Pl. ix, figs. 4 and 5; Möbius, 1902, p. 190, Pl. xxix, figs. 1–5; Bouvier, 1913, p. 54, text-figs. 8–11.

Occurrence.—Station 294, Ross Sea, 158 fathoms; 1 ♂, 1 immature.

Measurements, in mm.—

	"Terra Nova." Stn. 294. ♂	"Challenger." Holotype. ♀
Length of proboscis	17·5	15·0
Greatest diameter of proboscis	4·4	4·0
Length of trunk	17·0	14·75
Width between second and third lateral processes	3·36	2·9
Width across second lateral processes	11·2	9·2
Length of abdomen	4·64	4·0
Third right leg –		
Coxæ	11·25	9.25
Femur	31·75	26·6
First tibia	29·0	24·5
Second tibia	31·75	27·75
Tarsus	12·0	10·75
Propodus	10·0	8·0
Claw	7·3	4·0

Remarks.—Of the two specimens referred to this species, the one is a male and the other an immature specimen in which the genital openings are not yet patent. The former differs from the holotype in having (1) the second coxæ of all the legs a little more expanded distally and with more prominent dorsal tubercles, and (2) the claw much more than half the length of the propodus. In both of these characters our specimen agrees better with Bouvier's figures and description than with the holotype. On the other hand, the outline of the proboscis agrees very well with that of the holotype (not very accurately represented by Hoek's figure) and differs from Bouvier's figures in that the proximal dilatation is well beyond the middle of the length. The femur is exactly equal to the second tibia instead of being slightly shorter (holotype) or longer (Bouvier). It is to be noted that the measurements given by Bouvier as those of the holotype are taken from Hoek's figure, which, however, is enlarged two diameters; those given above are taken from the specimen itself.

A conspicuous, or at any rate very tangible, and perhaps important difference from the holotype consists in the presence of minute scattered spines on the proboscis (where they are set, not very regularly, in longitudinal rows) and on the dorsal surface of the legs; the surface of the body is smooth.

The immature specimen has the proboscis relatively more slender than in the adult.

Colossendeis lilliei, sp. n. (Text-fig. 4).

Occurrence.—Station 338, Entrance to McMurdo Sound, 207 fathoms; 1 ♂, 2 ♀ (incl. Holotype).

Description.—*Trunk* compact, its greatest width, across second pair of lateral processes, more than two-thirds of its length; lateral processes separated by much less than their own diameter; intersegmental suture-lines well-marked. Ocular tubercle rather bluntly conical, broader than in *C. robusta*, occupying greater part of width of cephalon; eyes dark, sharply defined, anterior pair the larger. Tubercles near anterior border of cephalon less distinct and more laterally placed than in *C. robusta*.

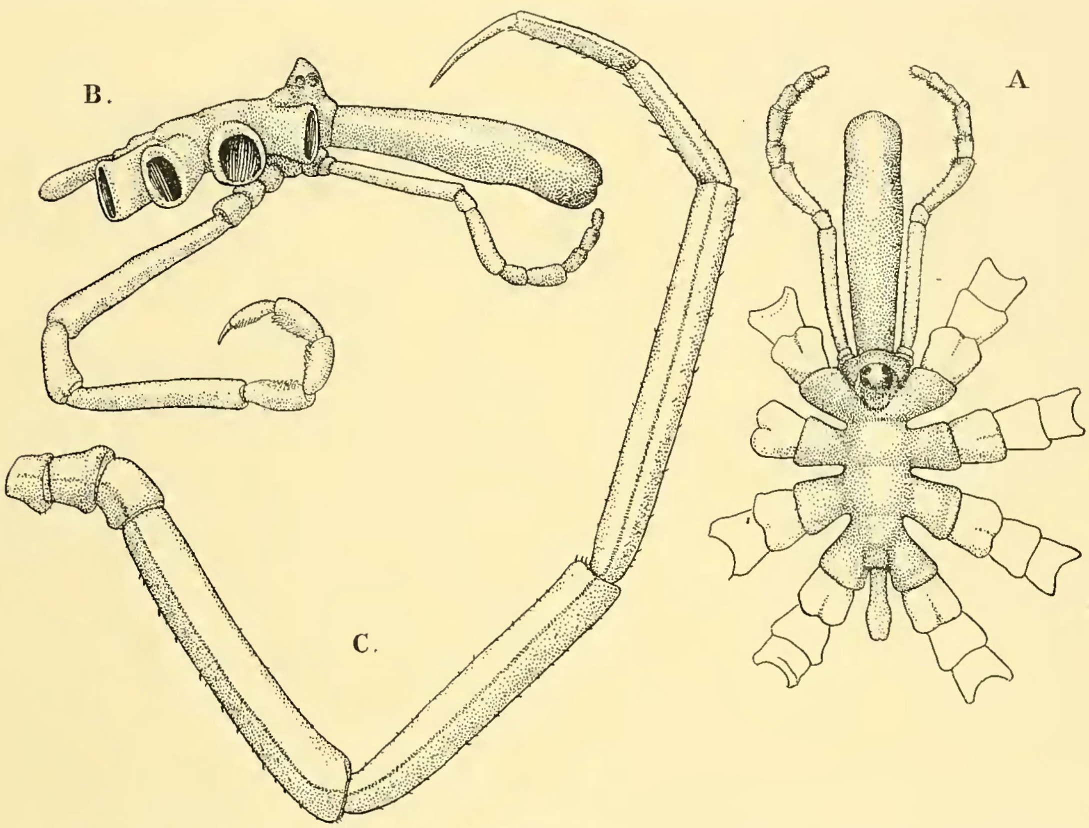

Fig. 4.—*Colossendeis lilliei*, sp. n., Female. A. Dorsal view of body with palps and coxæ. B. Lateral view of body with palp and oviger. C. Third leg of right side.

Proboscis hardly decurved, distinctly longer than trunk, less narrowed at base than in *C. robusta*, with proximal dilatation less abrupt and the widest part hardly beyond middle.

Abdomen distinctly clavate, longer than maximum diameter of proboscis.

Palp not differing greatly from that of *C. robusta* except that the terminal segment is much shorter than the preceding; distal segments minutely spinose.

Oviger resembling that of *C. robusta*; spines of distal segments (much worn in all the specimens) set, more or less regularly, in four rows.

Legs comparatively stout, greatest thickness of femur more than one-seventh of its length. Femur distinctly longer than first and shorter than second tibia. Tarsus subequal to propodus, claw more than three-fourths of length of latter.

Surface of trunk and proboscis smooth, legs rough with very minute spinules.

Measurements, in mm.—

	Holotype. ♀	♀	♂
Length of proboscis	11·0	10·5	9·0
Greatest diameter of proboscis . .	2·5	2·4	2·16
Length of trunk	9·0	8·75	8·0
Width between second and third lateral processes	2·64	2·96	2·25
Width across second lateral processes .	6·75	6·75	5·5
Length of abdomen	3·5	3·0	2·8
Third right leg—			
Coxæ	5·5	6·0	5·0
Femur	14·0	14·0	12·0
First tibia	13·5	13·75	11·5
Second tibia	16·0	16·0	13·5
Tarsus	5·75	5·44	4·32
Propodus	5·25	5·28	4·48
Claw	4·25	4·0	3·6
Palp—			
Second segment	5·6	—	—
Third ,, ...	·8	—	—
Fourth ,, ...	2·96	—	—
Fifth ,, ...	1·12	—	—
Sixth ,, ...	1·52	—	—
Seventh ,, ...	1·2	—	—
Eighth ,, ...	1·2	—	—
Ninth ,, ...	·88	—	—

Remarks.—This species appears to differ from *C. robusta* chiefly in having the lateral processes much closer together, the proboscis longer than the trunk, and the femur distinctly shorter than the second tibia.

In two out of the three specimens the palp of one side is imperfectly formed, the terminal segment being minute and fused with the penultimate. It is possible that in these cases the terminal segment is in process of regeneration after removal by accident, but, if so, the rarity of similar cases in other species lacks explanation.*

* Vanhöffen (1914, p. 580) mentions a deformation of the palp of *Ammothea glacialis*, Hodgson, due to the presence of a parasitic Isopod, *Coulmannia frigida*, Hodgson.

The species is named after Mr. D. G. Lillie, who was biologist in charge of the dredging and other work on board the "Terra Nova," to whom much credit is due for the extent of the collections brought home and their excellent condition.

Genus PENTANYMPHON, Hodgson.

Pentanymphon antarcticum, Hodgson.

P. antarcticum, Hodgson, 1904, p. 459, Pl. xiv; *id.*, 1907, p. 36, Pl. v; *id.*, 1908, p. 177; Bouvier, 1907, p. 30, text-figs. 3–6; *id.*, 1913, p. 66, text-figs. 22–24.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 1 specimen. Station 318, McMurdo Sound, 130 metres; 1 specimen. Station 331, Entrance to McMurdo Sound, 250 fathoms; 1 specimen. Station 338, Entrance to McMurdo Sound, 207 fathoms; 12 specimens. Station 340, off Granite Harbour, 160 fathoms; 3 specimens. Station 355, McMurdo Sound, 300 fathoms; 1 specimen. Station 356, off Granite Harbour, 50 fathoms; 18 specimens.

Measurements, in mm.—

	"Discovery," 30/3/03. Syntype. ♂ ovig.
Length of proboscis	2·2
Diameter of proboscis	·64
Length of trunk	6·64
Length of cephalic segment	2·72
Greatest width of cephalon	1·08
Width of neck	·4
Width between first and second lateral processes	·5
Width across second lateral processes	3·52
Third right leg—	
First coxa	·92
Second coxa	2·4
Third coxa	1·0
Femur	6·0
First tibia	6·48
Second tibia	9·92
Tarsus	1·8
Propodus	1·44
Claw	·68
Auxiliaries	·17
Palp—	
Second segment	1·43
Third ,,	·95
Fourth ,,	·50
Fifth ,,	·67

Remarks.—Prof. Bouvier, taking his measurements apparently from Mr. Hodgson's figures, concludes that the "Discovery" specimens differ from those of the "Français" and "Pourquoi Pas?" in the greater relative thickness of the neck and in some other characters of less importance; and he suggests, tentatively, that the species may be divided into two geographical races, the "forme laticolle" inhabiting the Australian province, and the "forme angusticolle" the Magellanic province of the Antarctic region. In the former the ratio between the width of the cephalon anteriorly and that of the neck is represented by the number 1·56, while in the latter it varies from 2·5 to 3·0. The actual specimens from which Mr. Hodgson's figures were drawn cannot now be identified, but it is very unlikely that the accuracy of the figures themselves is so great as Prof. Bouvier assumes it to be. In half a dozen specimens taken at random from among the syntypes of the species, I find the ratio to vary between 2·55 and 2·77, while a close scrutiny, without actual measurement, of the remaining syntypes as well as of the material obtained by the "Terra Nova" failed to reveal any conspicuously thick-necked individuals such as would correspond to a ratio of 1·56. It is, at all events, clear that the slender-necked form is by no means restricted to the Magellanic province, while the thick-necked form, if it exists at all, is in no way characteristic of the Australian province.

Both Hodgson and Bouvier comment on the difficulty or impossibility of perceiving the genital pores in many specimens of the male sex. This is the case also with most of the specimens that I assume to be males in the present collection, but in several ovigerous specimens they are visible on the legs of the last three pairs, as Hodgson states. Bouvier makes the very probable suggestion (previously made by Hoek in the case of *Boreonymphon robustum*) that the pores only appear at the breeding period. In the ovigerous males and in some others which, from their size, are probably approaching maturity, the ventral surface of the femur bears a series of about ten low, truncated tubercles, bearing the openings of the femoral glands.

In one specimen more transparent than the rest (perhaps from a recent moult) the general arrangement of the nervous system can be made out. There are six large ganglia in the ventral chain, each of them lying within the limits of the somite innervated by it, with the exception of the last, which is moved forwards into the penultimate somite.

Genus NYMPHON, Fabricius.

Although several writers (e.g., Meinert, 1899, p. 34) have commented on the indefinite character of the genus *Chætonymphon*, Sars, it is still retained as a valid genus by Prof. Bouvier in his latest memoir (1913, p. 94). I am encouraged to depart from this precedent, however, by the fact that Prof. Bouvier himself seems to have been misled by it, and to have described as a new species of *Nymphon* a form that had already been twice named and described in the genus *Chætonymphon* (see below, *N. australe*).

Nymphon charcoti, Bouvier.

N. charcoti, Bouvier, 1911, p. 1138; *id.*, 1913, p. 81, text-figs. 32–34.

Occurrence.—Station 294, Ross Sea, 158 fathoms; 2 ♀, 1 ♂. Station 349, McMurdo Sound, 80 fathoms; 1 ♀.

Measurements, in mm.—

	Station 349. ♀
Length of proboscis	8·5
Diameter of proboscis	2·56
Length of trunk	16·5
Length of cephalic segment	8·0
Greatest width of cephalon	4·12
Width of neck	1·48
Diameter of ocular tubercle	1·0
Width between first and second lateral processes	1·88
Width across second lateral processes	11·0
Third right leg—	
First coxa	4·0
Second coxa	9·0
Third coxa	3·5
Femur	23·0
First tibia	24·0
Second tibia	32·0
Tarsus	8·5
Propodus	5·5
Claw	4·5
Palp—	
Second segment	4·5
Third ,,	5·0
Fourth ,,	4·5
Fifth ,,	5·5

Remarks.—Our largest specimen, of which measurements are given above, considerably exceeds the maximum dimensions given by Bouvier, and shows that the species takes a place among the largest of the genus. Its limbs are much less setose than those of the male figured by Bouvier, but the other two females, as well as the male, have the setæ even longer and more numerous than in his figure. The male has the femora considerably less dilated than in Bouvier's specimen, not differing in this respect from the females. The claws of the legs are in no case conspicuously longer than the propodus, and in the specimen measured they are distinctly shorter. In all other respects the specimens agree very well with Bouvier's account, and confirm his opinion that the differences between his specimens were not of specific value.

Nymphon gracillimum, sp. n. (Text-fig. 5).

Occurrence.—Station 314, McMurdo Sound, 222–241 fathoms; 1 ♂ (Holotype).

Description.—*Trunk* elongated and slender, the lateral processes separated by more than their own diameter. Cephalic segment nearly as long as remaining segments together. Neck long and slender, less than half as wide as anterior dilatation of cephalon. Ocular tubercle broad, low, and rounded; ocular pigment abundant and dark.

Proboscis cylindrical, slightly decurved, rather pointed at the tip as seen from above, shorter than cephalic segment.

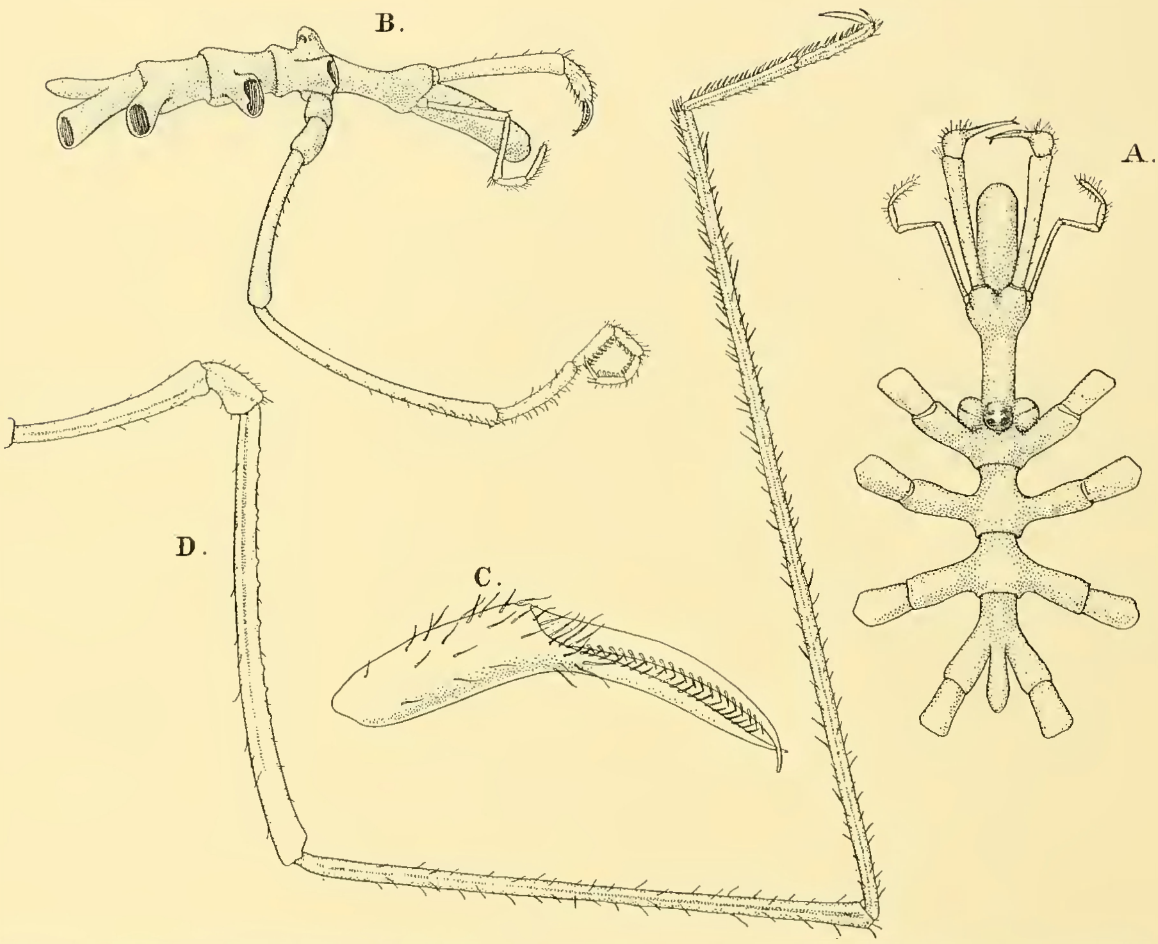

Fig. 5.—*Nymphon gracillimum*, sp. n., Male. A. Dorsal view of body with chelophores, palps, and first coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Chela, further enlarged. D. Third leg of right side.

Abdomen elevated, slightly clavate, and more than twice as long as wide.

Chelophore with scape longer than proboscis and six times as long as wide. Chela shorter than scape, fingers about one-third longer than palm.

Palp fairly slender, third segment three-fourths as long as second, fourth half as long as third and shorter than fifth.

Oviger long and slender, fourth segment two-thirds of length of fifth.

Legs very long and slender, rather sparsely set with spinous setæ, which become more numerous distally and only here and there exceed in length the diameter of the segment bearing them. Second coxa much longer than the other two together. Femur more than one and a half times as long as the three coxæ together, at least sixteen times as long as its greatest diameter, with a row of about ten gland-tubercles on its ventral edge. Second tibia about half as long again as the first and not much less than twice as long as the femur. Tarsus longer by about one-third than the propodus, the two together measuring about one-fourth of the second tibia. Main claw more than half as long as propodus and three times as long as auxiliary claws.

Measurements, in mm.—

	(Holotype.)
Length of proboscis	1·92
Diameter of proboscis	·56
Length of trunk	4·8
Length of cephalic segment	2·3
Greatest width of cephalon	·92
Width of neck	·4
Width between first and second lateral processes	·48
Width across second lateral processes	2·48
Third right leg—	
First coxa	·92
Second coxa	2·8
Third coxa	·8
Femur	6·4
First tibia	8·16
Second tibia	12·0
Tarsus	1·6
Propodus	1·2
Claw	·64
Auxiliaries	·2
Palp—	
Second segment	1·15
Third ,,	·85
Fourth ,,	·4
Fifth ,,	·58

Remarks.—This species is closely related to *N. gracilipes*, Miers, the characters and synonomy of which I have recently discussed elsewhere (1915*b*). In view of the considerable range of variation shown by the forms included under that name, it is possible that they may prove to be united by intermediate gradations with the species now described. For the present, however, the latter appears to be sufficiently distinguished by its greater slenderness, especially of the chelophores and legs, the relative shortness of the fourth and fifth segments of the palp, the greater length of the second tibia, and the fact that the claw is more than half as long as the propodus.

Nymphon hiemale, Hodgson.

N. hiemale, Hodgson, 1907, p. 20, Pl. iii, fig. 1, Pl. x, fig. 8.

Occurrence.—Station 338, Entrance to McMurdo Sound, 207 fathoms; 1 ♀.

Measurements, in mm.—

	"Discovery." Holotype. ♀
Length of proboscis	3·32
Diameter of proboscis	1·04
Length of trunk	6·64
Length of cephalic segment	2·96
Greatest width of cephalon	1·52
Width of neck	·56
Width between first and second lateral processes	·68
Width across second lateral processes	3·76
Leg—	
First coxa	1·28
Second coxa	2·96
Third coxa	1·36
Femur	9·6
First tibia	10·4
Second tibia	15·7
Tarsus	2.24
Propodus	2·16
Claw	·88
Auxiliaries	·3
Palp—	
Second segment	1·64
Third ,,	1·44
Fourth ,,	·75
Fifth ,,	1·1

Remarks.—The specimen obtained by the "Terra Nova" resembles very closely those got by the "Discovery." The measurements given above are taken from one of the latter labelled by Mr. Hodgson as the type.

Bouvier's key to the Antarctic species of *Nymphon* brings this species into proximity with *N. meridionale*, Hock, which I have regarded as a synonym of *N. gracilipes*, Miers. *N. hiemale* is, however, a much larger species, and differs in certain proportions of the body and limbs, as shown by the measurements given above. The greater length of the proboscis and shortness of the cephalic segment are noteworthy. There is also a characteristic difference in the fingers of the chelæ, which are much straighter, meeting along their length when closed. In *N. gracilipes* the movable finger is strongly arched, and the fingers gape widely even when the points cross for some distance.

Nymphon adareanum, Hodgson.

N. adareanum, Hodgson, 1907, p. 23, Pl. iii, fig. 3.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 12 specimens.

Measurements, in mm.—

	"Discovery." Holotype. ♂
Length of proboscis	·65
Diameter of proboscis at base	·5
Length of trunk	1·75
Length of cephalic segment	·85
Greatest width of cephalon	·68
Width of neck	·34
Length of abdomen	·65
Third right leg—	
First coxa	·4
Second coxa	·9
Third coxa	·45
Femur	2·05
First tibia	2·15
Second tibia	3·0
Tarsus	·3
Propodus	1·05
Claw	·5
Auxiliaries	·33
Palp—	"Terra Nova." ♀
Second segment	·34
Third ,,	·30
Fourth ,,	·12
Fifth ,,	·18

Remarks.—The "Terra Nova" specimens agree very closely with the holotype. The proportions of the palpal segments are incorrectly given by Hodgson. Those of the remaining palp of the holotype, which could not be measured without removal, do not differ perceptibly from those of a "Terra Nova" specimen of which the measurements are given above. The very small number and the simple form of the special spines on the ovigers are, as Hodgson has pointed out, unusual characters of this species. In a male from the "Terra Nova" collection the numbers of spines on the last four segments of the oviger are 2 : 1 : 1 : 1.

Nymphon proximum, sp. n. (Text-fig. 6).

Occurrence.—Station 295, Ross Sea, 190 fathoms; 1 ♂ (Holotype).

Description.—*Trunk* compact, all the lateral processes in contact, at least at the base, first two intersegmental articulations distinct, no neck. Width of cephalon a

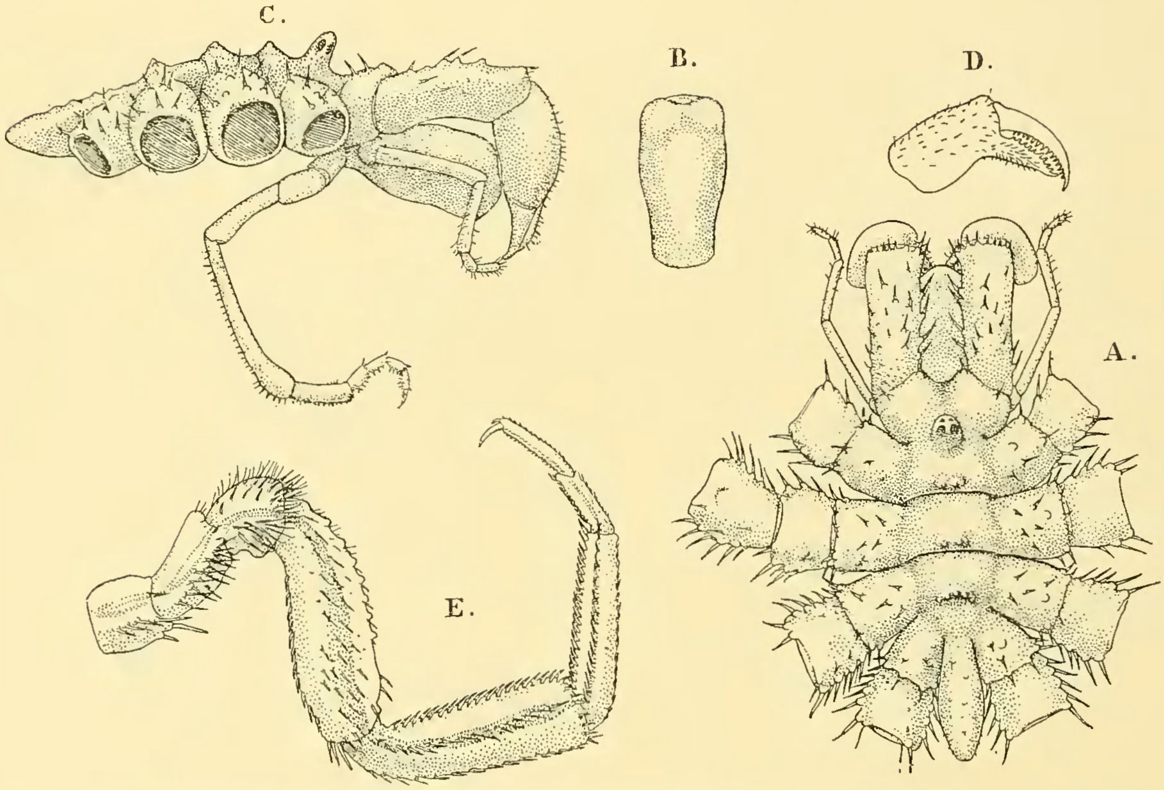

Fig. 6.—*Nymphon proximum*, sp. n., Male. A. Dorsal view of body with chelophores, palps, and coxæ. B. Ventral view of proboscis. C. Lateral view of body with chelophore, palp, and oviger. D. Chela, further enlarged. E. Third leg of right side.

little more than half length of trunk, greatest width of trunk across second lateral processes four-fifths of its length. Ocular tubercle about as high as it is wide, somewhat compressed antero-posteriorly, inclined forwards. A pair of stout setæ on a tubercle in middle of each of first three leg-bearing somites dorsally, and a number of short stout setæ on each of lateral processes.

Proboscis very stout, expanding from base for less than half its length, then cylindrical.

Abdomen horizontal, fusiform, about two-fifths of length of trunk.

Chelophore stout, scape armed above, and especially on inner face, with strong spiniform setæ. Chela with palm less than twice as long as wide, much longer than immovable finger, which forms an angle of roughly 120° with its inner edge. Immovable finger with setose pad extending for two-thirds of its length and with nine teeth on inner edge.

Palp with second segment longer by one-half than third, which is about three times as long as fourth or fifth.

Legs very stout but tapering rapidly from end of first tibia. Femur equal to first tibia and longer by one-fourth than second. Tarsus shorter than propodus, which is less than three times as long as claw; auxiliary claws not more than one-fourth of length of main claw. Legs beset with stout roughened spines much shorter than the diameter of the segments carrying them; on the tibiæ the spines are closely set in two dorsal, two lateral, and one ventral row. On ventral edge of femur is a row of about seven gland-tubercles.

Measurements, in mm.—	*N. proximum.* Holotype.	*N. villosum.* Holotype.
Length of proboscis	3·0	3·04
Diameter of proboscis	1·65	1·52
Length of trunk	5·0	4·2
Width of cephalon	2·75	2·8
Width across second lateral processes	4·2	4·0
Length of abdomen	2·1	2·0
Third right leg—		
Coxæ (together)	3·4	3·4
Femur	3·5	3·6
First tibia	3·5	4·0
Second tibia	2·8	3·8
Tarsus	1·2	1·4
Propodus	1·4	1·6
Claw	·5	·68
Palp—		
Second segment	1·8	1·72
Third ,,	1·2	1·36
Fourth ,,	·38	·46
Fifth ,,	·38	·7

Remarks.—This species approximates in many of its characters to *Chætonymphon villosum*, Hodgson, but differs conspicuously from it in having the covering of long hairs replaced by short stout spines. It further differs in the proportions of various

F 2

parts, the fingers of the chelæ being much shorter than in that species, the femur equal to the first tibia and longer than the second, the second segment of the palp relatively a little longer, and the last two segments of equal length. In *Ch. villosum* also the proboscis is not contracted at the base.

Nymphon biarticulatum (Hodgson)?

Chætonymphon biarticulatum, Hodgson, 1907, p. 28, Pl. iv, fig. 2, Pl. x, fig. 12.

Occurrence.—Station 314, McMurdo Sound, 222–241 fathoms; 1 ♀.

Remarks.—The single specimen agrees in many characters with the holotype of Hodgson's species, but differs in the more compact body, the shorter and stouter legs clothed with shorter setæ, the much less elevated ocular tubercle, and in a number of other minor points. It is quite possible that it may represent a distinct species, but as it is solitary and far from perfect, no good purpose would be served by a more detailed but necessarily incomplete description.

Nymphon mendosum (Hodgson).

Chætonymphon mendosum, Hodgson, 1907, p. 30, Pl. iv, fig. 3, Pl. x, fig. 13.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 3 specimens. Station 314, McMurdo Sound, 222–241 fathoms; 11 specimens. Station 318, McMurdo Sound, 130 metres; 1 specimen. Station 321, McMurdo Sound, 169 fathoms; 3 specimens. Station 338, Entrance to McMurdo Sound, 207 fathoms; 3 specimens. Station 340, off Granite Harbour, 160 fathoms; 13 specimens. Station 355, McMurdo Sound, 300 fathoms; 1 specimen. Station 356, off Granite Harbour, 50 fathoms; 7 specimens.

Remarks.—The form of the chelæ in this and some allied species appears to afford diagnostic characters to which sufficient attention has not yet been drawn. In *N. mendosum* the immovable finger lies nearly at right angles to the palm, the setose cushion on its lower edge occupies more than half its length, the movable finger extends beyond it for a considerable distance, and the teeth of both fingers are widely spaced. In the closely allied *N. biarticulatum* the immovable finger forms a very oblique angle with the palm, the setose pad extends for less than half its length, the overlap of the movable finger is less extensive, and the teeth are more closely set. *N. villosum*, again, is in most of these characters intermediate between the two.

Nymphon australe, Hodgson.*

N. australe, Hodgson, 1902, p. 257, Pl. xl.
Chætonymphon altioculatum, Möbius, 1902, p. 181, Pl. xxvi, figs. 1–6.
Chætonymphon australe, Hodgson, 1907, p. 32, Pl. x, fig. 14.
Ch. australe-var. *austrinorum*, Hodgson, t.c. p. 35, Pl. iv, fig. 4, Pl. x, fig. 15.
Nymphon stylops, Bouvier, 1911, p. 1137; *id.*, 1913, p. 73, text-figs. 25–31.

* The assumption that Hodgson's name has priority over that given by Möbius in the same year depends on the fact that the records of this Museum show the distribution of the "Southern Cross" Report to have been begun on 31st May, 1902, while Möbius' Report on the "Valdivia" Pycnogonida was not received by our Library until 30th December, 1902.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 4 specimens. Station 294, Ross Sea, 158 fathoms; 3 specimens. Station 314, McMurdo Sound, 222–241 fathoms; 3 specimens. Station 338, Entrance to McMurdo Sound, 207 fathoms; 200 specimens. Station 340, off Granite Harbour, 160 fathoms; 20 specimens. Station 356, off Granite Harbour, 50 fathoms; 11 specimens.

Measurements, in mm.—

	"Southern Cross." Holotype. ♀[1]	"Discovery." ♀[2]	"Terra Nova." Stn. 220. ♂[3] (ovig.)	"Terra Nova." Stn. 340. ♂[4] (ovig.)
Length of proboscis	2·64	3·2	2·56	3·52
Diameter of proboscis	1·2	1·12	1·12	1·36
Length of trunk	4·4	5·84	4·88	6·8
Length of cephalic segment	2·2	2·5	2·25	3·2
Greatest width of cephalon	1·92	1·6	1·76	2·4
Height of ocular peduncle	·8 (?)	1·28	1·12	1·36
Width between first and second lateral processes	1·12	·96	1·04	1·2
Width across second lateral processes	3·08	4·0	3·2	5·36
Third leg (right or left)—				
Coxæ (together)	3·6	4·4	3·68	6·4
Femur	3·6	5·36	3·6	6·64
First tibia	4·4	7·04	4·8	9·6
Second tibia	4·16	6·56	4·4	8·64
Tarsus	2·0	2·8	2·08	3·6
Propodus	1·6	2·08	1·6	2·4
Claw	·64	·88	·64	·96

[1] One of two specimens (♂ ♀) in tube labelled "figured specimens," here selected as Holotype.
[2] Syntype of var. *austrinorum*.
[3] Specimen approaching typical form.
[4] Specimen approaching var. *austrinorum*. See remarks below.

Remarks.—The great majority of the specimens obtained by the "Terra Nova" agree closely with the "Discovery" specimens that form the types of the variety *austrinorum*. There are, however, a number that, in their smaller size, longer legs, and more strongly built and hairier bodies, approach the typical form of the species without its being possible to separate them definitely from the others. I am not prepared to express an opinion as to the status of the variety *austrinorum*, but it may not be without significance that, of all the "Terra Nova" specimens, those that approach most nearly to the typical *australe*-form are the four obtained at Station 220, off Cape Adare, the type-locality for the species.

Bouvier's *Nymphon stylops* appears to differ in no essential feature, as far as his description and figures go, from the typical form of this species.

Genus AUSTROPALLENE, Hodgson.

Hodgson (1915, p. 144) has recently proposed this genus for the reception of those Antarctic species hitherto referred to *Pseudopallene* or to *Cordylochele*, which have a pair of spurs on the cephalon over the bases of the chelophores, and no terminal claw on the ovigers. Neither character is quite satisfactory, for the northern species of *Phoxichilus* (= *Pseudopallene*) have a group of conical tubercles in place of the cephalic spurs, and one of these tubercles may be larger than the others; while in *Austropallene* there is usually, perhaps always, a minute terminal spine, if not a "claw," on the oviger.

Austropallene cornigera (Möbius).

Pseudopallene cornigera, Möbius, 1902, p. 186, Pl. xxvii, figs. 14–20; Hodgson, 1907, p. 7, Pl. i, fig. 3; Bouvier, 1913, p. 97.
Cordylochele turqueti, Bouvier, 1905, p. 297; *id.*, 1907, p. 33, text-figs. 7–18 *bis*.
Pseudopallene australis, Hodgson, 1907, p. 10, Pl. i, fig. 2.
Austropallene cornigera, Hodgson, 1914–15, p. 144.

Occurrence.—Station 194, off Oates Land, 180–200 fathoms; 1 ♀, 1 ♂. Station 294, Ross Sea, 158 fathoms; 1 ♀. Station 314, McMurdo Sound, 222–241 fathoms; 6 ♀, 3 ♂, 3 immature. Station 338, Entrance to McMurdo Sound, 207 fathoms; 2 ♀. Station 355, McMurdo Sound, 300 fathoms; 1 ♀, 1 immature.

Remarks.—Differences of some importance exist between the specimens recorded under this name, without, however, affording ground for the recognition of more than one species. The relative length of the legs varies considerably, in some cases equalling that of the "Valdivia" specimens, and in others not exceeding the proportions recorded by Hodgson and by Bouvier. The following measurements (in mm.) are taken from specimens chosen as having nearly the same body-length:—

	Station 314. ♀	Station 338. ♀
Length of trunk	5.5	6·5
Third right leg—		
Total length	25·5	38·0
Femur	6·5	10·0
First tibia	6·0	9·5
Second tibia	6·75	10·5

Variations in the outline of the proboscis, the direction and length of the cephalic spurs, and the development of spurs on the lateral processes, all tend to confirm the synonymy given above, which combines the suggestions of Hodgson and of Bouvier. In all cases, however, the terminal lips of the proboscis are setose, not merely tuberculated as Bouvier found them.

Austropallene brachyura (Bouvier).

Pseudopallene brachyura, Bouvier, 1911, p. 1138; *id.*, 1913, p. 98, figs. 51–54.
Austropallene spicata, Hodgson, 1914–15, p. 144.

Occurrence.—Station 314, McMurdo Sound, 222–241 fathoms; 1 ♀. Station 338, Entrance to McMurdo Sound, 207 fathoms; 1 ♀. Station 340, off Granite Harbour, 160 fathoms; 1 ♀, 1 immature.

Remarks.—The specimens differ from Bouvier's account of this species in the following points: The spurs on the lateral processes and first coxæ are distinctly longer; on each lateral process, in addition to the spurs, there is a small tubercle about the middle of the distal edge; and the second coxæ have, on the dorsal surface, two rows of tubercles, much more prominent than in Bouvier's figure, and some of them almost spiniform. Like the holotype, all our specimens are females, and although somewhat larger, their measurements show a close agreement in proportions. There can, I think, be little doubt that Hodgson's *Austropallene spicata* has been founded on the male sex of the same species. The two syntypes that I have examined are both males, and they agree very closely with the "Terra Nova" specimens except for a slightly greater slenderness of body and a marked increase in the relative length of the second coxæ.

Austropallene tibicina, sp. n. (Text-figs. 7 and 8).

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 3 ♀, 2 ♂ (incl. Holotype).

Description.—Resembling *A. brachyura* in general form, but more slender and with the spurs of the body and legs much larger.

Cephalic segment nearly half the total length of the trunk, anterior dilatation about two and a half times the diameter of the neck. Ocular tubercle low, obtuse, much smaller in diameter than the neck, eyes well-separated, reddish.

Lateral processes separated by intervals of at least their own diameter, the first with one, the others with a pair of large distal spurs, and each also with a small conical tubercle in the middle of the distal margin. The lateral processes and their spurs are more elongated in the male than in the female.

Proboscis contracted, about the middle of its length, to a slender, downwardly-curved tube, with a conspicuous brush of setæ on the three terminal lips.

Abdomen relatively a little larger than in *A. brachyura*, directed obliquely upwards.

Chelophores slender, the scape more (♂) or less (♀) than four times as long as thick, shorter than the proboscis. Chelæ not more than two-thirds the length of the scape, movable finger strongly arched, toothless, shorter than the palm, immovable finger extending far beyond it, curved only at the tip, with two blunt tubercles between which the tip of the immovable finger fits; both fingers sharply pointed.

Oviger of male with fifth segment twice as long as fourth, bearing a short lateral process at its distal end.

Legs slender. First coxa of each with a pair of lateral spurs which, at least in the male, exceed the diameter of the segment. Second coxa three (♀) or four (♂) times as

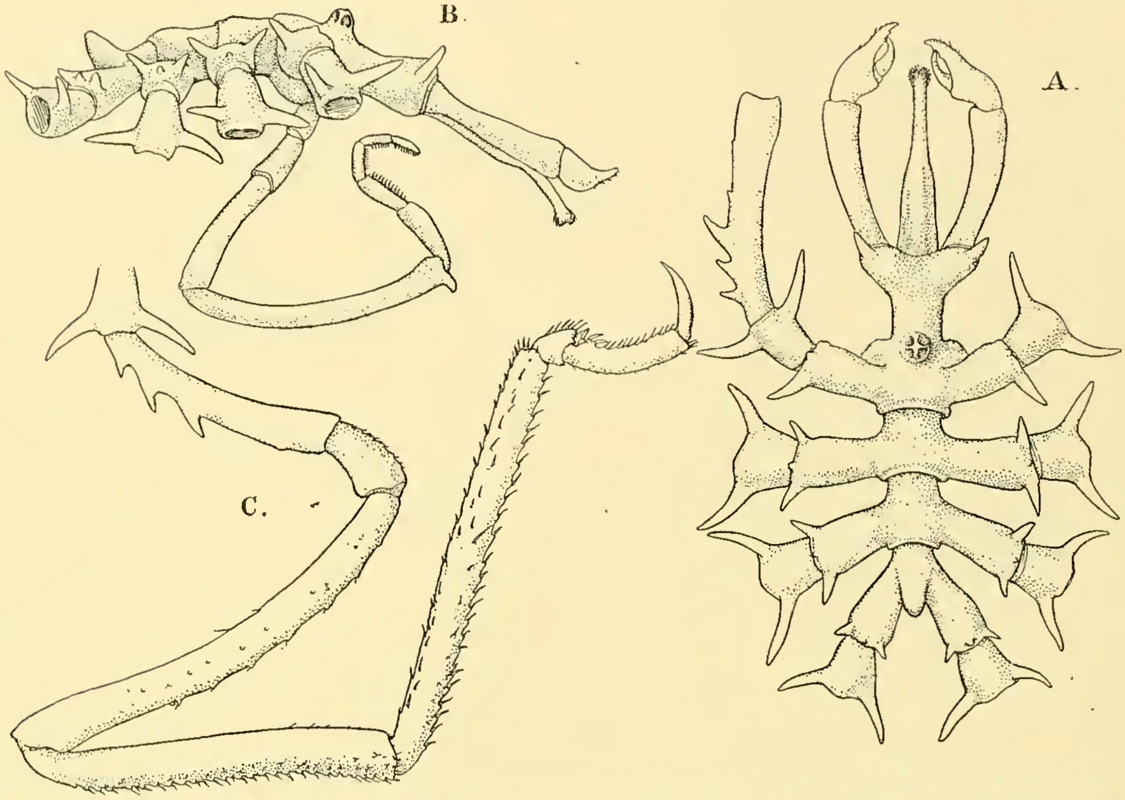

Fig. 7.—*Austropallene tibicina*, sp. n., Male. A. Dorsal view of body with chelophores and first and second coxæ. B. Lateral view of body with chelophore and oviger. C. Third leg of right side.

long as the first and a little less or more than half as long as the femur, gently curved and dilating distally; on the dorsal surface are two rows of tubercles, those of the

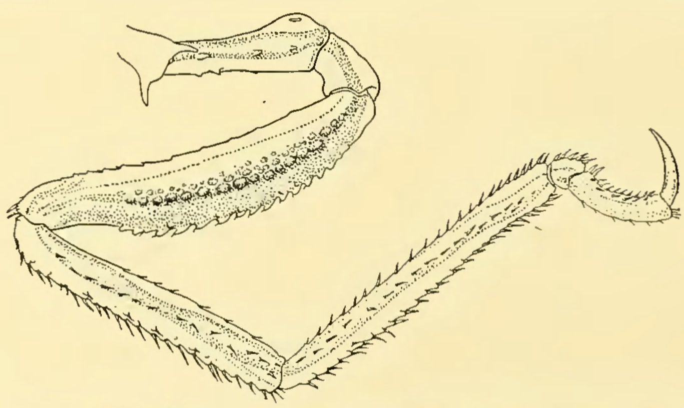

Fig. 8.—*Austropallene tibicina*, sp. n., Female. Third leg of right side.

posterior row the larger, and two or three of them in the male forming large spurs. Femur longer by one-fourth than the first tibia and subequal to the second.

Surface of body smooth, the legs spinous, especially the distal segments.

Measurements, in mm.—

	Holotype. ♂	♀
Length of proboscis	1·68	1·44
Diameter of proboscis at base	·36	·36
Diameter of proboscis near tip	·12	·12
Length of cephalon	·88	·76
Greatest width of cephalon	1·00	·92
Width of neck	·4	·38
Length of trunk	2·6	2·16
Width between first and second lateral processes	·44	·4
Width across second lateral processes	2·08	1·44
Third right leg—		
First coxa	·48	·44
Second coxa	1·92	1·36
Third coxa	·72	·48
Femur	3·72	3·04
First tibia	3·0	2·56
Second tibia	3·6	2·88
Tarsus and propodus	1·32	1·04
Claw	·72	·64

Remarks.—This species is allied to *A. brachyura*, especially in the armature of spurs on the lateral processes and proximal segments of the limbs and in the shortness of the abdomen. It differs from that species, amongst other characters, in the form of the proboscis with its slender distal part and conspicuous apical brush, and in the long and sharply pointed immovable finger of the chela.

GENUS PALLENOPSIS, Wilson.

Pallenopsis glabra, Möbius.

Pallenopsis glabra, Möbius, 1902, p. 184, Pl. xxvii, figs. 1–6; Hodgson, 1907, p. 11; Bouvier, 1913, p. 109, figs. 62–65.

P. hiemalis, Hodgson, 1907, p. 17, Pl. i, fig. 4, Pl. ii, fig. 3.

Occurrence.—Station 314, McMurdo Sound, 222–241 fathoms; 1 ♀. Station 338, Entrance to McMurdo Sound, 207 fathoms; 5 ♀, 4 ♂, 1 immature. Station 355, McMurdo Sound, 300 fathoms; 1 ♀.

Remarks.—Except that they are a good deal larger and more spiny, the "Discovery" specimens referred by Hodgson to *P. glabra* do not seem to me to differ greatly from the types of his *P. hiemalis*. Most of the specimens obtained by the "Terra Nova" resemble very closely the types of *P. hiemalis*, but they show a good deal of variation in the development of spines or setæ on the body and limbs, although none are quite so spiny as Hodgson's *P. glabra.* They also differ among themselves in the development of the rounded or irregular dorsal prominences on the lateral processes, in the sharpness of the distal corners of the first coxa, and in the extent and shape of the "spinous cushion" at the base of the movable finger of the chelophores. In some, this cushion is depressed and restricted to a small area at the very base of the finger, in others it occupies at least half of the length of the finger, and its distal end projects freely as a conical lobe as in Wilson's figure of the chela of *P. forficifer.* In all the females the femur is distinctly shorter than the second tibia, although the difference is less than in the males. Möbius and Bouvier agree that the femur is equal to the second tibia of the female in *P. glabra.*

At the distal ends of the femur and first tibia there are three small tubercles dorsally and an indistinct tubercle on each side below the lateral line. These tubercles vary in their degree of development, and can hardly be detected in the specimens referred by Hodgson to *P. glabra*; they correspond to the five processes that are found in this position in some or all of the species belonging to Loman's subgenus *Rigona.*

I am not at all confident that this species can be maintained as distinct from *Phoxichilidium patagonicum*, Hoek (1881, p. 84, Pl. xii, figs. 6–9). The only adult specimen among Hoek's syntypes is the female which he has figured. This differs considerably from all the specimens that I have referred to *P. glabra.* It has the lateral processes separated by less than half their own diameter at the base, the cephalon nearly parallel-sided as seen from above, with the ocular tubercle not occupying the whole of its width anteriorly; the chela is hardly widened distally, and its outer edge is straight; the propodus is about three times as long as wide, the main claw is less than half the length of the propodus, and the auxiliaries about half the length of the main claw. In adult specimens of *P. glabra* the lateral processes are separated at the base by a distance about equal to their own diameter, the cephalon narrows toward the front, where the base of the ocular tubercle occupies the whole of its width; the chela is widened distally, and its outer edge is concave; the propodus is about four times as long as wide, the main claw is usually more than half the length of the propodus, and the auxiliaries distinctly less than half the length of the main claw. When, however, the comparison is extended to the immature specimens of both forms, all these distinctions lose their sharpness; in particular, the immature specimen that Hoek described under the name *P. patagonicum* var. *elegans* (1881, p. 86, Pl. xii, fig. 10) appears to differ in no respect from specimens of *P. glabra* of similar size, except that the lateral processes are less than their own diameter apart, the main claws are a little shorter, and the auxiliaries a little longer.

Pallenopsis pilosa (Hoek).

Phoxichilidium pilosum, Hoek, 1881, p. 90, Pl. xiii, figs. 10–13.
Pallenopsis pilosa, Hoek, 1883, p. 9; Hodgson, 1907, p. 15, Pl. ii, fig. 2; Bouvier, 1913, p. 107, figs. 60 and 61.

Occurrence.—Station 294, Ross Sea, 158 fathoms; 2 ♀, 1 ♂.

Remarks.—The specimens agree very closely indeed with those of the "Discovery" collection, referred to this species by Hodgson. While accepting this identification, I would point out that the specimens from the Ross Sea region agree with one another in certain characters, in which they differ from the two surviving syntypes of Hoek's species.* In the latter the body and limbs are distinctly more slender, the lateral processes separated by nearly their own diameter, the abdomen nearly equal to the first two segments together, the auxiliary claws less than one-fourth as long as the main claws, and the "under-fur" of minute setæ is everywhere conspicuous on the surface of the body and legs. The Ross Sea specimens are more robust, the lateral processes separated by not more than half their own diameter, the abdomen is about equal to (only in one specimen distinctly longer than) the cephalic segment, the auxiliary claws are about one-third as long as the main claws, the under-fur is much less conspicuous and less generally distributed.

Pallenopsis vanhöffeni, Hodgson.

Pallenopsis vanhoffeni, Hodgson, 1914–15, p. 145.
P. gaussiana, *id.*, *ibid.*
P. setigera, *id.*, t.c. p. 146.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 1 young.

Remarks.—The single, very young specimen resembles fairly closely in size and structure the holotype of *P. gaussiana*, with which I have compared it. It seems very probable, however, that *P. gaussiana* is the young form of *P. vanhöffeni*, Hodgson; and, indeed, I find that Mr. Hodgson mentions this as a possibility in the description of the species that he has kindly permitted me to see in manuscript. The spines near the antero-lateral margins of the cephalon, which Hodgson notes as distinctive of *P. gaussiana*, are found also, although reduced in size, in the adult *P. vanhöffeni*. The species appears to be distinguished at all stages from *P. pilosa* by the fact that the trunk-segments are all coalesced.

I venture also to place *P. setigera* as a synonym of the same species. Mr. Hodgson relies for its discrimination largely upon the structure of the ovigers, which are stated to be club-shaped and composed of seven segments. The only adult specimen among the syntypes that I have examined is a male in which the oviger of the left side is broken off in the middle of the fifth segment. The right oviger has the sixth segment not perceptibly inflated or club-shaped; on its distal surface is a brown annular scar, from the centre of which rises a shrivelled soft papilla. There can be little doubt that the abbreviated condition of this oviger is the result of accident. In other respects the specimen appears to me indistinguishable from *P. vanhöffeni*.

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* From "Challenger" Station 157, depth 1,950 fathoms. The specimen recorded from Station 147 is not now in the collection.

Pallenopsis spicata, Hodgson (Text-fig. 9).

Pallenopsis spicata, Hodgson, 1914–15, p. 146.

Occurrence.—Station 338, Entrance to McMurdo Sound, 207 fathoms; 1 ♂ ovig.

Description.—*Trunk* distinctly segmented, the first three somites each with a pair of conical tubercles on dorsal surface close to hinder margin. Lateral processes

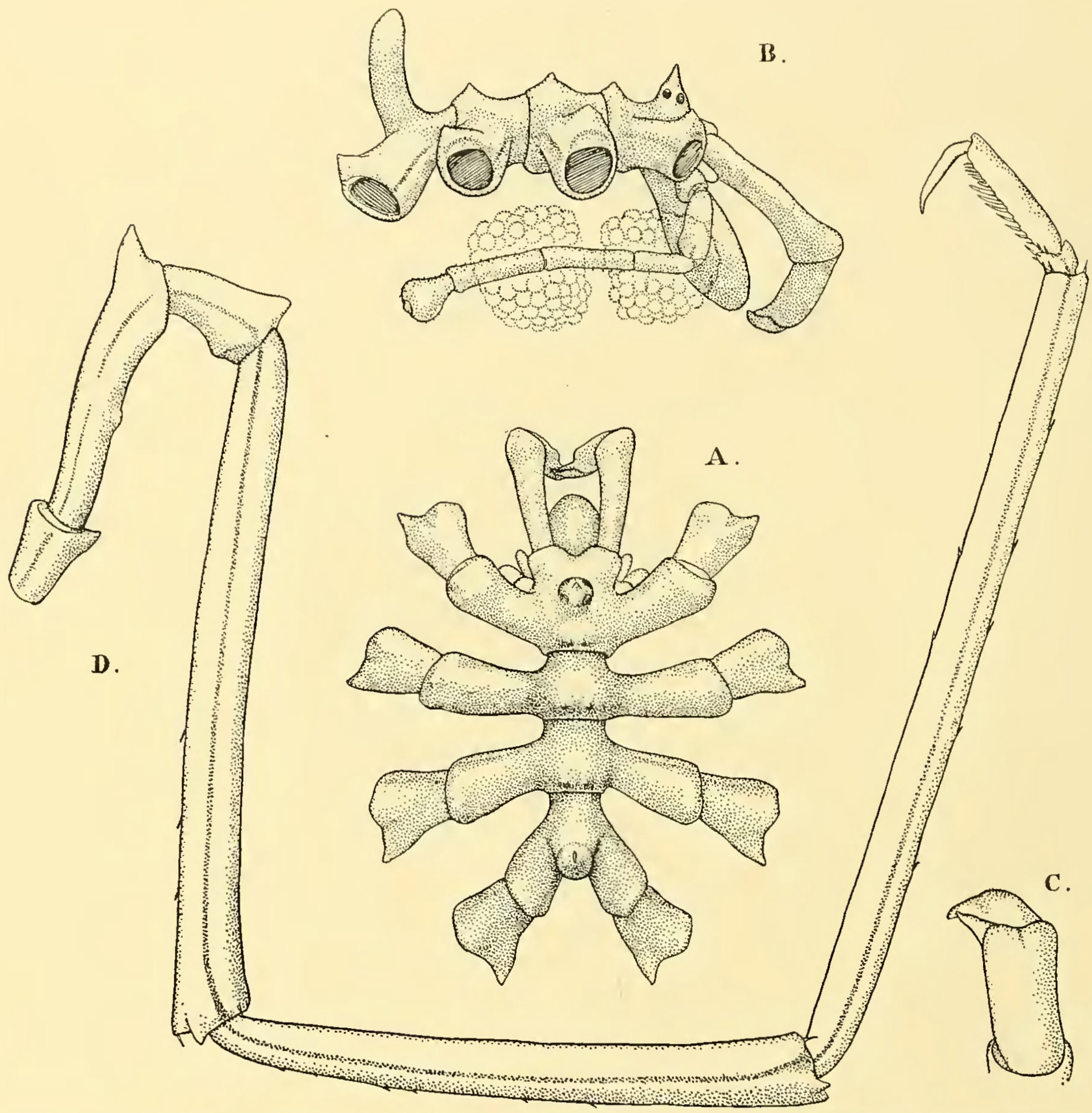

Fig. 9.—*Pallenopsis spicata*, Hodgson, Male. A. Dorsal view of body with chelophores, palps, and first coxæ. B. Lateral view of body with chelophore and oviger. Outlines of egg-masses dotted. C. Chela, further enlarged. D. Third leg of right side.

separated by intervals of at least half their own diameter, each with a bluntly conical tubercle distally. Cephalic segment hardly equal in length to the two following somites together. Cephalon little produced over base of proboscis, occupying about half the length of cephalic segment, much wider than long, slightly swollen over base of each chelophore. Ocular tubercle conical nearly from the base, not much taller than its basal diameter; anterior eyes hardly larger than posterior.

Proboscis directed obliquely downwards, slightly inflated, conoidal at apex.

Abdomen almost vertical, cylindrical, blunt.

Chelophores with scape undivided, palm of chela half as long as scape, movable finger with its distal or outer surface greatly swollen for two-thirds of its length, but bearing only a very few minute setæ.

Palp an elongate papilla wedged in between bases of chelophore and oviger.

Ovigers composed of seven segments; fourth and fifth equal, each more than half as long again as third, sixth little more than half as long as fifth, greatly dilated, pyriform, its greatest width twice that at the base, pale in colour and soft, set with minute recurved setæ; seventh segment forming a small soft papilla on distal surface of sixth.

Legs long and rather slender. First coxa with posterior corner of distal margin on dorsal side produced and conical. Second coxa much longer than the other two together, with a well-marked gland-tubercle about the middle of its upper surface and the distal end produced ventrally into a large acutely conical process which, in the last two pairs, carries the genital aperture on its proximal slope near the apex. Third coxa with lower distal angle also produced but less acute. Femur and first tibia and, less distinctly, second tibia, with three conical tubercles at distal end above, and one obscure tubercle on each side below, the lateral line. Opening of femoral cement-gland not detected, no projecting duct present. Second tibia with a distinct distal fringe of spines below. Propodus with ventral spines increasing in size from base for two-thirds of its length, beyond which is a group of smaller spines. Main claw about two-thirds as long as propodus. No auxiliary claws.

Surface of body and limbs smooth and naked, with only a few scattered spinules on the legs.

Measurements, in mm.—

Length of proboscis	4·25
Greatest width of proboscis	1·75
Length of cephalon	1·5
Width of cephalon	2·6
Length of cephalic segment	3·0
Length of trunk	7·25
Width between first and second lateral processes	1·4
Width across second lateral processes	7·75
Length of abdomen	3·25
Length of scape of chelophore	3·75
Length of palm of chela	2·0

Third right leg—

First coxa	2·0
Second coxa	6·0
Third coxa	2·25
Femur	16·5
First tibia	14·0
Second tibia	19·0
Tarsus and propodus	3·75
Claw	2·0

Remarks.—The specimen described above resembles the holotype, which is also a male, in almost every detail except that it is considerably larger.

This species differs from the typical forms of the genus *Pallenopsis* in the absence of auxiliary claws * and of the femoral gland-duct of the male, and most conspicuously in the structure of the ovigers. In the first of these characters it resembles *P. macronyx*, Bouvier, and, apparently, *P. brevidigitata*, Möbius.† The femoral duct is reduced to a papilla in the former of these species, and is not described or figured in the latter. An important point of resemblance is found in the ovigers of the male sex of *P. brevidigitata*, which have the sixth segment enlarged and pear-shaped. In that species, however, four normal segments follow the sixth, while in *P. spicata* the whole distal part is represented by a small papilla. It is worthy of note that this reduced number of segments in the oviger is found in the male sex, since it is in the female that other species of the genus show a tendency to a reduction of this appendage and a coalescence of some of its segments (Loman, 1908, p. 63). It would be of interest to know the condition of the oviger in the female and young of *P. spicata.* The condition found in the adult type-specimen of Hodgson's "*P. setigera*," described above, suggests as a possibility that the terminal segments may even be deciduous in the adult male.

Genus PHOXICHILIDIUM, Milne-Edwards.

Phoxichilidium australe, Hodgson (Text-fig. 10).

P. australe, Hodgson, 1914–15, p. 145.

Occurrence.—Station 355, McMurdo Sound, 300 fathoms; 2 ♂, 1 ♀.

Description of male.—*Trunk* elongated, segmentation distinct, lateral processes separated by about their own diameter. Cephalon narrowed in front, and produced over base of proboscis. Ocular tubercle more than half as wide as anterior part of cephalon, not higher than wide, inclined forwards, broadly rounded, with a small apical tubercle. Eyes dark.

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* *Cf.* also Hodgson's *Heteropallene* (1910*b*, p. 225).

† Although Möbius mentions "2 Nebenklauen" among the characters of the genus, they are omitted from his figures and not mentioned in his description of this species.

Proboscis slightly curved upwards, widest distally, and with a slight swelling about the middle; with a pair of short, conical teeth at lower angles of its truncated distal extremity.

Abdomen short and blunt, obliquely raised.

Chelophore extending well beyond proboscis, scape slender and curved, chelæ small, fingers gaping.

Oviger of five distinct segments, the third showing by a suture-line near the base that it consists of two segments coalesced. Terminal segment as long as preceding, with a few recurved spines.

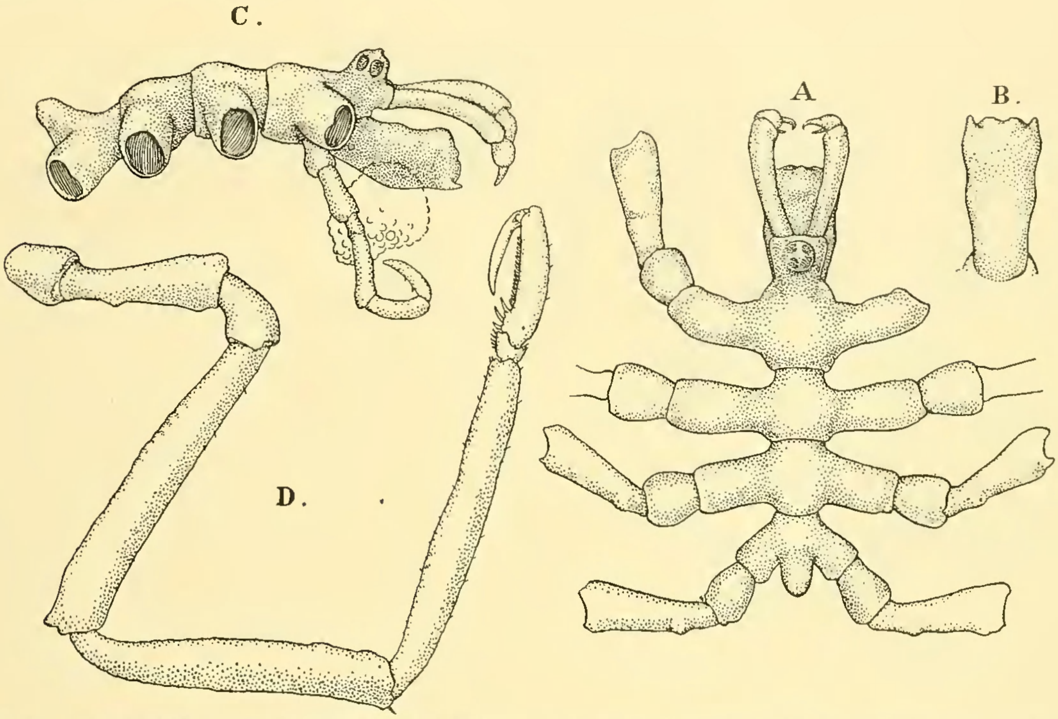

FIG. 10.—*Phoxichilidium australe*, Hodgson, Male. A. Dorsal view of body with chelophores and first and second coxæ. B. Ventral view of proboscis. C. Lateral view of body with chelophores and oviger. Outline of egg-mass dotted. D. Fourth leg of right side.

Legs with second coxæ longer than the other two together. Femur, first and second tibiæ subequal. Propodus with three stout spines at base of ventral edge, followed by a series of small spines of uniform size extending to near base of claw. Main claw two-thirds of length of propodus, auxiliaries very minute. A series of about seven inconspicuous tubercles on dorsal surface of femur carrying the large openings of cement-glands.

Measurements, in mm.—

	Station 355. ♂
Length of proboscis (below)	1·76
Greatest diameter of proboscis	·72

Length of trunk	3·08
Length of cephalic segment	1·2
Width between first and second lateral processes	·52
Width across second lateral processes	2·64
Fourth right leg—	
First coxa	·52
Second coxa	1·4
Third coxa	·76
Femur	3·2
First tibia	3·08
Second tibia	3·2
Tarsus and propodus	1·48
Claw	·76

Remarks.—The identification of the "Terra Nova" specimens with Hodgson's briefly described species has been confirmed by comparison with one of the syntypes.

The presence of only five segments in the oviger shows that the species must be referred to *Phoxichilidium* in the sense in which the genus is accepted by Loman (1908, p. 64). According to that author, only two of the described species belong to this genus—namely, *P. femoratum* (Rathke) and *P. robustum* (Dohrn). Hodgson's species agrees with the latter in the form of the proboscis (in which it also agrees with certain species, such as Dohrn's *P. angulatum*, that would be referred by Loman to *Anoplodactylus*), but differs in having the body segmented, the lateral processes separated, and the legs much longer and more slender.

Genus ENDEIS, Philippi.

Endeis, Philippi, 1843, p. 175; Norman, 1908, p. 231.
Chilophoxus, Stebbing, 1902, p. 187.
Phoxichilus, auctt. plur. nec Latreille, 1804, p. 137.

Genotype.—*Endeis gracilis*, Philippi, 1843, p. 176, Pl. ix, fig. 1.

Remarks.—Nothing appears to be wanting to justify Norman's restoration of *Endeis* in place of Stebbing's *Chilophoxus*, except a formal designation of the genotype, which is here supplied. Loman (1911, p. 16) states that Philippi described the ovigers (under the name of palps) as having eight segments, and bases on this a protest against the proposed change of name. As a matter of fact, Philippi's description and figure agree in attributing seven segments to the so-called "palps." In a later paper, Loman (1915, p. 200) makes no mention of this discrepancy, but maintains his protest on a different ground, "Puisque Philippi relève lui-même les différences entre *Endeis* et *Phoxichilus*, il serait par trop téméraire de vouloir identifier ces deux genres." The reply to this would seem to be that, whatever Philippi may have thought about it, his figures show clearly that he had before him a specimen congeneric with *Phalangium* *spinosum*, Montagu. The fact that Schimkewitsch (1913, p. 605) has discovered a type-specimen of *Endeis didactyla* and has identified it with Dohrn's *Ammothea magnirostris* only proves that Philippi's generic diagnosis, upon which Loman lays stress, agrees with neither of the species upon which it was based.

Endeis australis (Hodgson) (Text-fig. 11).

Phoxichilus australis, Hodgson, 1907, p. 5, Pl. 1, fig. 1; Bouvier, 1913, p. 118, text-fig. 74.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 1 ♀. Station 314, McMurdo Sound, 222–241 fathoms; 1 ♂, 2 ♀. Station 338, Entrance to McMurdo Sound, 207 fathoms; 1 ♀. Station 340, off Granite Harbour, 160 fathoms; 2 ♀. Station 355, McMurdo Sound, 300 fathoms; 1 ♂.

Remarks.—To the descriptions of this species by Hodgson and by Bouvier it may be added that a pair of small tubercles, more prominent in some specimens than in others, are present on the anterior margin of the cephalon above the base of the proboscis (Fig. 11). These tubercles appear to correspond to those regarded by Dohrn as vestiges of the chelophores. The orifices of the cement-glands described by Bouvier cannot be discerned in either of the males in this collection, possibly owing to the specimens not being fully mature.

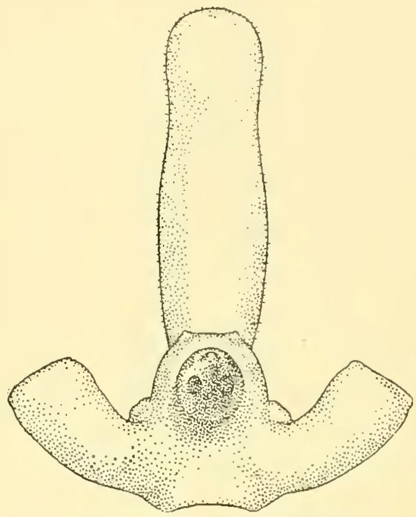

Fig. 11.—*Endeis australis* (Hodgson). Dorsal view of cephalic segment and proboscis of specimen showing well-developed cephalic tubercles.

Genus AMMOTHEA, Leach.

Ammothea, Leach, 1814, p. 33.
Leionymphon, Möbius, 1902, p. 183.

I have elsewhere (1915*a*) re-described the holotype of Leach's *Ammothea carolinensis*, with which I have attempted to show that Pfeffer's *A. grandis* is identical.

Bouvier (1913, p. 122) includes, among the characters distinguishing this genus from *Achelia*, "pas de saillie cémentaire fémorale." While it is true that there is no conspicuous prominence as in *Achelia*, the opening of the femoral cement-gland is very distinct, at a little distance from the end of the femur on the dorsal surface, and in *A. meridionalis* it is elevated on a gentle swelling visible in side view (Fig. 12, C and D, p. 54). Bouvier also, in his key, distinguishes *Ammothella* from *Ammothea* only by the biarticulate scape of the chelophores, but as he includes in *Ammothella* the *Achelia hispida* of Hodge, which has an unjointed scape, it might be better to use for this purpose the transverse ridges of the trunk somites, which are very distinct in all the species of the present genus.

Ammothea glacialis (Hodgson).

Leionymphon glaciale, Hodgson, 1907, p. 50, Pl. vii, fig. 3.
Ammothea glacialis, Bouvier, 1913, p. 123.

Occurrence.—Station 194, off Oates Land, 180–200 fathoms; 1 young. Station 220, off Cape Adare, 45–50 fathoms; 1 immature. Station 314, McMurdo Sound, 222–241 fathoms; 5 immature. Station 318, McMurdo Sound, 130–180 metres; 1 young. Station 322, McMurdo Sound, 20 metres; 1 ♀. Station 338, Entrance to McMurdo Sound, 207 fathoms; 2 ♀, 2 ♂ (ovig.), 3 immature. Station 340, off Granite Harbour, 160 fathoms; 2 ♀, 1 ♂ (ovig.), 2 immature, 1 young. Station 355, McMurdo Sound, 300 fathoms; 1 ♂ (ovig.), 3 immature. Station 356, off Granite Harbour, 50 fathoms; 1 young.

Remarks.—This species has hitherto been known only by the immature holotype obtained by the "Discovery" and an adult female recently recorded by Hodgson from the "Gauss" collection. It is the most abundant species of the genus in the collections of the "Terra Nova."

Adult specimens are little larger than the holotype, with which they agree except as regards the chelophores and, in the males, the ovigers. The form of the proboscis is better indicated by Hodgson's description than by his figure. The ovigers of the male have the distal segments modified as in other species of the genus; the terminal segment is little longer than the preceding.

Measurements, in mm., of adults from Station 338.—

	♀	♂
Length of proboscis	12	10·5
,, trunk	9	9·5
,, abdomen	4	3·5
Third right leg—		
Coxæ	11·5	11
Femur	17·25	15
First tibia	14·5	13·5
Second tibia	19	18·5
Tarsus and propodus	4·72	4·8
Main claw	2·32	2·4
Auxiliaries	1·24	·92
Palp—		
Second segment	4·8	4·4
Fourth segment	6·28	5·72

Young Stages.—Four very young specimens included in the list given above (Stations 194, 318, 340 and 356) are only referred to this species with some doubt. Their most conspicuous character is the presence on the legs of coarse short spines set in longitudinal rows; in the smaller specimens each spine is elevated on a conical prominence. The double dorsal tubercles of the lateral processes and first coxæ are also beset with short spines. The proboscis is about as long as the trunk, conical in the smaller specimens, but becoming slightly pyriform in the larger, decurved, with a slight constriction at one-third its length from the base. The transverse body-ridges have acute spine-like median processes as tall as the ocular tubercle. The fourth segment of the palp is not more than one-third longer than the second. The ovigers are represented only by minute buds.

In their spiny armature, these specimens resemble those described by Bouvier (1906, p. 20) as *A. curculio*, but afterwards (1913, p. 127) regarded by him as the young of *A. gibbosa*. They differ, however, in the form of the proboscis, which, in our specimens, is much stouter, and in the larger specimens shows a tendency towards a pyriform shape; further, in our largest specimens the second segment of the palp is three-quarters as long as the fourth, while in specimens of *A. gibbosa*, only a little larger, the proportion, in Prof. Bouvier's figure, is less than one-half.

Ammothea gibbosa (Möbius).

Colossendeis gibbosa, Möbius, 1902, p. 192, Pl. xxx, figs. 1–5.
Ammothea curculio, Bouvier, 1906, p. 20; *id.*, 1907, p. 40, figs. 19–22.
Leionymphon gibbosum, Hodgson, 1907, p. 40.
Leionymphon grande, Hodgson, 1907, p. 41, Pl. vi. fig. 1 (*nec Ammothea grandis*, Pfeffer, 1889, p. 43).
Ammothea gibbosa, Bouvier, 1913, p. 127, figs. 78–82.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 3 immature.

Remarks.—Bouvier, while referring some of his specimens to *A. grandis*, Pfeffer, and others to *A. gibbosa* (Möbius), expresses a doubt as to the separation of these two species. He also points out that the "Discovery" specimen figured by Hodgson as *A. grandis* shows some of the characters that he regards as distinctive of *A. gibbosa*.

The specimens obtained by the "Terra Nova," which are all immature, undoubtedly belong to the same species as the "Discovery" specimens. Like these, they differ much from some South Georgia specimens in the Museum collection, which I take to represent the *A. grandis* of Pfeffer and to be indistinguishable from the earlier *A. carolinensis* of Leach (Calman, 1915*a*, p. 314). The latter have the setules on the body and limbs shorter, more closely set, and much less distinctly separated in longitudinal bands, especially on the tibiæ, than have the "Discovery" and "Terra Nova" specimens; further, the abdomen is much more horizontal, and the distal ridge on the lateral processes is less distinctly bilobed. The median dorsal processes of the body-ridges are not, however, noticeably higher in the one case than in the other, and in none of the specimens are they so much expanded at the tip as in Bouvier's figure of the adult *A. gibbosa*. The somewhat greater length of the propodus in the South Georgia specimens also agrees with Bouvier's conception of *A. grandis*. On the other hand, Hodgson, after examining the type-specimens of Möbius and of Pfeffer, states that the specific identity of the "Discovery" specimens with the latter was established "beyond all doubt." The matter cannot, perhaps, be settled without a renewed appeal to the type-specimens, but the evidence available indicates that the "Discovery" and "Terra Nova" specimens should be referred to *A. gibbosa*, and that *Leionymphon grande*, Hodgson 1907, should be removed from the synonymy which I recently (1915*a*, p. 314) gave for *A. carolinensis*, Leach.

Measurements, in mm.—The following measurements are taken from adult females:—

	Ammothea gibbosa. "Discovery."	*Ammothea grandis.* South Georgia.
Length of proboscis	15·5	13
,, trunk	11	10
,, abdomen	3·5	3·25
Third right leg—		
Coxæ	12·5	10
Femur	14·5	11
First tibia	13	10
Second tibia	17	12·5
Tarsus and propodus	5	5·6
Main claw	2	2·3
Auxiliaries	1·28	1·28

Ammothea spinosa (Hodgson).

Leionymphon spinosum, Hodgson, 1907, p. 49, Pl. vii, fig. 2.
Ammothea spinosa, Bouvier, 1913, p. 123.

Occurrence.—Station 338, Entrance to McMurdo Sound, 207 fathoms; 1 ♀, 1 ♂.

Remarks.—This well-marked species was described by Hodgson from a single female specimen, with which the two now examined agree closely, the male differing only in the structure of the ovigers.

Ammothea minor (Hodgson).

Leionymphon minus, Hodgson, 1907, p. 44, Pl. vi, fig. 2.
Ammothea minor, Bouvier, 1913, p. 131, figs. 83, 84.
Ammothea gracilipes, Bouvier, 1913, p. 132, figs. 85–87.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 1 ♀, 1 immature. Station 340, off Granite Harbour, 160 fathoms; 1 ♂. Station ?, 1 ♀, 3 immature.

Remarks.—The specimens obtained by the "Terra Nova" unquestionably belong to the same species as the types of the "Discovery" collection, and, like them, agree rather better with Bouvier's account of the species he describes as *A. gracilipes* than with the immature specimen that he identifies with Hodgson's species. In the larger specimens the abdomen is much elevated, the legs, if not quite so slender as in Bouvier's figure of *gracilipes*, much more so than in that of *minor*, and the second coxa equal in length to the sum of the other two. In the smaller specimens the proportions of the legs, and in particular of the second coxa, approach more nearly to those of Bouvier's figure of *A. minor*, but the abdomen is still elevated.

Measurements, in mm.—

	"Discovery." Holotype. ♂	"Terra Nova." ♂
Length of proboscis	3·6	3·4
,, trunk	3·4	3·6
,, abdomen	1·12	1·2
Third right leg—		
First coxa	1·22	1·4
Second coxa	2·32	2·6
Third coxa	1·4	1·2
Femur	6·88	7·2
First tibia	7·04	6·8
Second tibia	8	8
Tarsus and propodus	2·8	2·8
Main claw	1·6	1·6
Auxiliaries	·72	·68

Ammothea australis (Hodgson).

Leionymphon australe, Hodgson, 1907, p. 46, Pl. vii, fig. 1.
Ammothea australis, Bouvier, 1913, p. 123.

Occurrence.—Station 331, Entrance to McMurdo Sound, 250 fathoms; 1 ♂. Station 338, Entrance to McMurdo Sound, 207 fathoms; 1 ♂. Station 340, off Granite Harbour, 160 fathoms; 1 ♂, 1 young. Station 356, off Granite Harbour, 50 fathoms; 1 young.

Remarks.—The specimens agree closely with syntypes of the "Discovery" collection and differ from specimens, which I refer to *A. clausii*, from South Georgia and the South Sandwich Islands, in having the abdomen obliquely set and separated by a short interval from the articulation between the last two trunk-somites, the apex of the ocular tubercle rounded with a small central spike instead of conical, and the setæ of the body and limbs less numerous. The spinous character of the young, referred to by Mr. Hodgson, is noteworthy.

Ammothea meridionalis, Hodgson (Text-fig. 12).

Ammothea meridionalis, Hodgson, 1914–15, p. 246.

Occurrence.—Station 356, off Granite Harbour, 50 fathoms; 1 ♂ ovig.

Description.—*Lateral processes* (except the last two pairs) separated by intervals much less than half their own diameter. Transverse body-ridges prominent, rising in the middle line into acutely conical processes. Cephalon wider than long, contracted behind, with a pair of spinose tubercles over the bases of the chelophores. Paired tubercles on the lateral processes fairly prominent. Ocular tubercle as tall as first transverse ridge, clavate, rounded above with an inconspicuous apical tubercle situated behind the middle.

Proboscis about as long as trunk, slightly contracted before the middle of its length, then conical towards the tip.

Abdomen nearly horizontal, narrowing a little from the base, half as long as the trunk.

Chelophores unusually long, extending to or beyond the middle of the proboscis, scape about five times as long as wide, slightly dilated, and armed with spines distally.

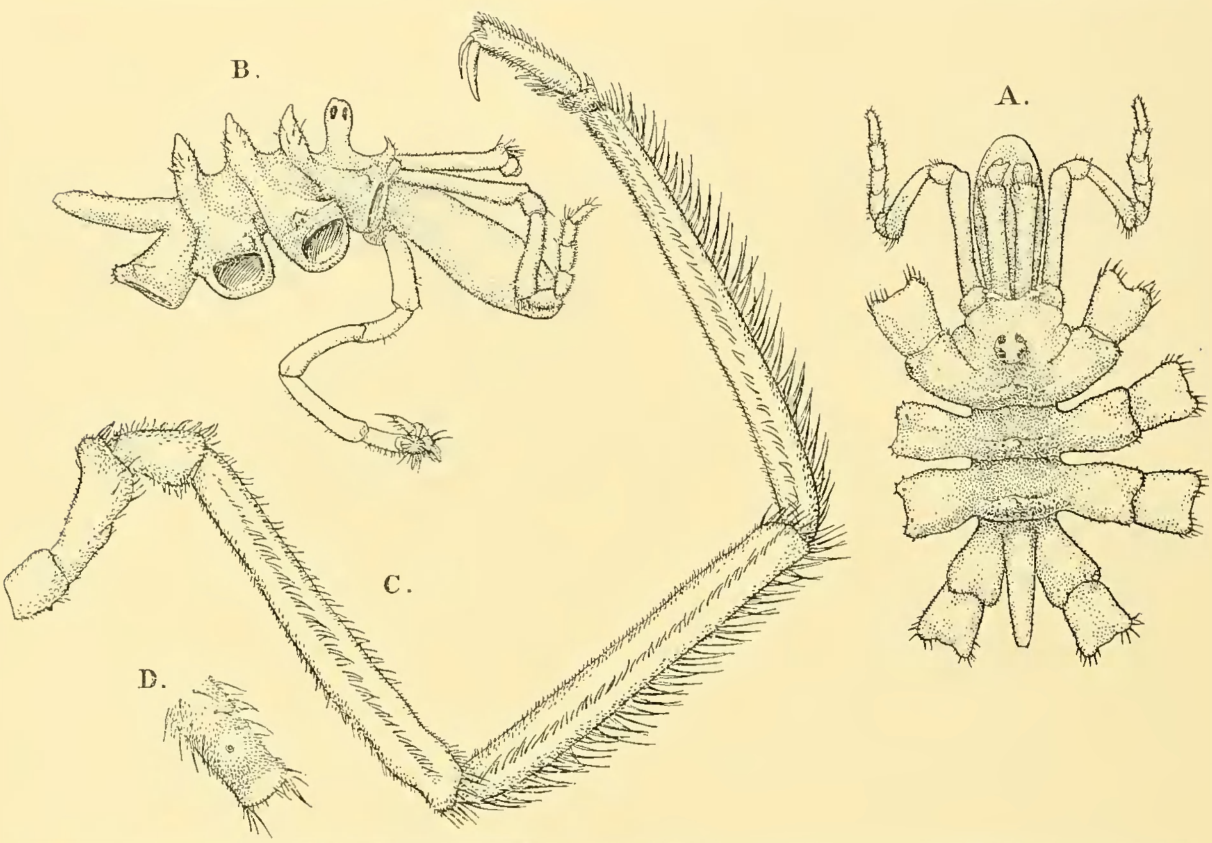

FIG. 12.—*Ammothea meridionalis*, Hodgson, Male. A. Dorsal view of body with chelophores, palps, and first coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Third leg of left side. D. Terminal part of femur from above to show opening of cement-gland.

Palp with second segment one-third to one-half as long again as fourth, the distal segments not dilated or serriform. *Oviger* with terminal segment more slender and a little longer than penultimate.

Second coxa twice as long as first, which is a little shorter than third. Femur equal to first tibia, and shorter than second. Propodus nearly straight, main claw more than half its length, auxiliaries two-thirds as long as main claw.

Body and limbs covered with minute close-set setæ, among which on the legs are scattered very much longer setæ; these become especially conspicuous on the tibiæ, where they are set in four rows, two dorsal and two lateral.

Measurements, in mm.—

	"Gauss." Holotype.	"Terra Nova." ♂
Length of proboscis	4·9	5·2
,, trunk	4·4	5·4
,, abdomen	2·24	2·48
,, chelophores	2·4	2·88
Third left leg—		
Coxæ	—	6·6
Femur	12	10·5
First tibia	12	10·5
Second tibia	14	12·5
Tarsus and propodus	—	3·28
Main claw	—	1·52
Auxiliaries	—	1·0
Palp—		
Second segment	2·64	3·0
Fourth ,,	2·0	2·0

Remarks.—In the great length and slenderness of the chelophores, in having the second segment of the palp much longer than the fourth, and in the very long hairs with which the limbs are beset, this species differs remarkably from all those hitherto described in this genus.

The holotype described by Mr. Hodgson differs from the "Terra Nova" specimen here figured only in having the chelophores a very little shorter, the second segment of the palp only about one-third, instead of one-half, longer than the fourth, and the abdomen a little longer, rather more elevated, and more clavate.

Ammothea striata (Möbius)?

Leionymphon striatum, Möbius, 1902, p. 183, Pl. xxvi, figs. 7–12.
Ammothea striata, Bouvier, 1913, p. 124, figs. 75–77.

Occurrence.—Station 194, off Oates Land, 180–200 fathoms; 1 ♂.

Remarks.—A single specimen of large size is referred, although with considerable doubt, to this species. Unfortunately, it is in such bad condition as to make a full determination of its characters impossible, the exoskeleton being soft and almost membranous, the body contracted, and the legs collapsed and crumpled.*

The most conspicuous feature of the specimen is the shortness of the proboscis, which measures only about 9 mm., while the length of the trunk is about 14 mm. As

* Mr. Lillie notes that the bottom at Station 194 consisted largely of "undecomposed animal *débris*."

regards this point, the accounts of *A. striata* are somewhat obscure. Möbius says that the proboscis is "fast so lang wie der Rumpf," but his figures show it as either about half or two-thirds as long. Bouvier describes it as "légèrement plus longue que le tronc," and figures it as little more than half as long. Both authors agree, however, that the proboscis is curved downwards, while in our specimen it is straight. Further, the abdomen is horizontal, the oviger more slender than in Bouvier's figure, and with the penultimate segment more nearly equal to the terminal one, the propodus has three or four very large spines on its inner edge, and the auxiliary claws are not more than one-fourth of the length of the main claw. The other characters, so far as they can be determined, are in general agreement with the accounts of *A. striata*. No fully adult specimen of this species appears to have been figured. Bouvier, although he enumerates only adults as having been taken by the "Pourquoi Pas?", figures a male with chelate chelophores, and, therefore, presumably immature.

Genus ACHELIA, Hodge.

Hodge, 1864, p. 114.

Hodgson (1910*a*, p. 436) having revived the name *Achelia*, Bouvier (1913, pp. 46 and 138) has restricted it to those Ammotheidæ that have eight segments in the palp, giving at the same time a warning that certain earlier names might have a claim to supersede it. The validity of these earlier names depends on the identification of species from European seas that cannot be discussed here, and I am content to follow Bouvier in using Hodge's name for the genus.*

Hodgson (1914–15, p. 147) has proposed a new genus *Austrothea* for two species which appear, from an examination of his type-specimens, to differ in no respect from the typical form of *Achelia* except that they have well-separated lateral processes and longer legs. It is clear that these characters by themselves cannot furnish a basis for generic distinction, and, in fact, the present collection gives evidence that they are subject to variation within the limits of a species. I propose, therefore, to regard *Austrothea* as a synonym of *Achelia*. Of the two species of *Austrothea* described by Hodgson, one, *A. spicata*, is represented by many specimens in the "Terra Nova" collections and is redescribed below; the other, *A. germanica*, is described by Hodgson from a very young specimen with chelate chelophores, and I can express no opinion on its specific distinctness; like specimens of similar age in the present collection, it has the ocular tubercle very tall, slender, and acutely conical.

More than a hundred specimens belonging to this genus were obtained by the

* It may be pointed out, however, that the identification of Costa's *Alcinous vulgaris* with Dohrn's *Ammothea franciscana*, which Bouvier adopts apparently from Norman, might justify, although it does not compel, the use of *Alcinous*; also that, in identifying the still earlier *Paribœa spinipalpis*, Philippi, with *Achelia echinata*, Hodge, Bouvier, by omitting the mark of interrogation placed by Norman against this identification, surrenders our last defence against the revival of Philippi's generic name. See, however, Schimkewitsch (1913, p. 605).

"Terra Nova," all except three from a single station. The classification of these presents difficulties that I have not been able to solve entirely to my own satisfaction. The vast majority (after putting aside a few young specimens that I have not attempted to refer to their species) can be grouped as shown in the following key, where the groups are regarded as species related to *A. communis* (Bouvier).

Key to the species of Achelia examined.

a. Auxiliary claws less than half as long as principal claw. Ocular tubercle higher than wide, apex conical.
- *a'.* First three trunk-somites separated by articulation. Lateral processes separated. Chelophores extending to middle of proboscis . . *A. spicata* (Hodgson)
- *b'.* All trunk-somites coalesced. Lateral processes in contact. Chelophores extending to one-third of length of proboscis . . . *A. intermedia*, sp. n.

b. Auxiliary claws more than half as long as principal claw. Ocular tubercle not higher than wide, rounded, with an apical point.
- *a'.* First three trunk-somites separated by articulation. Chelophores extending to middle of proboscis. Antero-lateral tubercles of cephalon prominent . . . . [*A. communis* (Bouvier)]
- *b'.* All trunk-somites coalesced. Chelophores less than half as long as proboscis. Antero-lateral tubercles obscure or wanting . . *A. brucei*, sp. n.

Unfortunately for the simplicity of this arrangement, however, there remain over three specimens that, on account of differences in the segmentation of the body, are excluded from all these categories, and there are a few others in which the agreement with one or other of the species is not so obvious and complete as might be desired. The number of these aberrant specimens is so small that it is perhaps justifiable to leave them out of account as "abnormal," but, added to the variations that occur within the groups here treated as specific, they tend to shake our confidence in the stability of these groups. I am inclined to think that future work may result in ranking *A. intermedia* as a form of *A. spicata*, and *A. brucei* as a form of *A. communis*, if, indeed, it be not found necessary to include all four under one specific name.

Achelia spicata (Hodgson) (Text-figs. 13 and 14).

Austrothea spicata, Hodgson, 1914–15, p. 147.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 23 ♀, 13 ♂. Station 355, McMurdo Sound, 300 fathoms; 1 ♀, 1 ♂.

Description.—*Trunk* hardly longer than its greatest width, across the second lateral processes; first two intersegmental articulations very distinct, third marked only by a faint superficial groove. Lateral processes more or less well separated, the last two pairs usually separated to the base; a pair of dorsal tubercles, the posterior the larger, on each of the first three lateral processes, and a small anterior tubercle only on the last lateral process. Cephalon a little wider than long, without antero-lateral tubercles. Ocular tubercle much higher than wide, inclined forwards, conically tapered above the eyes; anterior pair of eyes not much larger than posterior.

Proboscis about two-thirds of length of trunk, widest about the middle, where its width is less than half its length.

Abdomen horizontal, little shorter than proboscis, reaching beyond middle of second coxa of last legs, slightly clavate and bluntly pointed.

Chelophores extending to, or a little beyond, middle of proboscis. *Palps* with second and fourth segments equal, sixth and seventh produced ventrally, terminal segment little longer than preceding.

First coxæ each with two conical tubercles of which the posterior is the larger. Femur and first and second tibiæ subequal or slightly longer successively; femur from about three times as long as deep in the female to more than six times in the male. Auxiliary claws one-third as long as main claw.

Sexual differences.—Apart from the usual differences in the diameter of the femora, the males apparently tend to have the trunk more elongated and the lateral processes more widely separated than in the females; they have also the tubercles on the lateral processes more prominent and those of the first coxæ forming spurs which may be as long as the width of the segment.

Variation.—The specimens examined differ among themselves in the relative length of the body, the degree of separation of the lateral processes, and the length of the legs. Two extreme types are represented in Figs. 13 and 14, but many specimens are intermediate. In the more elongated forms the spiniform tubercles on the lateral processes and first coxæ are longer, as is also the conical apex of the ocular tubercle.

Two specimens differ from the typical form in the segmentation of the body. In one, there is a very distinct articulation between the last two somites; in the other, the only articulation is between the first two.

Measurements, in mm.—The measurements here given are taken from two fairly representative specimens:—

	♂	♀
Length of proboscis	1·2	1·04
Greatest width of proboscis	·5	·44
Length of trunk	1·72	1·6
Width across second lateral processes	1·6	1·52
Length of abdomen	1·04	·92
Third right leg—		
Coxæ	1·52	1·48
Femur	1·8	1·84
First tibia	1·88	2·0
Second tibia	2·0	1·92
Tarsus and propodus	1·08	1·2
Main claw	·56	·52
Auxiliaries	·16	·16

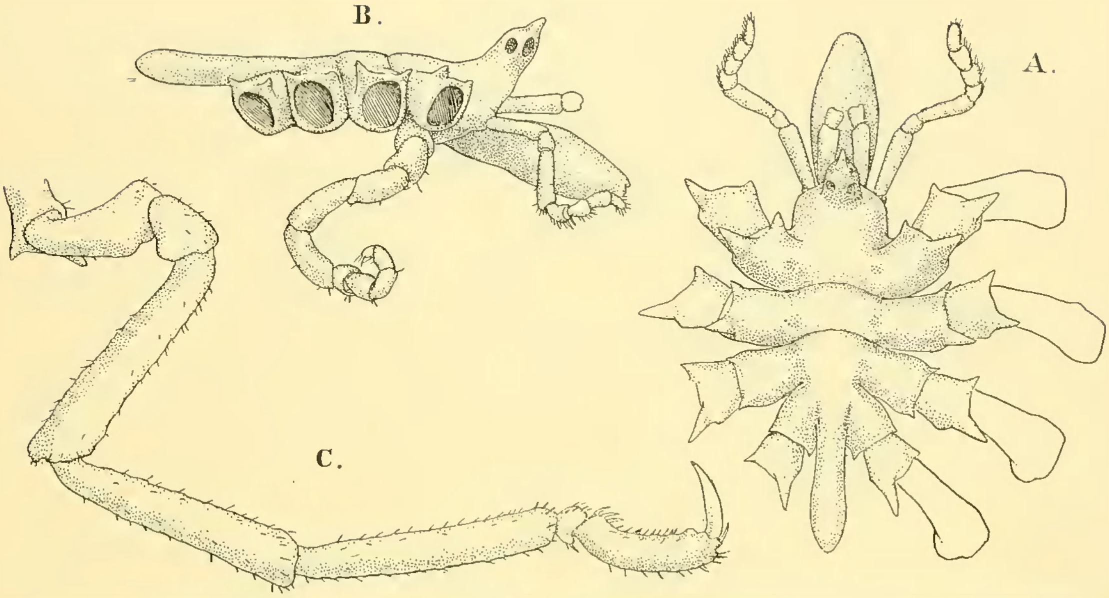

Fig. 13.—*Achelia spicata* (Hodgson), ovigerous Male of the more compact type. A. Dorsal view of body with chelophores, palps, and first and second coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Third leg of right side.

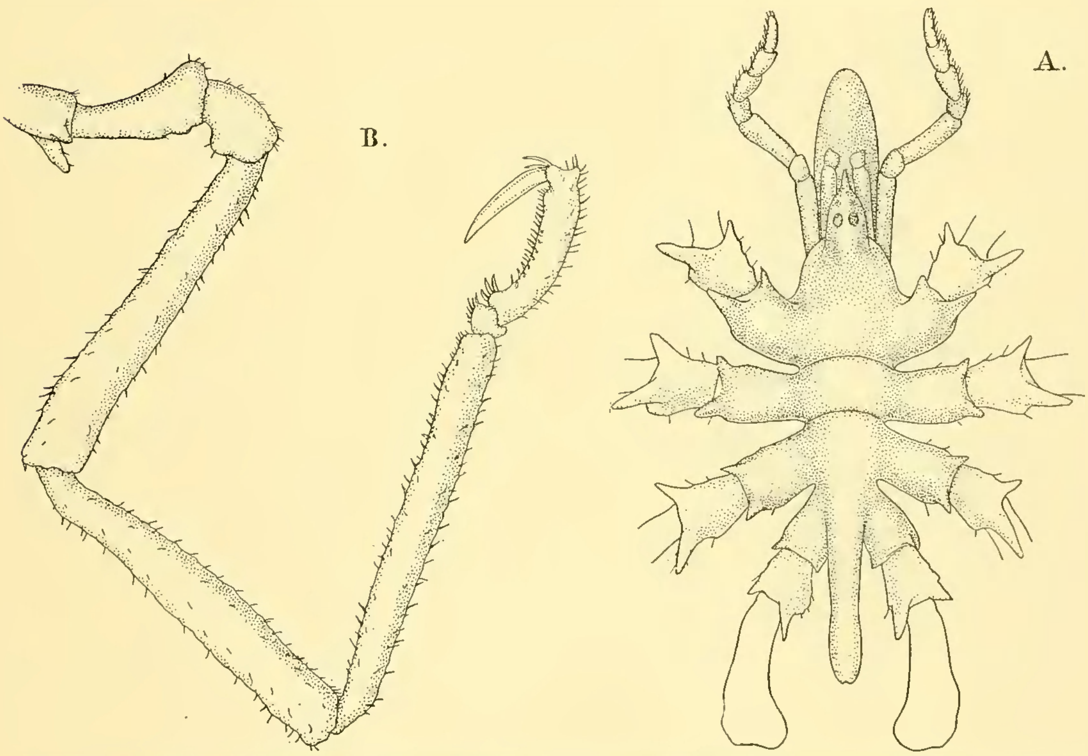

Fig. 14.—*Achelia spicata* (Hodgson), ovigerous Male of the more slender and elongated type. A. Dorsal view of body with chelophores, palps, and first and second coxæ. B. Third leg of right side.

Remarks.—I have examined two of Mr. Hodgson's syntypes. One is immature, and the other, an adult female, is of a slender type with very long legs and with the femora less dilated than is usual in this sex. In other respects it resembles very closely indeed the slender male here figured (Fig. 14) except that the lateral processes are not so well separated.

Achelia intermedia, sp. n. (Text-fig. 15).

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 5 ♀, 6 ♂ (incl. Holotype).

Description.—The specimens that are referred to this species differ from the more compact forms of *A. spicata* only in the following points:—

(1) The lateral processes are all in contact and the segmentation of the body is

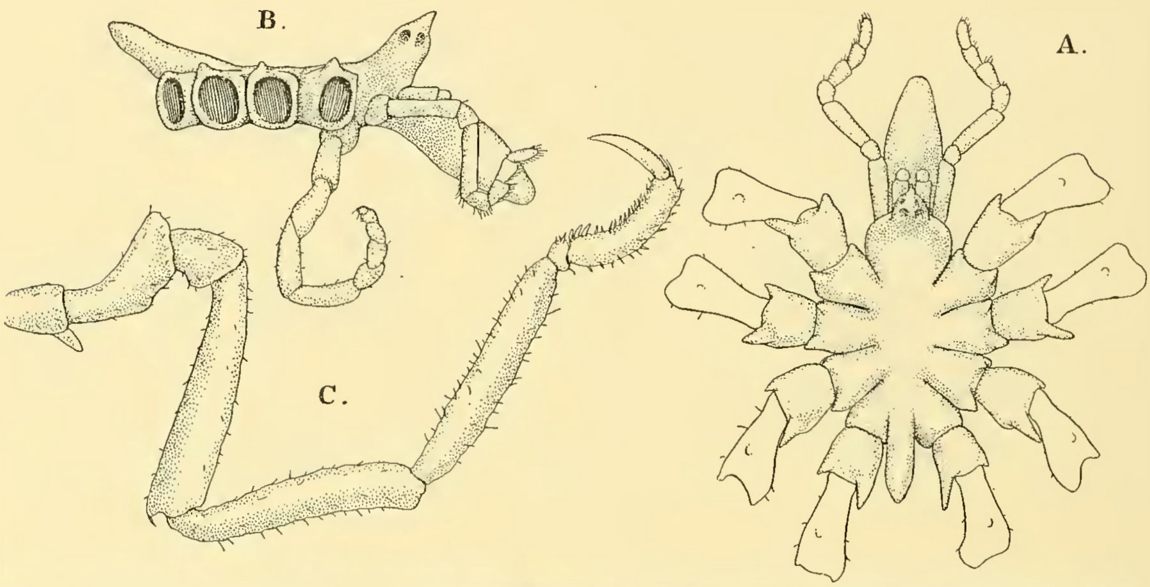

Fig. 15.—*Achelia intermedia*, sp. n., ovigerous Male. A. Dorsal view of body with chelophores, palps, and first and second coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Third leg of right side.

obliterated, the limits of the somites being marked only by faint grooves. The trunk is relatively shorter, less than one-third longer than the proboscis.

(2) The chelophores are much shorter, not extending beyond one-third of the length of the proboscis.

(3) The abdomen is shorter, not reaching to the middle of the coxæ of the last pair.

In all these characters the specimens approach those described below as *A. brucei*. From these, however, they are at once distinguished by the short auxiliary claws and by the much higher ocular tubercle.

Achelia brucei, sp. n. (Text-fig. 16).

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 46 ♀, 16 ♂ (incl. Holotype).

Description.—The specimens recorded under this name differ from *A. communis* (Bouvier) (of which I have examined four specimens, presented to the British Museum by Prof. Bouvier) only in the following characters:—

(1) The somites of the trunk are defined dorsally only by more or less indistinct grooves on the surface of the integument. Very often the groove between the first and second leg-bearing somites, and less often that between the second and third, are emphasised by differences of colour, but only in one single specimen do these two lines appear to be marked by an actual fold of the integument giving a distinct double outline, as in the specimens of *A. communis*.

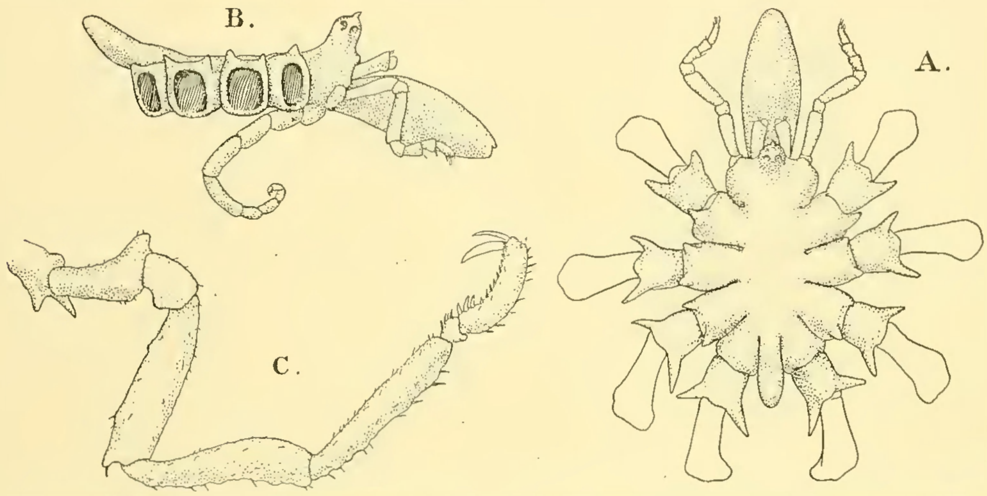

Fig. 16.—*Achelia brucei*, sp. n., ovigerous Male. A. Dorsal view of body with chelophores, palps, and first and second coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Third leg of right side.

(2) The chelophores fall far short of the middle of the proboscis. In the specimens of *A. communis* that I have examined they reach the middle.

(3) The antero-lateral tubercles of the cephalon are very slight or altogether absent in the female, and much less prominent in the male than they are in *A. communis*.

(4) The setæ on the legs are less numerous.

The value of these characters is somewhat discounted by the comments that Bouvier makes on the variability of his species, but the constancy of the segmentation of the trunk in the large number of specimens that I have examined suggests that this character, at all events, is of specific value.

The specific name is chosen in compliment to Commander Wilfred M. Bruce, R.N.R., who, I am informed, gave valuable help in the operations of trawling and dredging on board the "Terra Nova."

GENUS AUSTRORAPTUS, Hodgson.

In addition to the genotype, *A. polaris,* I have provisionally included in this genus two species, apparently new, which differ from it in characters that might justify generic separation. One species, however, is represented by a solitary specimen, and it is not quite certain, though it is probable, that it has assumed adult characters. The other species might have been removed from the genus without much hesitation were it not for the character of the palps in a young specimen that I suppose to belong to *A. polaris.* If they have been correctly interpreted, the two new species retain respectively in the adult condition two different characters—the chelate chelophores and the eight-segmented palp—that are united in the larva of *A. polaris.*

Austroraptus polaris, Hodgson (Text-fig. 17).

A. polaris, Hodgson, 1907, p. 54, Pl. viii, fig. 2.

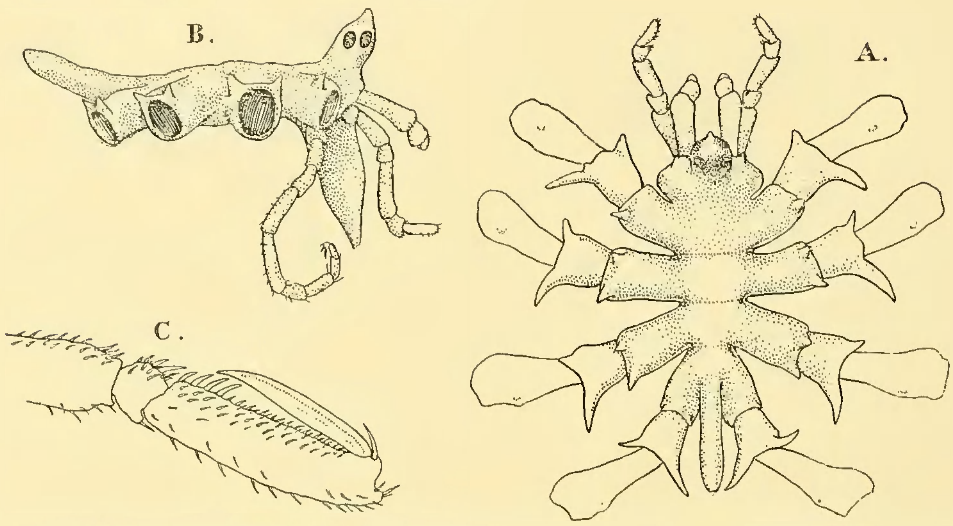

FIG. 17.—*Austroraptus polaris,* Hodgson, Female syntype from "Discovery" collection. A. Dorsal view of body with chelophores, palps, and first and second coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Terminal part of one of the legs.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 1 ♀, 1 young.

Measurements, in mm.—

	"Discovery." Syntype. ♀
Length of trunk	2·4
Third right leg—	
Coxæ (together)	2·56
Femur	4·6
First tibia	4·6
Second tibia	4·4
Tarsus and propodus	1·68
Claw	1·0

Remarks.—As the figures of this species in Mr. Hodgson's report are not altogether satisfactory, I give some additional figures prepared from the female syntype. The male hardly differs except that the ocular tubercle is taller and more slender. The relative lengths of the long segments of the leg differ a little even in the legs of the same individual. The male has genital apertures on the last two pairs of legs only, not on the last three, as stated in the original description. The female syntype has apertures on all the legs except the second on the right side; this is evidently an abnormal condition, and the "Terra Nova" specimen has apertures on all the legs.

A young specimen, with chelate chelophores, is referred to this species rather than to either of the two following, chiefly because it has the lateral processes separated to the base and the spurs on the lateral processes and first coxæ long and acute. It differs from the adult in having the ocular tubercle produced above the eyes into a long slender apical cone which is longer than the basal part (as in young specimens of *Achelia* in the present collection); the proboscis is more produced at the tip than in the adult; the fingers of the chelæ are strongly arched and gaping. The most important character, however, is that the terminal portion of the palp, corresponding to the terminal segment in the adult, is divided into two segments in the palp of one side and into three in that of the other. This makes it very probable that the young of *A. polaris*, like the adults of *Achelia*, have the palp composed of eight segments, and the retention of this feature in the adults of *A. juvenilis*, described below, need not be regarded as a generic distinction.

Austroraptus juvenilis, sp. n. (Text-fig. 18).

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 1 ♂ ovig. (Holotype), 1 ♀.

Description.—*Body* compact, the lateral processes in contact for almost the whole of their length, intersegmental lines marked only by superficial grooves. Cephalon about twice as broad as long, inflated laterally and with convex anterior margin; antero-lateral tubercles very small. Ocular tubercle stout, much taller than wide, inclined forwards, the blunt apical cone above the eyes shorter than the basal part. Lateral processes each with a broad rounded tubercle near the posterior distal corner and a more or less vestigial anterior tubercle.

Proboscis directed almost vertically downwards, slightly inflated a little beyond the base, then acutely conical with a minutely truncate apex.

Abdomen elevated, clavate, about half as long as trunk.

Chelophores with scape about twice as long as wide, slightly expanded distally. Second segment irregularly globose.

Palp a good deal stouter than that of *A. polaris*, similarly bent at the fifth segment, but having the distal part, which corresponds to the terminal segment of *A. polaris*, divided into three short but very distinct segments, so that the whole palp consists of eight segments.

First coxa with a large bluntly conical posterior spur and a small anterior tubercle; second coxa more than twice as long as first or third. Distal segments of legs not much more slender than proximal. Propodus slightly curved, about three

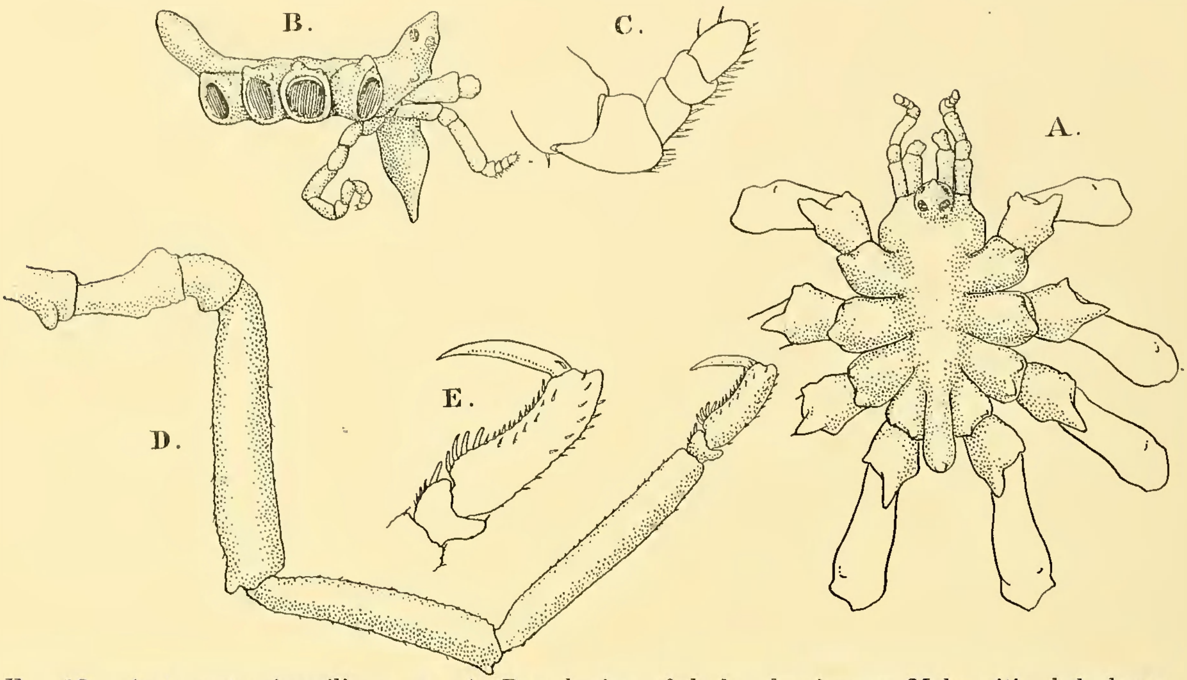

Fig. 18.—*Austroraptus juvenilis*, sp. n. A. Dorsal view of body of ovigerous Male with chelophores, palps, and first and second coxæ. B. Lateral view of body of Female with chelophore, palp, and oviger. C. Terminal part of palp of Female. D. Third leg of right side, Female. E. Terminal part of leg.

times as long as broad. Main claw three-quarters as long as propodus; auxiliaries very minute.

Measurements, in mm.—

	Holotype. ♂	♀
Length of trunk	2·2	2·2
Third leg—		
First coxa	·48	·48
Second coxa	1·6	1·2
Third coxa	·6	·52
Femur	3·52	3·4
First tibia	3·2	2·88
Second tibia	3·4	3·2
Tarsus and propodus	1·6	1·4
Claw	·88	·8

Remarks.—In having eight segments in the palp this species approaches the genus *Achelia*, but it differs from the typical species of that genus in the form of the proboscis and in the abbreviation of the terminal segments of the palp. Of less importance is the absence of two characters included by Bouvier in his definition of *Achelia*, but by no means conspicuous in some species of that genus—namely, the prominence which bears the opening of the femoral cement-glands and that which carries the genital opening in the male sex. On the other hand, the form and position of the proboscis and the general aspect of the animal are quite those of *Austroraptus*, although it differs from both the other species in the number of palpal segments and the very compact form of the body.

Austroraptus præcox, sp. n. (Text-fig. 19).

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms ; 1 ♂ (Holotype).

Description.—*Body* compact, the lateral processes in contact at their bases, diverging a little distally ; first intersegmental articulation distinct, second less so, third marked only by a groove. Cephalon nearly twice as wide as long, with a pair of spur-like antero-lateral tubercles. Ocular tubercle much taller than wide, inclined forward, conical apex above eyes nearly as long as basal part. Lateral processes each with a pair of conical dorsal tubercles, of which the posterior is the larger.

Proboscis directed obliquely downwards, not more than half as long as trunk, cylindrical in its basal half, then conical with a very narrowly truncate apex.

Abdomen elevated, sub-cylindrical, about half as long as trunk.

Chelophores with scape hardly longer than wide, with a pair of dorsal tubercles on

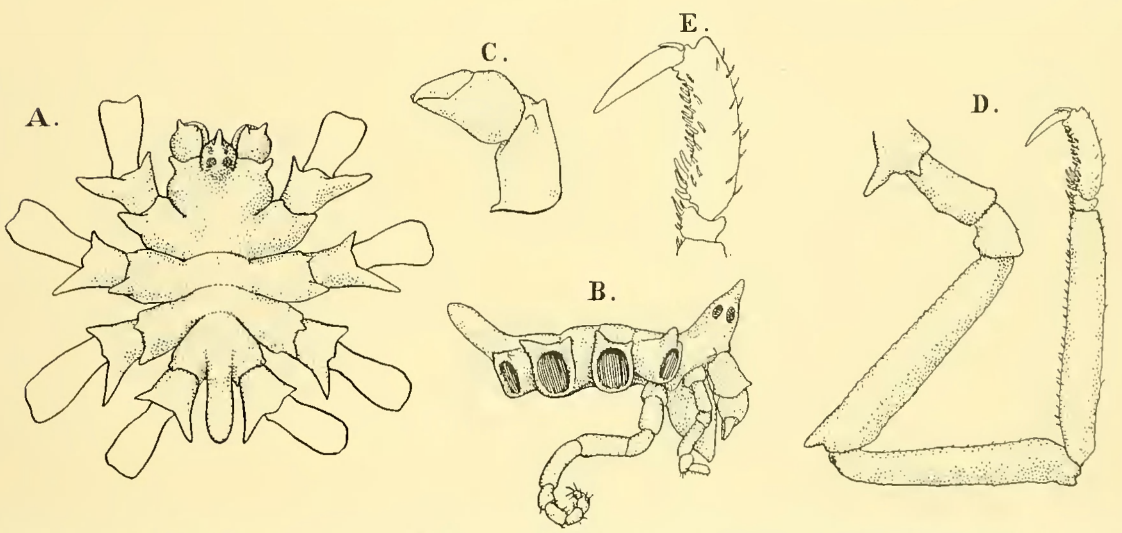

Fig. 19.—*Austroraptus præcox*, sp. n., Male. A. Dorsal view of body with chelophores and first and second coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Chelophore, further enlarged. D. Leg. E. Terminal part of leg.

its distal margin, the outer tubercle the larger. Chela completely formed, palm as long as broad and a little longer than the fingers, which are straight and meet along their length, crossing only at the very tips.

Palps and *Ovigers* shorter and stouter, but otherwise differing little from those of *A. polaris*.

First coxa with a pair of conical distal spurs, the posterior much the larger. Femur longer than first tibia, and subequal to second. Propodus more than three times as long as wide, rather more curved than in *A. polaris*, claw a little shorter, auxiliaries much as in that species.

Genital apertures distinct on second coxæ of last two pairs of legs.

Measurements, in mm.—

	Holotype. ♂
Length of trunk	1·75
Leg—	
First coxa	·56
Second coxa	1·0
Third coxa	·52
Femur	2·8
First tibia	2·6
Second tibia	2·8
Tarsus and propodus	1·28
Auxiliaries	·2

Remarks.—The presence of distinct genital apertures suggests that this specimen has attained fully adult characters, in which case the completely chelate form of the chelophores might justify its removal to another genus. In support of this view it may be pointed out that the chelæ, in having straight fingers meeting along their whole length, differ widely from the larval chelæ with their strongly arched fingers, described in the young specimen referred to *A. polaris* above. It is possible, of course, that this is merely an individual case of late persistence of larval characters, or, what is practically the same thing, of precocious development of the reproductive organs, as in the chelophore-bearing male of *Colossendeis gracilis*, described by Hoek (1881, p. 70), or the young specimens of *C. angusta*, mentioned by Meinert (1899, p. 59, Pl. v, fig. 21). Even if this be so, however, the species would seem to be distinguished from *A. polaris* by the condensed form of the body, with the lateral processes in contact at the base, and by the much shorter and stouter chelophores. From *A. juvenilis* it is distinguished not only by the segmentation of the palps, but by the longer auxiliary claws and other minor characters.

Genus AUSTRODECUS, Hodgson.

Austrodecus glaciale, Hodgson (Text-fig. 20).

A. glaciale, Hodgson, 1907, p. 53, Pl. viii, fig. 1; Bouvier, 1913, p. 147, text-figs. 96 and 97.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 1 ♂, 1 ♀. Station 339, Entrance to McMurdo Sound, 140 fathoms; 1 ♂.

Remarks.—The specimens here recorded as males present one very conspicuous character not mentioned by Prof. Bouvier; this is the presence, on the underside of the femur of all the legs, of a prominent rounded process bearing at its tip the opening

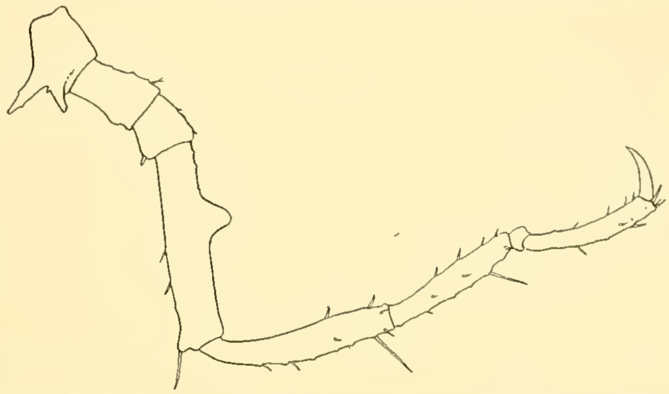

FIG. 20.—*Austrodecus glaciale*, Hodgson. Leg of Male showing prominence bearing opening of femoral cement-gland.

of the femoral cement-glands (Fig. 20). With Prof. Bouvier I have failed to demonstrate the sexual openings in the males, and with him also I have not been able to confirm Mr. Hodgson's statement that the female openings occur on the last pair of legs, although they are easily demonstrated on the first three pairs.

GENUS RHYNCHOTHORAX, Costa.

Rhynchothorax australis, Hodgson (Text-fig. 21).

R. australis, Hodgson, 1907, p. 57, Pl. viii, fig. 3; *id.*, 1914–15, p. 148.

Occurrence.—Station 294, Ross Sea, 158 fathoms; 1 ♂, 1 ♀.

Remarks.—This species, described from a single female specimen obtained by the "Discovery," has been taken in abundance by the "Gauss," and it is not necessary, therefore, to attempt to anticipate the fuller account that Mr. Hodgson will doubtless supply. It may be noted, however, that our two specimens do not show the difference that Hodgson finds to exist between the sexes as regards the approximation of the lateral processes. The palp (Fig. 21) consists of six segments (not five, as stated by Hodgson), a small but very distinct segment intervening between the basal one and that shown as succeeding it in the original figure. The terminal segment is a good deal larger than is shown in that figure, where it is partly concealed by the penultimate. The large spine on the third segment of the palp, which Dohrn designates "Kaudorn," is present in this species also, although far less strong than it is in *R. mediterraneus*.

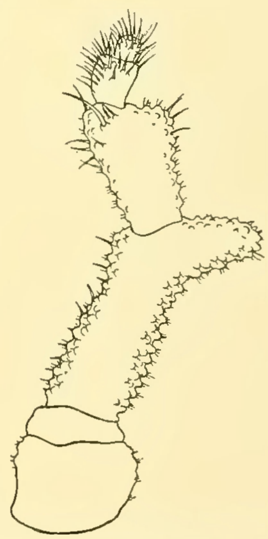

FIG. 21.—*Rhynchothorax australis*, Hodgson. Palp, from inner side.

In the male sex, the second coxa of the penultimate leg has the posterior corner, which bears the openings of the cement-glands, slightly produced as a round knob, in striking contrast to the long process found in this position in *R. mediterraneus*.

Genus PYCNOGONUM, Brünnich.

Pycnogonum gaini, Bouvier (Text-fig. 22).

P. gaini, Bouvier, 1910, p. 30; *id.*, 1913, p. 156, text-figs. 101–104.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms; 1 young. Station 314, McMurdo Sound, 222–241 fathoms; 2 ♂. Station 338, Entrance to McMurdo Sound, 207 fathoms; 3 ♂, 1 ♀. Station 340, off Granite Harbour, 160 fathoms; 1 ♂. Station 355, McMurdo Sound, 300 fathoms; 1 ♀.

Remarks.—This species, described by Bouvier from a single female specimen, is also represented in the "Gauss" collection. The "Terra Nova" specimens from the Ross Sea area complete the record of circumpolar distribution for the species. They agree closely with Bouvier's account, and the largest is of nearly the same size as that described by him. It is not quite correct, however, to state that the species is "de beaucoup, la plus grande du genre *Pycnogonum*." Sars's and Norman's measurements and the evidence of specimens in this Museum show that *P. littorale* grows to a similar or even slightly greater size.

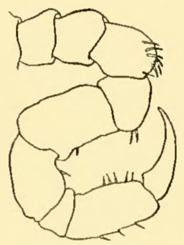

Fig. 22. — *Pycnogonum gaini*, Bouvier. Oviger of Male.

The ovigers of the male (Fig. 22) are composed of eight segments, excluding the terminal claw, in contrast to those of *P. littorale*, which have nine.* The penultimate segment is very short, giving the terminal part of the oviger some resemblance to that of the walking legs, with which appendages the oviger also agrees in the total number of its segments.

* Curiously enough Sars (1891, pp. 8 and 10, Pl. 1, fig. 1*g*) attributes only eight segments to the ovigers of *P. littorale*, and notes that they "have the same number of joints as the ambulatory legs." The ovigers of this species have been correctly described and figured by Hoek (1877, p. 237, Pl. xiv, fig. 1), and Wilson (1880 p. 469, Pl. 1, fig. 3*a*).

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The more important references are indicated by black type.

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NATURAL HISTORY REPORT.

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CRUSTACEA.

PART I. DECAPODA.

BY

L. A. BORRADAILE, M.A.
(Fellow, Dean and Lecturer of Selwyn College, Cambridge; Lecturer in Zoology in the University).

WITH SIXTEEN FIGURES IN THE TEXT.

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CRUSTACEA.*

PART I.—DECAPODA.

BY L. A. BORRADAILE, M.A.,

Fellow, Dean and Lecturer of Selwyn College, Cambridge; Lecturer in Zoology in the University.

WITH SIXTEEN FIGURES IN THE TEXT.

I.—INTRODUCTION.

THE species of Decapoda obtained by the "Terra Nova" number 46 in all, and are distributed pretty evenly throughout the taxonomic divisions of the order. According to the localities in which they were taken, they fall into five groups:

(1) Antarctic.
(2) From New Zealand and the neighbouring waters.
(3) From Melbourne Harbour (a single species).
(4) From between Rio de Janeiro and South Trinidad Island.
(5) Pelagic species from the tropical and sub-tropical Atlantic.

(1) The Antarctic species were:

Pasiphaea longispina, Lenz and Strunck, 1914.
Chorismus antarcticus (Pfeffer), 1887.
Crangon (*Notocrangon*) *antarcticus*, Pfeffer, 1887, var. *gracilis*, n.

All were taken in the Ross Sea.

* In sending to the press this paper and that which follows it, I wish to acknowledge very heartily the courtesy of the authorities of the British Museum (Natural History), who have afforded me facilities for doing at the Museum a good deal of the work which the examination of the "Terra Nova" collection has involved. In particular I am indebted to Dr. W. T. Calman for the readiness with which he has placed at my disposal not only the collections under his charge, but also his own time and knowledge. Miss G. M. Woodward's excellent illustrations owe much to the assistance which she has received from Dr. Calman in their preparation.

That there are only three of them, all previously described, is in agreement with what is known of the poverty in Decapoda of Antarctic waters. *Chorismus antarcticus* has already been reported in the Ross Sea, as well as in South Georgia and to the south of Kerguelen. It has thus an Antarctic circumpolar distribution, extending as far north as South Georgia. The same is true of *Crangon antarcticus*, with the difference that specimens of this species taken between 80° E. and 160° W. long. belong to a different variety from those of South Georgia, on the opposite side of the Antarctic region. These two species are the only Decapoda reported from South Georgia, so that, so far as this evidence goes, that island clearly belongs to the same geographical province as the Antarctic continent, and not to the adjoining South American region. I have discussed below the affinities of *Crangon antarcticus* and its bearing upon the bipolarity theory. *Pasiphaea longispina* was taken near Kaiser Wilhelm Land by the German expedition. Very probably it is also circumpolar. Two other species of *Pasiphaea*, recently described by Stebbing, but not obtained by the "Terra Nova," make up to five the total number of Antarctic Decapoda at present known.

(2) The New Zealand species were:

Solenocera novae-zealandiae, n. sp.
Sergestes semiarmis, Bate, 1888.
Leucifer batei, Borr., 1915.
Thalassocaris novae-zealandiae, n. sp.
Rhynchocinetes typus, H. M.-Edw., 1837.
Tozeuma novae-zealandiae, n. sp.
Periclimenes (*Hamiger*) *novae-zealandiae*, n. sp.
Aegeon cataphractus (Olivi), 1792.
Jasus, sp.
Arctus immaturus, Bate, 1888 (? sp.).
Axius novae-zealandiae, n. sp.
Galathea pusilla, Hend., 1885.
Uroptychus maori, n. sp.
,, *novae-zealandiae*, n. sp.
Paguristes subpilosus, Hend., 1888.
Eupagurus novae, Chilton, 1911.
,, *kirki*, Filhol, 1885.
,, *crenatus*, n. sp.
Porcellanopagurus edwardsi, Filhol, 1885 (? sp.).
Portunus corrugatus (Penn.), 1777.
Pilumnus maori, n. sp.
Pinnotheres pisum (L.), 1766.
Grapsus (*Leptograpsus*) *variegatus* (Fabr.), 1793.
Plagusia chabrus (L.), 1764.

Elamena longirostris, Filhol, 1885.
Echinomaia hispida, n. gen. et sp.
Paramithrax (Paramithrax) latreillei, Miers, 1879.
,, *(Leptomithrax) affinis*, n. sp.
,, *parvus*, n. sp.

All were taken at or near the north end of the North Island.

Twelve of the twenty-nine species are new. Nearly all the others have already been recorded from New Zealand waters. Of those which have not, *Aegeon cataphractus* is a very widely distributed species whose appearance here need cause little surprise. The specimen which I have doubtfully referred to *Arctus immaturus* indicates, if the reference be correct, the occurrence of a Cape Verde species near New Zealand. In the moderately deep water to the North of New Zealand there is evidently a very rich and varied decapod fauna, which well deserves the attention of New Zealand zoologists.

(3) The single species from Melbourne Harbour was *Leucifer hanseni*, Nobili, 1905.

(4) The tropical Atlantic species from near Rio de Janeiro and South Trinidad Island comprise:

Pandalus paucidens, Miers, 1881.
Neptunus (Hellenus) spinicarpus (Stm.), 1870.
Goneplax hirsutus, n. sp.
Gecarcinus lagostoma, H. M.-Edw., 1837.
Eurypodius latreillei, Guérin, 1828.
Persephona (Myropsis) laevis, n. sp.

Geographically speaking they are a mixed assemblage. *Persephona laevis* and *Neptunus spinicarpus* indicate West Indian affinities for the fauna, *Goneplax hirsutus* is a link with the North, while *Pandalus paucidens* and *Eurypodius latreillei* are Magellanic. *Gecarcinus lagostoma* is the only land decapod taken by the expedition. Some of the pelagic Sergestidae mentioned below were taken in this region.

(5) The pelagic species from the Atlantic were the following Sergestidae:

Sergestes atlanticus, H. M.-Edw., 1830.
,, *pacificus*, Stm., 1860.
,, *cornutus*, Kr., 1859.
,, *corniculum*, Kr., 1859.
,, *edwardsi*, Kr., 1859.
,, *vigilax*, Stm., 1860.
Leucifer batei, Borr., 1915.
,, *faxoni*, Borr., 1915.

There is nothing remarkable in the occurrence of any of them.

The most interesting species contained in the collection were the very handsome new spider-crab *Echinomaia hispida*, belonging to the remarkable group of genera which includes *Cyrtomaia* and *Platymaia*, and the peculiar carcinized hermit-crab *Porcellanopagurus*.

LIST OF STATIONS.

1. Antarctic (Ross Sea Area).

Station 276. 71° 41' S., 166° 47' W., 0–1,750 metres, Jan. 5, 1913, Plankton.
,, 294. 74° 25' S., 179° 3' E., 289 metres (158 faths.), Jan. 15, 1913, Bottom fauna.
,, 314. 5 miles N. of Inaccessible Island, McMurdo Sound, 406–441 metres (222–241 faths.), Jan. 23, 1911, Bottom fauna.
,, 316. Off Glacier Tongue, about 8 miles N. of Hut Point, McMurdo Sound, 348–457 metres (190–250 faths.), Feb. 9, 1911, Bottom fauna.
,, 318. Hole in ice between Cape Evans and Inaccessible Island, 130–180 metres, June 13–Sept. 16, 1911, Bottom fauna.
,, 338. 77° 13' S., 164° 18' E., 379 metres (207 faths.), Jan. 23, 1912, Bottom fauna.
,, 339. 77° 5' S., 164° 17' E., 256 metres (140 faths.), Jan. 24, 1912, Bottom fauna.
,, 340. 76° 56' S., 164° 12' E., 293 metres (160 faths.), Jan. 25, 1912, Bottom fauna.
,, 348. Off Barne Glacier, McMurdo Sound, 366 metres (200 faths.), Feb. 13, 1912, Bottom fauna.
,, 355. 77° 46' S., 166° 8' E., 547 metres (300 faths.), Jan. 20, 1913, Bottom fauna.
,, 356. Off Granite Harbour, entrance to McMurdo Sound, 92 metres (50 faths.), Jan. 22, 1913, Bottom fauna.
Stomach of Albatross, locality not stated.

2. New Zealand and the Neighbouring Waters.

Station 90. From Summit, Gt. King, Three Kings Islands, S. 14° W., 8 miles, 183 metres (100 faths.), July 25, 1911, Bottom fauna.
,, 96. 7 miles E. of North Cape, New Zealand, 128 metres (70 faths.), Aug. 3, 1911, Bottom fauna.
,, 109. 34° 15' S., 172° 0' E., 3 metres, Aug. 5, 1911, Plankton.
,, 112. 33° 37' S., 171° 30' E., 3 metres, Aug. 8, 1911, Plankton.
,, 126. 34° 13' S., 172° 15' E., Surface, Aug. 24, 1911, Plankton.
,, 127. Off Three Kings Islands, Surface, Aug. 25, 1911, Plankton.
,, 131. Off Three Kings Islands, Surface, Aug. 27, 1911, Plankton.
,, 133. Spirits Bay, near North Cape, 20 metres, Aug. 30, 1911, Plankton.
,, 134. Spirits Bay, near North Cape, 20–37 metres (11–20 faths.), Aug. 31, 1911.
,, 135. Spirits Bay, near North Cape, 3 metres, Sept. 1, 1911, Plankton.
Nelson.
Bay of Islands.
Elmsley Bay.

3. Melbourne Harbour.

4. Near Rio de Janeiro and South Trinidad Island.

Station 36. South Trinidad Island, July 26–30, 1910, Shore collecting.
,, 41. 22° 56' S., 41° 34' W., Surface, May 2, 1913, Plankton.
,, 42. 22° 56' S., 41° 34' W., 73 metres (40 faths.), May 2, 1913, Bottom fauna.

5. Pelagic Stations in the Atlantic Ocean.

Stations 39 and 40. Six miles off mouth of Rio de Janeiro Harbour, 2 metres, April 27, 1913.
Station 44. 21° S., 37° 50' W., Surface, May 4, 1913.
,, 45. 21° S., 37° 50' W., Surface, May 4, 1913.
,, 46. 20° 30' S., 36° 30' W., Surface, May 4, 1913.
,, 47. 20° 30' S., 36° 30' W., Surface, May 4, 1913.
,, 49. 18° 51' S., 33° 40' W., Surface, May 6, 1913.

Station 50. 18° S., 31° 45′ W., Surface, May 7, 1913.
" 53. 5° S., 27° 15′ W., 2 metres, May 12, 1913.
" 60. 2° N., 24° 45′ W., Surface, May 17, 1913.
" 61. 2° N., 24° 45′ W., Surface, May 17, 1913.
" 62. 4° 50′ N., 24° W., Surface, May 18, 1913.
" 63. 6° 10′ N., 24° 5′ W., Surface, May 19, 1913.
" 64. 23° 28′ N., 34° 45′ W., Surface, May 26, 1913.
" 65. 23° 28′ N., 34° 45′ W., Surface, May 26, 1913.
" 66. 25° 35′ N., 34° 10′ W., Surface, May 27, 1913.
" 67. 25° 35′ N., 34° 10′ W., Surface, May 27, 1913.
" 68. 27° 22′ N., 33° 40′ W., Surface, May 28, 1913.

II.—DESCRIPTIONS OF SPECIES.

Sub-order NATANTIA.

Tribe PENAEIDES.

Family PENAEIDAE.

Sub-family PENAEINAE.

1. *Solenocera novae-zealandiae*, n. sp. Fig. 1.

The collection contains a single specimen, unfortunately somewhat damaged, of a new *Solenocera* dredged off New Zealand in 70 fathoms of water. The rostrum is short,

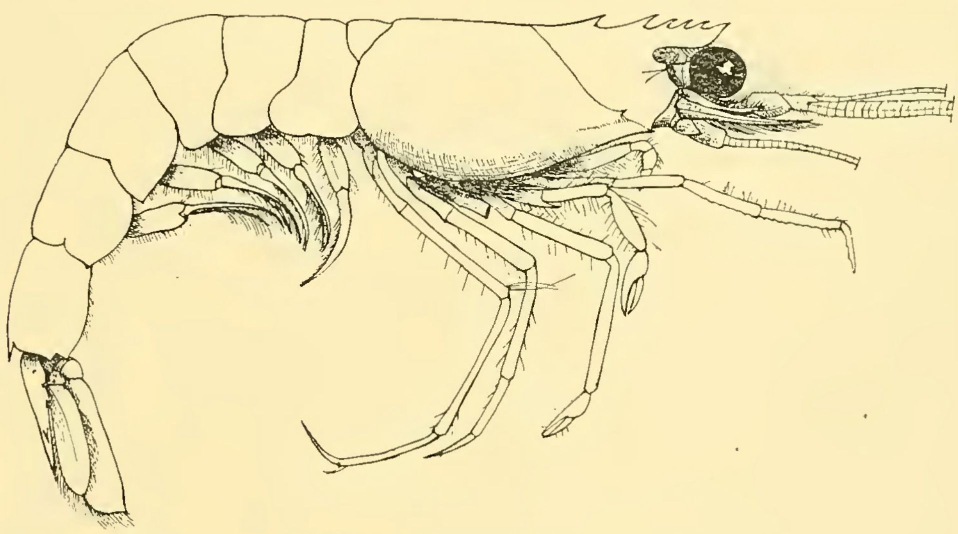

Fig. 1.—*Solenocera novae-zealandiae*, n. sp. Male, × 2.

ending before the middle of the cornea. Its crest bears five teeth, of which two stand behind the orbit. Supraorbital, antennal, branchiostegal and pterygostomial spines are present. The second joint of the antennular stalk is shorter than the first, but longer than the third. The antennal stalk does not reach the end of the eye. The antennal scale slightly outreaches the antennular stalk, narrowing to a rounded end, which is barely outreached by the subterminal spine. All the flagella are broken short in the specimen. The third maxilliped outreaches the antennal scale by the whole of its slender, pointed end-joint and a small part of the penultimate joint, which is about one-third longer than the end-joint. The first leg slightly outreaches the antennal stalk. Its fingers are not quite twice as long as the palm, its wrist longer than the hand. The second leg reaches the end of the antennular stalk. The third leg is missing on both sides of the specimen. The fourth leg nearly reaches the end of the first joint of the antennular stalk. The fifth leg slightly outreaches the whole stalk. The legs are smooth save for a few scattered hairs. The petasma is slender and simple, and probably not fully formed in the specimen. The abdominal segments are simple in shape, but the sixth bears a spine in the middle of the hinder edge. The telson is shorter than either branch of the uropods. It is slender and ends in a sharp spine. Its upper surface is marked by a deep groove to within about one-third of its length from the free end, where two strong, fixed lateral spines stand.

Length, 7 cm.

One specimen, from Station 96.

Family SERGESTIDAE.

Sub-family SERGESTINAE.

2. *Sergestes atlanticus*, H. M.-Edw., 1830.

Sergestes atlanticus, H. M.-Edwards, Ann. Sci. Nat. (1) XIX, p. 349, pl. X, figs. 1–9; Hansen, Proc. Zool. Soc. Lond., 1896, p. 949.

The Expedition took no adult members of this species, but at three stations in the North Atlantic there were obtained specimens of *S. ancylops*, Kr., 1859, which, according to Hansen, is a young form of *S. atlanticus*.

Ten specimens were taken at Stations 45, 46, 66.

3. *Sergestes pacificus*, Stm., 1860.

Sergestes pacificus, Stimpson, Proc. Acad. Philadelphia, 1860, p. 45; Ortmann, Ergebn. Plankton-Exped., II, G, b, p. 30 (1893).

This form has not hitherto been recorded from the Atlantic. Hansen merges it in *S. atlanticus*, but according to Ortmann the possession of a supraocular spine differentiates it from the latter species, and this is borne out by the figures of Bate ("Challenger" Macrura, pl. XVIII) and Krøyer (*S. frisii*, K. Dansk. Videnskab. Selsk. Skr. (5) IV, pl. I), which both show *S. atlanticus* without the spine. A similar case occurs among the Pontoniinae, where *Periclimenes spiniferus* differs from *P. petitthouarsi* only by the possession of a supraocular spine.

Eight specimens were taken at Stations 49, 50, 68.

4. *Sergestes cornutus*, Kr., 1859.

Sergestes cornutus, Krøyer, K. Dansk. Videnskab. Selsk. Skr. (5), IV, pp. 249 and 277, pl. II, fig. 2; Ortmann, Ergebn. Plankton-Exped., II, G, b, pp. 30 and 34 (1893); Hansen, Proc. Zool. Soc. Lond. 1896, pp. 949 and 952.

Nine specimens were taken at Stations 46, 50, 62, 66.

5. *Sergestes corniculum*, Kr., 1859.

Sergestes corniculum, Krøyer, K. Dansk. Videnskab. Selsk. Skr. (5), IV, pp. 252 and 278, pl. III, fig. 4; Ortmann, Ergebn. Plankton-Exped., II, G, b, pp. 31 and 34 (1893); Hansen, Proc. Zool. Soc. Lond. 1896, pp. 950 and 957.
S. laciniatus, Krøyer, *loc. cit.*, pp. 272 and 284, pl. V, fig. 15.

Two specimens were taken at Stations 46, 49.

6. *Sergestes semiarmis*, Bate, 1888.

Sergestes semiarmis, Bate, "Challenger" Macrura, p. 423, pl. LXVII, fig. 1; Ortmann, Ergebn. Plankton-Exped., II, G, b, pp. 32 and 36 (1893).

It seems not unlikely that this larval form is a stage of *S. corniculum*. One specimen was taken with a crowd of earlier larvae, from the *Acanthosoma* stage onwards, perhaps of the same species.*

Numerous specimens were taken at Stations 112, 127, 131.

7. *Sergestes edwardsi*, Kr., 1859.

Sergestes edwardsi, Krøyer, K. Dansk. Videnskab. Selsk. Skr. (5), II, pp. 246 and 277, pl. IV, fig. 9; Ortmann, Ergebn. Plankton-Exped., II, G, b, pp. 30 and 32 (1893); Hansen, Proc. Zool. Soc. Lond. 1896, pp. 950 and 961.

Two specimens were taken at Station 63.

8. *Sergestes vigilax*, Stm., 1860.

Sergestes vigilax, Stimpson, Proc. Acad. Philadelphia, 1860, p. 45; Ortmann, Ergebn. Plankton-Exped., II, G, b, pp. 32 and 36 (1893); Hansen, Proc. Zool. Soc. Lond. 1896, pp. 951 and 964.

One immature specimen was taken by the Expedition.
Station 49.

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* The larvae collected by the Expedition are not described in the present report. All that need here be said in regard to those found with *S. semiarmis* is that Ortmann (*loc. cit.*) records a similar case, but that my larvae differ from his in several respects, notably in the presence of a procurved, median, dorsal spine at the hinder end of the carapace, and in having on each side of the carapace two spines, not three, as in Ortmann's species. The assemblage examined by Ortmann contained *Elaphocaris* of two species. Possibly my *Acanthosoma* and his represent the same two species. It does not appear which, if either, of them belongs to *S. semiarmis*, but it is remarkable that on two occasions the latter should have been taken in company with larval swarms.

Sub-family LEUCIFERINAE.

9. *Leucifer batei*, Borr., 1915.

> *Lucifer reynaudii*, Bate, "Challenger" Macrura, p. 466, pl. LXXXIV (1888); Ortmann, Ergebn. Plankton-Exped., II, G, b, p. 40 (1893).
> *Lucifer batei*, Borradaile, Ann. Mag. Nat. Hist. (8), XVI, p. 228 (1915).

I have already (*loc. cit.*) given reasons for holding this species to be distinct from *L. acestra*, Dana, 1852, with which it has been identified by Kemp (Trans. Linn. Soc. Lond. (2), Zool., XVI, i, p. 58, 1913). Kemp, however, has recently (Mem. Ind. Mus. V, p. 323) maintained his views, on the ground that the differences which I believed to exist between the two species were discovered only by means of the figures given by Dana and Bate. It is, of course, now impossible to refer to Dana's specimens, and in the case of his species one is compelled to form a judgment upon the evidence given by his description and very clear figures, but Mr. Kemp appears to have overlooked my express statement that I had had specimens of Bate's *L. reynaudii* in my hands. Both the "Terra Nova" examples and those of Bate, now in the British Museum, agree closely with Bate's figures and description, and differ from those of Dana in the points I have specified. In one point, indeed, Bate is more exact than my key (*loc. cit.*, p. 230). In the male, the length of the sixth abdominal segment is as I have stated. In the female, it is a little *longer* than the uropod. This is shown by Bate. He also shows the characteristic difference in the shape of the end of the exopodite of the uropod in the two sexes. In the female, the spine on the outer side is placed a little before the end; in the male it arises from the outer angle of the subtruncate end. As some of my specimens are nearly as long as Dana's ($\frac{9}{16}$, as against $\frac{5}{8}$, of an inch), it is not likely that the very marked departures from his description which they show are due to their being in a different stage of growth. In these circumstances it seems inadvisable to refer them to Dana's species, and I have therefore called them *L. batei*.

Dana's *L. reynaudi* is, as Kemp rightly points out, a different species from that to which Bate gave the same name. Kemp now identifies it with "*L. typus auct.*," therein reversing a previous decision of his own (Linn. Trans. *loc. cit.*). But in truth there is no "*L. typus auct.*," at least in the sense of a single species, recognizably the same in the works of a number of authors. I have already (*loc. cit.*) pointed out the lack of agreement between the forms known as "*L. typus*" by various writers, and, believing that the latter have probably in most cases given a correct account of the specimens before them, have proposed to treat as species the various forms which the descriptions seem to reveal. Such a procedure, if it run the risk of temporarily burdening science with the necessity of observing distinctions which have little significance, has on the other hand the advantage of leading more speedily to the analysis of the problem, and so to its solution. Kemp has cited in particular Bate and Ortmann as sponsors for the *L. typus*, which he refers to *L. reynaudi*, Dana. In view of the new evidence he adduces, it is very likely that he is right in regarding Bate's species as identical with the true

L. reynaudi. I would point out, however, that the differences between these species have not yet been wholly disposed of. Bate's specimens, which are quite faithfully represented by the figure in the "Challenger" Report, still fail to agree with Kemp's redescription (Linn. Trans. *loc. cit.*) of Dana's species. In them the last leg does not nearly reach the end of the neck, and the latter is from once and three-quarters to more than twice as long as the rest of the cephalothorax. The size of the specimens makes it impossible for these discrepancies to be due to differences in age, but it is quite possible that they may be accounted for by variation. In any case, however, the matter needs further investigation.

Numerous specimens of *L. batei* were taken by the Expedition at Stations 45, 46, 47, 50, 53, 61, 63, 64, 65, 66, 67, 68, and 126.

10. *Leucifer faxoni*, Borr., 1915.

Lucifer typus?, Faxon, Stud. Chesapeake Zool. Lab. Sci. Res. 1878 (1879).
Lucifer sp., Brooks, Phil. Trans. Roy. Soc. 1882, I., p. 87, pl. VII.
Lucifer faxoni, Borradaile, Ann. Mag. Nat. Hist. (8), XVI, p. 228 (1915).

Specimens taken in the sub-tropical Atlantic by the Expedition evidently belong to the species described by Faxon and Brooks from more northerly waters of the same ocean.

Twelve specimens were taken at Stations 39, 40.

11. *Leucifer hanseni*, Nobili, 1905.

Lucifer hanseni, Nobili, Bull. Mus. Paris, 1905, p. 394; Ann. Sci. Nat. Zool. (9), IV, p. 25, pl. II., fig. 1, and text-fig. 3b (1906); Kemp, Mem. Ind. Mus. V., p. 324, text-fig. 37a (1915).
Lucifer inermis, Borradaile, Ann. Mag. Nat. Hist. (8), XVI, p. 229 (1915).

I regret to have altogether overlooked Nobili's papers in my recent enumeration of the species of *Leucifer*.

Numerous specimens were taken in Melbourne Harbour.

Tribe CARIDES.

Family PASIPHAEIDAE.

12. *Pasiphaea longispina*, Lenz and Strunck, 1914.

Pasiphaea longispina, Lenz and Strunck, Deutsche Südpolar Exp. XV, iii, p. 315, pl. XIX.

Lenz and Strunck's specimen was damaged. Those which were taken by the "Terra Nova" enable me to add the following facts to the German authors' description.

The rostrum slightly outreaches the eye, and has a sharp, downwardly hooked tip. The length, in the mid-dorsal line, of the sixth abdominal segment equals that of the telson, and is twice that of the second segment. The sixth segment has no spine behind. The telson is little shorter than the sharp-tipped endopodite, and a good deal shorter than the round-ended exopodite of the uropod. Its dorsal surface is deeply grooved. It is narrow, and its sides converge gradually towards the hinder end, where they diverge on the arms of a Y, whose deep, backwardly directed cleft contains on each side seven spines, the whole structure having a remarkably larval appearance, though the specimens are quite adult. Thus, *P. longispina* would belong to the sub-genus *Phye*, were the latter worth maintaining in view of the complete gradation of form shown by the telson in the several species of *Pasiphaea*.

One specimen was taken at Station 276, the other from the stomach of an albatross, at a locality which is not stated, but must have been considerably further north.

Family PANDALIDAE.

Sub-family THALASSOCARIDINAE.

13. *Thalassocaris novae-zealandiae*, n. sp. Fig. 2.

Diagnosis.—Rostrum almost straight, very slightly upturned towards the tip; its formula $\frac{10}{4}$, four of the teeth standing behind the orbit. A spine below the eye and one behind the antenna present on the carapace. Antennular stalk reaching end

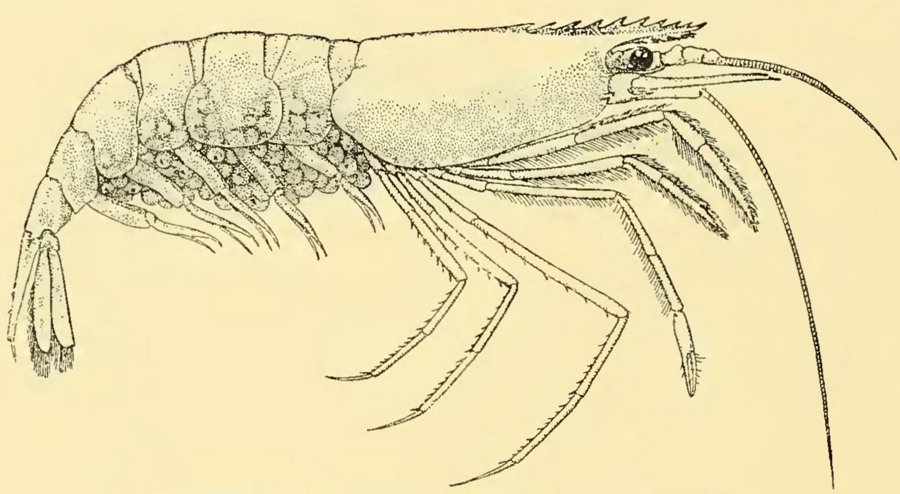

Fig. 2.—*Thalassocaris novae-zealandiae*, n. sp., × $2\frac{1}{2}$.

of rostrum; its last two joints subequal, together shorter than first. Antennal scale as long again as antennular stalk, without teeth on outer edge, its inner edge converging towards terminal spine, which projects freely. Antennal stalk slightly longer than antennular. Third maxilliped outreaching antennal scale by about one-third, and first leg by about one-half, of its end-joint. Second leg slightly outreaching third maxilliped, its chela slender and simple, its wrist longer than its hand, but divided into two by a joint slightly beyond the middle of its length. Third leg longest of all, fourth a little outreached by second, fifth by first. Legs 3–5 with slender, naked end-joints, but a row of spines under meropodite, carpopodite, and propodite, and legs 3 and 4 with a spine under ischiopodite. Abdominal segments without keels or spines. Telson nearly as long as uropods, which have exopodite and endopodite equal, and a blunt tooth at end of outer edge of exopodite.

Length of longest specimen, 45 mm.

Three specimens were taken at Station 96.

Sub-family PANDALINAE.

Genus PANDALUS.

Sub-genus PANDALUS.

The name *Dichelopandalus* (Caullery, 1896) has been proposed for those members of this sub-genus in which the first leg is minutely chelate, and that of *Stylopandalus* (Coutière, 1905) for those in which it is simple. Until, however, it is shown that the groups of species thus designated are in other respects natural divisions of *Pandalus*, it will be well to retain the type-subgenus intact.

14. *Pandalus* (*Pandalus*) *paucidens*, Miers, 1881.

Pandalus paucidens, Miers, Proc. Zool. Soc. Lond., 1881, p. 74, pl. VII, figs. 6, 7.

The gill-formula of this species is that of *P. montagui*, and the first leg is minutely chelate.

Fourteen specimens were taken at Station 41.

Family RHYNCHOCINETIDAE.

15. *Rhynchocinetes typus*, H. M.-Edw., 1837.

Rhynchocinetes typus, H. M.-Edwards, Ann. Sci. Nat. (2) VII, p. 165, pl. IV, fig. c; Miers, Cat. N. Zealand Crust., p. 77 (1876).

One specimen was taken at Station 96.

Family HIPPOLYTIDAE.

16. *Chorismus antarcticus* (Pfeffer), 1887.

Hippolyte antarctica, Pfeffer, Jahrb. Hamburg. Wiss. Anst. IV, p. 51, pl. I, figs. 22–27 (1887).
Chorismus antarcticus, Calman, Rep. Nat. Antarctic Exp. 1901–4, Nat. Hist., II, Crust. Decap. p. 1 (1907); Lenz and Strunck, Deutsche Südpolar Exp. XV, iii, p. 318 (1914).

The specimens agree perfectly with the descriptions of Pfeffer and Calman, but the rostral formula may be higher than is stated by them. In a surprising number of the specimens the rostrum is damaged,* but several of the specimens show that the formula may reach $\frac{10}{10}$. There is no constant relation between the numbers of teeth above and below the rostrum, and their spacing shows a good deal of variation. There is more often one than two teeth near the tip. The rostrum is usually a little longer, but may

* This appears to have been the case with that figured by Pfeffer.

be a little shorter, than the antennal scale. The relative lengths of the last two joints of the third maxilliped and also those of the wrist and hand of the first leg vary a little. The wrist does not exceed the hand in length. The telson is seldom perfect, but in undamaged specimens it may be seen to bear at the end two pairs of spines—a small lateral and a long intermediate pair—and between the intermediate spines five bristles.

I can detect no constant difference between the "Terra Nova" specimens and South Georgian examples.

Numerous specimens were taken at Stations 294, 314, 316, 318, 338, 339, 340, 348, 355, 356.

17. *Tozeuma novae-zealandiae*, n. sp. Fig. 3.

Diagnosis.—Body sparsely hairy all over. Rostrum as long as rest of carapace, slightly upcurved, with a ridge along each side, but rounded above except at the tip,

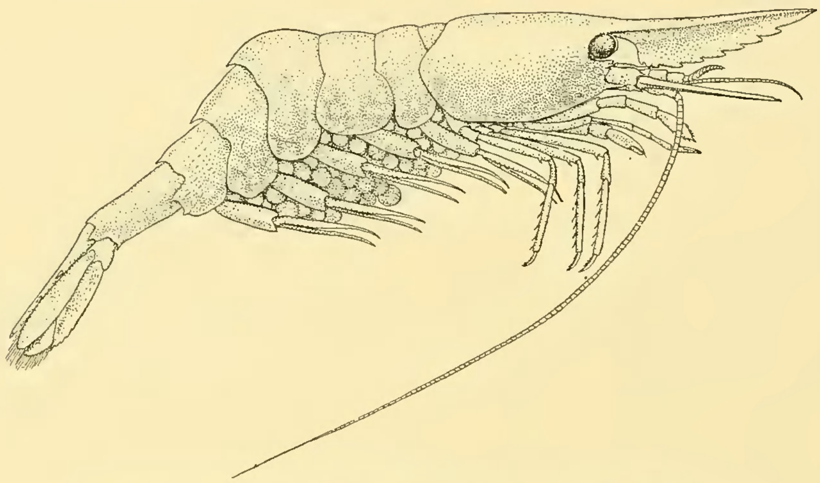

Fig. 3.—*Tozeuma novae-zealandiae*, n. sp. Female, × 2½.

where it is prismatic; bearing below seven teeth, of which the first is subdivided into three smaller teeth. Carapace with antennal and pterygostomian spines. Abdomen strongly bent; the third to fifth segments keeled and bearing a median spine behind, the fifth also with two spines on each pleuron, the sixth long, with a lobe bearing a spine projecting backwards on each side. Uropod slightly longer than telson, its endopodite and exopodite subequal. Telson longer than sixth segment, diminishing evenly to the end, which is truncate, with a median tooth. Antennular stalk about one-third length of rostrum, its second and third joints subequal, together shorter than first joint, which has a strong stylocerite projecting beyond it; upper flagellum reaches just beyond middle of rostrum, lower just outreaches antennal scale. Antennal stalk nearly as long as antennular. Antennal scale four-fifths length of rostrum, its sides converging towards a narrow truncate end, at one side of which stands the terminal spine. Third maxilliped outreaching antennular stalk; its end-joint sharply pointed, ending in a spine. First leg barely reaching last joint of third maxilliped, its palm short and stout. Second leg outreaching third maxilliped. Last three legs with dactylopodites serrate, half a dozen spines under propodites, and a strong spine near end of meropodites.

Length of single specimen (a female with eggs), 5 cm.

Station 96.

Family PALAEMONIDAE.

Sub-family PONTONIINAE.

Genus PERICLIMENES.

Sub-genus HAMIGER, n. sub-gen.

A new pontoniine prawn, of which two specimens were dredged in 70 fathoms off the North Cape of New Zealand, appears from most of its organization to be a *Periclimenes*, but shows certain features that are very rare in that genus, and others that are shared by none of its known species. In the circumstances it seems best that, for the present at least, the new prawn should represent a distinct sub-genus.* The features which it exhibits that are unusual in *Periclimenes* are the absence of a hepatic spine (which is missing only in a few cases, such as *P. lifuensis*, *P. parasiticus*, and *P. brevinaris*), and a broadening of the ischiomeropodite of the third maxilliped, such as is found in *P. brocki* alone. The unique features are presented by the two pairs of chelipeds, of which the first bears a feathery tuft of hairs on the fingers, while one of the second is of great size and has an abnormal configuration of the fingers. These peculiarities, however, are hardly of generic value, for there are considerable variations in the structure of both pairs of chelipeds in *Periclimenes*. The name which I propose for the new sub-genus has reference to the hooked fingers of the great cheliped.

18. *Periclimenes* (*Hamiger*) *novae-zealandiae*, n. sp. Fig. 4.

Diagnosis.—Rostrum straight, its tip faintly upcurved, its formula $\frac{8}{2}$, three of the teeth standing behind the orbit. Antennal spine alone present on the carapace. Antennular stalk slightly outreaching the rostrum, its last two joints subequal and together shorter than the first, which has a strong distal spine and a rather slender stylocerite reaching about the middle of its length. Outer antennular flagellum cleft to a distance about equal to the length of the uncleft region. Antennal stalk equal to first joint of antennular. Antennal scale slightly outreaching antennular stalk; its sides subparallel, its end broadly rounded, its subterminal spine not projecting. Third maxilliped a little outreaching antennal stalk; its end-joint nearly as long as that which precedes it; these two together longer than ischiomeropodite, which is broad,

* For the sub-genera of *Periclimenes* see Ann. Mag. Nat. Hist. (8), XV, p. 207 (1915).

though not so broad as in *Pontonia*. First leg outreaching antennal scale by the hand; its fingers longer than the palm and bearing on their median sides each a row of long curled hairs. Second legs unequal; the smaller of normal shape with slender, toothless fingers as long as the palm; the larger with hand a little longer than carapace including rostrum, broadest at distal end, its fingers bent towards the middle line of the body, the movable one slender and toothless, outreaching the fixed finger, which is stout and strongly hooked, and bears at its base on the upper side a crest composed of two stout

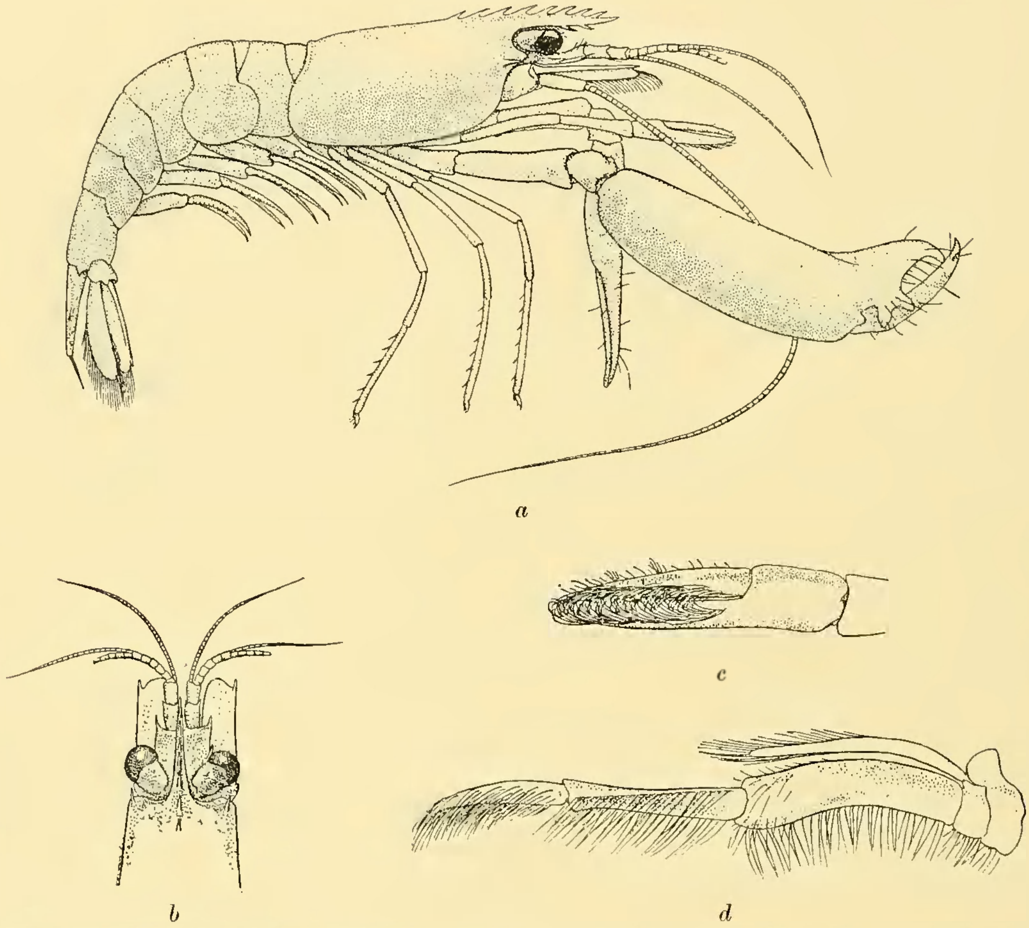

FIG. 4.—*Periclimenes (Hamiger) novae-zealandiae*, n. sp. Male. (*a*) Side view, × 4; (*b*) dorsal view of head, × 4; (*c*) end of first leg, × 12; (*d*) third maxilliped, × 12½.

teeth. Last three legs slender, rather short, biunguiculate, with a row of small teeth under the short, stout end-joint, and six movable spines under the propodite. Uropods with exopodite and endopodite broad, rounded, subequal. Telson shorter than uropods; its spines long and slender.

Two specimens, male and female, taken together. The female has lost the larger cheliped. Length of female, 27 mm.

Station 96.

Family CRANGONIDAE.

19. *Crangon* (*Notocrangon*) *antarcticus*, Pfeffer, 1887, var. *gracilis*, n. var.

Crangon antarcticus, Pfeffer, Jahrb. Hamburg. Wiss. Anst., IV, p. 45, pl. I, figs. 1–21 (1887); Ortmann, Proc. Ac. Philadelphia, 1895, pp. 177, 181, 190; Coutière, Bull. Mus. Paris, XVI, p. 240 (1900); Calman, Rep. Nat. Antarctic Exp., 1901–4, Nat. Hist. II, Crust. Decap. p. 3 (1907); Lenz and Strunck, Deutsche Südpolar Exp., XV, iii, p. 324 (1914).
Crangon (*Notocrangon*) *antarcticus*, Coutière, C. R. Ac. Sci. Paris, CXXX, p. 1640 (1900).

The affinities of this shrimp are of considerable interest, in view of the support which its distribution has been held to afford to the theory of bipolarity. There can be no doubt that it is more nearly related to the species of *Crangon* than to those of any other genus of Crangonidae. The resemblance in habit of body to the deep-water species of *Pontophilus*, noticed by Coutière, is purely superficial, and is not really very striking. The small gill-formula (5), the long second leg, the broad stylocerite, and the stout, narrow rami of the pleopods, with only the basal projection left to represent the endopodite of the second pair in the male, are enough to separate *C. antarcticus* widely from *Pontophilus*. No near relationship to any other genus, save to *Crangon*, can well be suggested, in view of the condition of the legs, gills, armature of the carapace, and eyes. Within the genus *Crangon*, the Antarctic species has been supposed by Ortmann to be most nearly related to the Californian *C. franciscorum*, a member of the typical sub-genus, but Calman has shown that this view is negatived by its gill-formula and the strong sculpture of its carapace. From its nearest geographical neighbour, *C. capensis*, Stm., also a member of the typical sub-genus, it is still further differentiated by the absence in the Cape species of the lateral spines on the carapace. On the whole, its affinities would seem, in view of its loss of the arthrobranch of the third maxilliped, and the strong sculpture of its carapace, to be with *Sclerocrangon*, rather than with *Crangon, sensu stricto*. It is not possible, however, to place *C. antarcticus* in *Sclerocrangon*. The presence of only one spine on the median keel of the carapace is not much more than a technical objection to this course, but the peculiarity of the second pleopod of the male is a more serious obstacle. In this respect the Antarctic species differs also from the sub-genus *Crangon*. Nor is its habit of body altogether that either of *Crangon* or of *Sclerocrangon*, while in the combination of a simple but salient arrangement of ridges and spines on the carapace with a smooth abdomen it is intermediate between the two sub-genera. The best solution of the problem of expressing its affinities in the terms of Systematic Zoology is that of Coutière, who has proposed to institute for it a new sub-genus, *Notocrangon*. The facts suggest that the common ancestor of *Crangon* gave rise on the one hand to *Crangon s. str.*, and on the other to a stock from which *Notocrangon* has departed less far than *Sclerocrangon*. On the face of it, this theory lends some support to the hypothesis of bipolarity, though that is of course not its only possible explanation.

The "Terra Nova" specimens belong undoubtedly to the form described by Calman from the same part of the Antarctic. All the peculiarities mentioned by him recur in the examples in my hands. A further feature, not mentioned by Calman, is the elongation of the last two joints of the third maxilliped, each of which is more than half the length of the basipodite and ischiomeropodite together. It is evident that we have here a distinct local race, characterized by greater length and slenderness of many of its parts. I propose for it the varietal name of *gracilis*. The same variety was taken near Kaiser Wilhelm Land by the German South Polar Expedition of 1901–03. On the other hand, South Georgian examples in the British Museum, which I have had the opportunity of examining, prove the correctness of Pfeffer's original description, and it would seem that those taken by the "Belgica" in long. 80° W. belonged to his form. If that be the case, the type variety is at present known to extend from about 30° W. to about 90° W., and var. *gracilis* from about 80° E. Eastwards to about 160° W. Further information as to the distribution of these forms will be of interest.

Numerous specimens were taken at Stations 294, 314, 316, 338, 339, 348, 355.

20. *Aegeon cataphractus* (Olivi), 1792.

Aegeon cataphractus (Olivi), Zool. Adriat., pl. III., fig. 1; Heller, Crust. Südl. Europa, p. 230, pl. VII, figs. 12-15 (1863).

The specimens, which are from New Zealand waters, differ from the Mediterranean form as it is described by Heller only in the almost complete loss of indications of the double nature of the keels of the second and third abdominal segments. It is probable that some of the supposed species of *Aegeon* will prove to be merely varieties of this extraordinarily widespread member of the genus.

Two specimens were taken at Station 96.

SUB-ORDER REPTANTIA.

TRIBE PALINURA.

FAMILY PALINURIDAE.

21. *Jasus*, sp. ? *J. verreauxi*.

The collection contains one specimen of a *Jasus*, in the natant stage.

Similar specimens from Stewart Island in the collection of the British Museum are referred by a label on the bottle, in the handwriting of Professor E.-L. Bouvier, to *J. verreauxi*, which is a New Zealand species.

One specimen, Station 96.

FAMILY SCYLLARIDAE.

22. *Arctus immaturus*, Bate, 1888. (?)

Arctus immaturus, Bate, "Challenger" Macrura, p. 71, pl. X, fig. 3.

The specimens differ from Bate's in that the antennular stalks are shorter, not reaching the end of the antennae. They have appendages on all the abdominal segments except the first. I refer them somewhat doubtfully to this species.

Two specimens were taken at Stations 133, 135.

Tribe ANOMURA.

Super-family THALASSINIDEA.

23. *Axius* (*Axius*) *novae-zealandiae*, n. sp. Fig. 5.

Diagnosis.—Cephalothorax deep and strongly compressed, with back continuously curved fore and aft, falling to the rostrum rather steeply, but not so abruptly as in *Scytoleptus*. Cervical groove well marked on the back, but less so at the sides. Flat

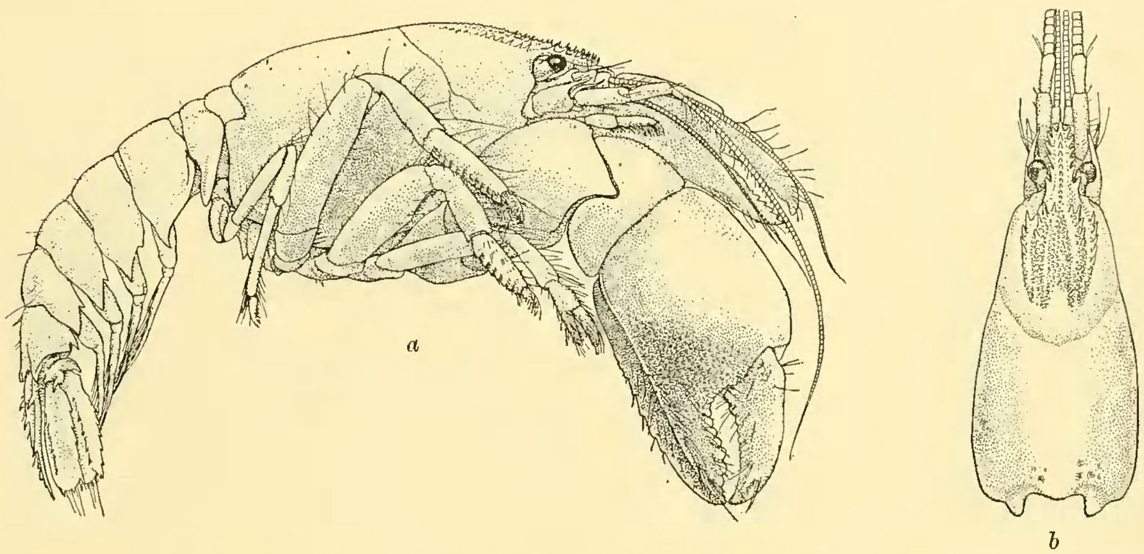

Fig. 5.—*Axius* (*Axius*) *novae-zealandiae*, n. sp. (*a*) Side view, × $2\frac{1}{2}$; (*b*) dorsal view of cephalothorax, × $2\frac{1}{2}$.

area of back with, in the middle, an elongate-triangular patch of granules, which narrows forwards to become the middle keel of the rostrum, where its granules pass into a single row of about a dozen spines. At each side of this patch a strip of granules, which just behind base of rostrum become spines. Outside this again the edging-keel of the flat area, bearing from seven to ten spines, which are small behind, but grow larger in front till the last is a stout thorn at some distance from base of rostrum. Beyond this thorn, keel continued till it becomes side keel of rostrum, where it bears six long spines. Rostrum thus bears above three spined keels. It ends in an upcurved spine. Eyes well pigmented, reaching barely half-way along rostrum. Antennular stalk outreaching rostrum by its end-joint. Second and third joints subequal, and together shorter than first. Basicerite of antenna equal to first joint of antennule; ischiocerite outreaching, by about half of its length, antennular stalk. Fixed and movable spines of antenna well developed, the latter a little longer than the former, and both a little outreaching the rostrum. Antenna a little longer than carapace including the rostrum. Third maxilliped outreaching rostrum by its last two joints, the last joint being a little longer than the preceding. Legs of the first pair unequal; that on right side, which is the larger, outreaching rostrum by its wrist and hand. Palm square, fingers nearly as long as the palm, fixed finger with a row of about ten blunt teeth. Inside of palm covered with fine pearly granules except near the wrist, and a patch of similar granules on the outside at the base of the fixed finger. Above, sides of palm slope to a sharp edge; lower side flat, with on outer side a sharp keel, continued along fixed finger. Smaller hand resembling larger, but more slender. Both sparsely hairy. Second leg outreaching rostrum by its hand, whose fingers are a little longer than the palm, and hairy all over the outer side. In third and fourth legs, propodite with some spines below in short transverse rows, more numerous on fourth leg than on third, and at the end a tuft of hairs, the dactylopodite having two longitudinal rows of spines and a sharp end-claw. In last leg only the distal two spine-rows on the propodite remain, hair-tuft longer, and broadened dactylopodite bites against a process of end of propodite, so that a clumsy subchela exists. Abdomen smooth. In male, each pleuron ends in a sharp point, and third to sixth bear each a spine on the fore edge. In female, pleura are broader but have a sharply cut hinder angle, except on sixth segment, and bear some hairs. Endopodite of the uropod with one, and exopodite with two keels; endopodite with about half a dozen spines on its outer edge and the same number on its keel; exopodite with the same arrangement on its outer edge and outer keel, but its inner keel smooth. Telson with, in its basal part, two marginal and four dorsal spines, in its distal part on each side two marginal spines, and on the broad, rounded end a group of three small spines on each side and a longer median spine.

Length of largest specimen, 6 cm.

Six specimens were taken at Station 96.

Super-family GALATHEIDEA.

Family GALATHEIDAE.

24. *Galathea pusilla*, Hend., 1885.

Galathea pusilla, Henderson, Ann. Mag. Nat. Hist. (5) XVI, p. 407; "Challenger" Anomura, p. 121, pl. XII, fig. 1 (1888).

Seven specimens were taken at Stations 90 and 96.

25. *Uroptychus maori*, n. sp. Fig. 6.

Closely related to *U. nitidus* (A. M.-Edw.), 1880, but differs in that (1) the antennal scale is only as long as the eye, and broader than in *U. nitidus*; (2) the ischium of the cheliped bears distally a fairly strong, straight spine below, and a very strong, curved spine above; (3) the fingers of the big chela are irregularly dentate with coarse and fine teeth, while those of the small chela are finely and regularly dentate save for a single big tooth on the movable finger.

One specimen was taken at Station 90.

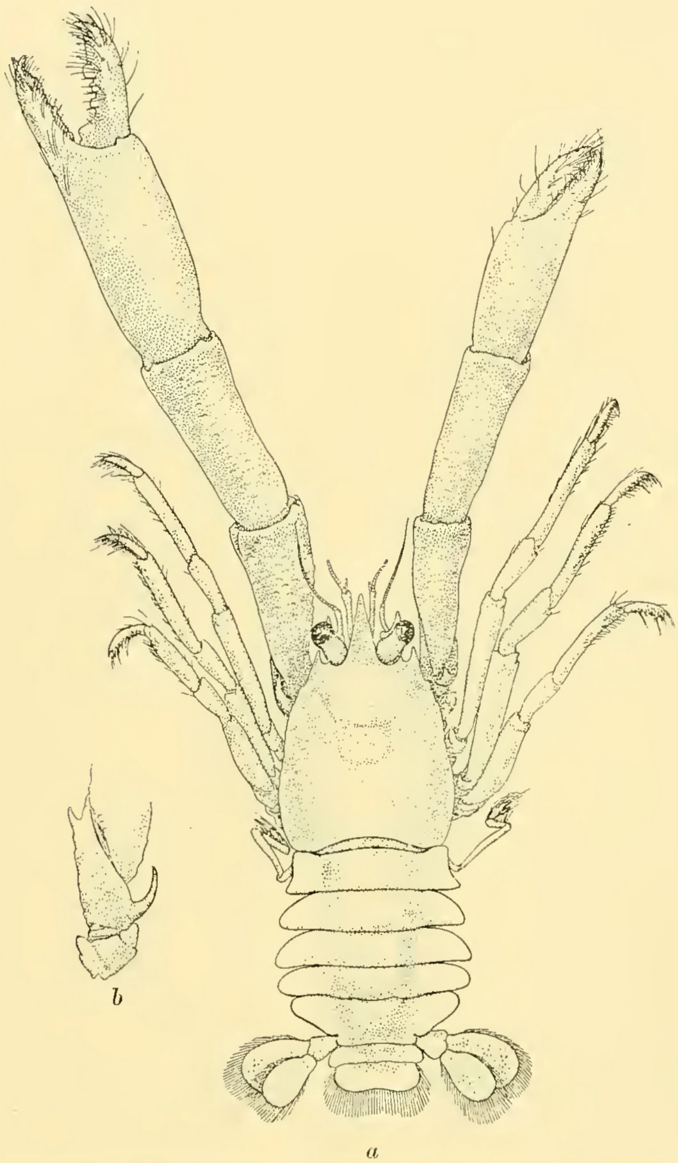

FIG. 6.—*Uroptychus maori*, n. sp. (*a*) Dorsal view, × $2\frac{1}{2}$; (*b*) externoventral view of ischium of great cheliped, × $2\frac{1}{2}$.

26. *Uroptychus novae-zealandiae*, n. sp. Fig. 7.

Diagnosis.—Carapace perfectly smooth and unarmed save for one spine at the anterolateral angle and a larger one at a short distance behind it; regions ill-marked;

rostrum slightly outreaching eyes, unarmed, hollow above. Eyestalks long, subcylindrical; eyes small. Antennule outreaching rostrum by flagella. Antenna outreaching rostrum by nearly the whole of the narrow region of its flagellum. All flagella short. Abdomen smooth. Third maxilliped outreaching eyes by end-joint and half propodite, polished, little hairy except near the tip. Cheliped of good length; hand equal to rest of limb; meropodite spiny only where it articulates with carpopodite,

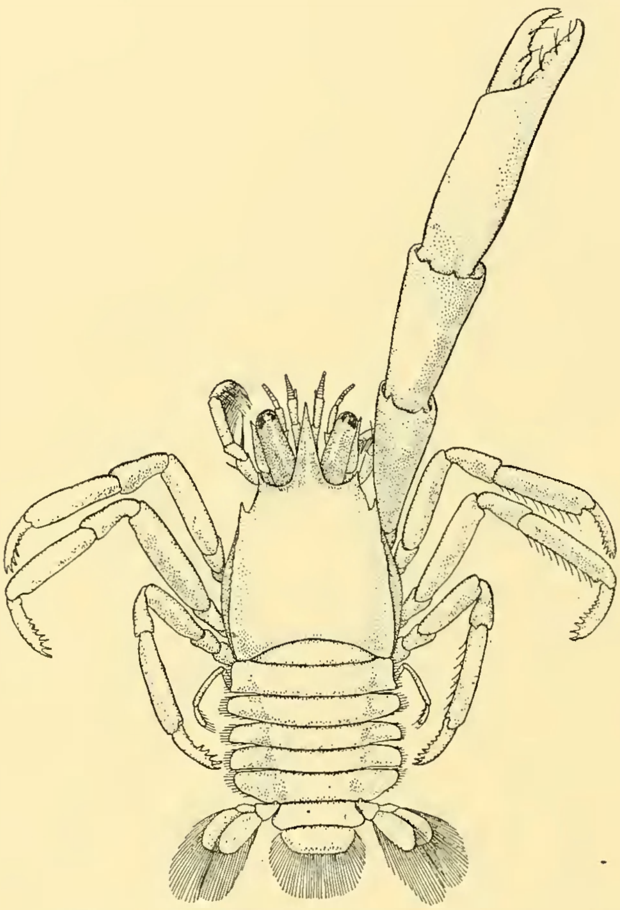

FIG. 7.—*Uroptychus novae-zealandiae*, n. sp., × 7.

which has also two spines at distal end; rest of limb smooth and unarmed; fingers shorter than palm, with faint traces of teeth. Second, third, and fourth legs smooth, unarmed save for a few slender spines at end of propodite, and a row of strong spines under dactylopodite.

Length, 8 mm.

One specimen was taken at Station 96.

Super-family PAGURIDEA.

Family PAGURIDAE.

Sub-family PAGURINAE.

27. *Paguristes subpilosus*, Hend., 1888.

Paguristes subpilosus, Henderson, "Challenger" Macrura, p. 77, pl. VIII, fig. 2.

The specimens would agree equally well with the description of *P. barbatus* (Heller) (Ortmann, Zool. Jahrb. VI, Syst., p. 279) were it not that the dactylopodites of the second and third legs are a good deal longer than the propodites and do not show a distinct continuation of the hairy line on the outside of the latter.

Four specimens were taken at Stations 90 and 96.

Sub-family EUPAGURINAE.

28. *Eupagurus norae*, Chilton, 1911.

Eupagurus edwardsii, Filhol, Bull. Soc. Philomath. Paris (7), VIII, p. 66 (1883); Miss. Ile Campbell, III, ii, p. 412, pl. LII, figs. 1, 2 (1885); Thomson, Trans. N.Z. Inst. 1898, pp. 173, 182.

Eupagurus norae, Chilton, Rec. Canterbury Mus. I, p. 299 (1911).

The specimens agree closely with Thomson's description, but in most, though not in all, the teeth on the fingers of the great chela are obsolescent.

Many of both sexes were dredged in shallow water at Station 134, off New Zealand.

29. *Eupagurus kirki*, Filhol, 1885.

Eupagurus kirki, Filhol, Miss. Ile Campbell, III, ii, p. 416, pl. LI, fig. 5; Thomson, Trans. N.Z. Inst. 1898, p. 175, pl. XX, figs. 8–10.

According to Thomson, the antennular stalk should be one-fourth shorter than the eyestalk. In the three specimens taken by the Expedition the antennular stalk slightly outreaches the eye.

Station 134.

30. *Eupagurus crenatus*,* n. sp. Fig. 8.

Diagnosis.—Carapace smooth, with a few sparse hairs. Rostrum low, broad, not covering eye somite. Length of eyestalks moderate, less than width of carapace just behind antennae. Antennular stalk outreaching eye by nearly all its last joint. Antennal scale outreaches eye; flagellum outreaching, by a little, second leg. Third maxilliped a little outreaching antennule. First legs unequal. In the right, which is the larger of the two, meropodite hatchet-shaped in side view, its outer surface scaly, a spine at distal end of its upper edge and a row of smaller spines along lower edge; wrist faintly granular on outer side, strongly so above, some of the granules rising into

* In allusion to the crenate ridges on the hands of the chelipeds.

blunt spines, a smooth strip near the inner side of the upper surface and a row of spines along the upper edge; hand granular all over, except inner surface, which is polished and pitted; a regular row of granules sweeping along lower edge but turning upwards near base of palm, where a more irregular row of oblong granules marks the extreme lower edge, another irregular row running along outer side of palm and fixed finger, and a strong row slanting downwards across upper part of palm to base of movable finger, along which it is continued by a granular ridge; upper edge of palm and movable finger sharp and irregularly granular. Smaller hand subprismatic, with

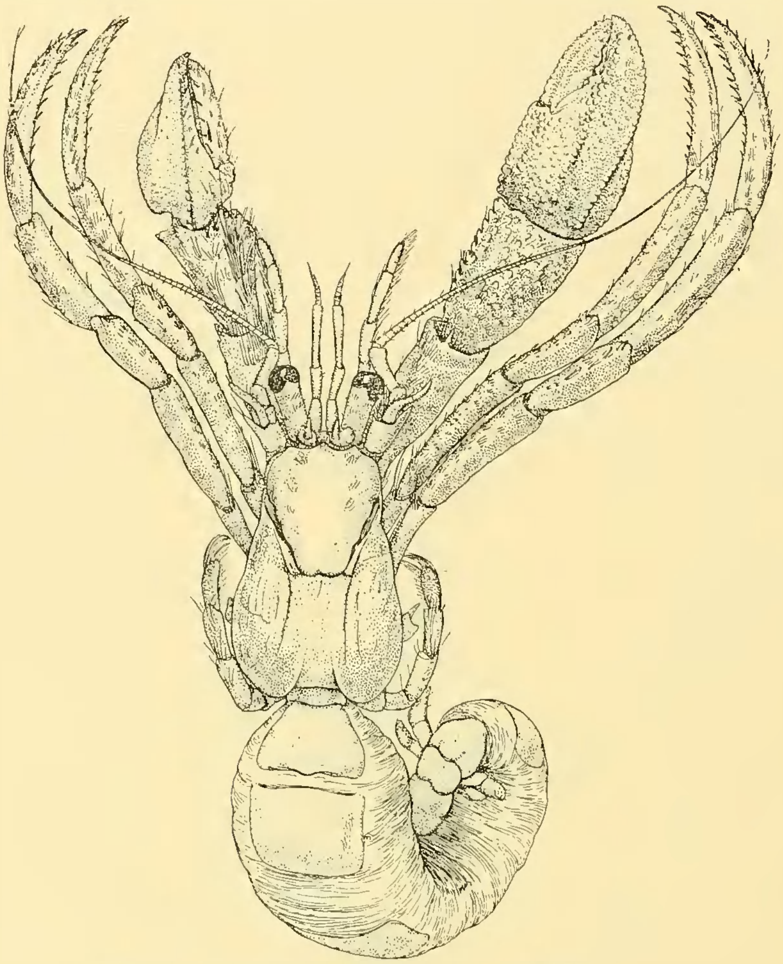

FIG. 8.—*Eupagurus crenatus*, n. sp. Male, × 3.

sharp, granulate ridges along upper and lower edges, and another along palm and fixed finger. Second and third legs outreaching great chela by about half of their dactylopodites, those of left side a little smaller than those of right; dactylopodites bear a row of fine spines below, carpopodites a spine above at end. All legs rather sparsely hairy.

Length of single specimen (a male), 4 cm.

Station 90.

31. *Porcellanopagurus edwardsi*, Filhol, 1885. (? sp.).

Porcellanopagurus edwardsi, Filhol, Bull. Soc. Philomath. Paris (7) IX, p. 48; Miss. Ile Campbell, III, ii, p. 410, pl. XLIX, figs. 2–4 (1885); Thomson, Trans. N.Z. Inst. XXXI, p. 187 (1899); Chilton, Subant. Is. N. Zealand, XXVI, p. 610 (1909).

The collection contains a single female specimen, taken at Station 96, off the north end of New Zealand, of a species of the very interesting genus *Porcellanopagurus*. It probably belongs to *P. edwardsi*, but its great chela differs considerably from that of the male specimen described and figured by Chilton. The scales on the wrist are coarser and less regular, the upper edge of the palm has a well-marked, though irregular, crest of sharp granules or teeth, and along the lower edge there runs a strong, regular line of fine granules, such as appears to be present in *P. japonicus*, Balss, 1913. Very possibly these differences are sexual, and in any case the examination of a series of examples would be necessary before a new species could be established for the form taken by the "Terra Nova." The specimen forms the subject of a separate report (p. 111 below).

Tribe BRACHYURA.

Sub-tribe BRACHYGNATHA.

Super-family BRACHYRHYNCHA.

Family PORTUNIDAE.

Sub-family PORTUNINAE.

32. *Portunus corrugatus* (Penn.), 1777. Fig. 9.

Cancer corrugatus, Pennant, Brit. Zool. IV, p. 5, pl. V, fig. 9.
Portunus corrugatus, Bell, Brit. Stalk-eyed Crust., p. 94 (1853); Miers, "Challenger" Brachyura, p. 200 (1886).

The collection contains a female specimen of this very widespread species, dredged in moderately deep water off New Zealand. It is of small size (7 mm. long), but closely resembles a rather larger British specimen with which I have compared it, and also, as the accompanying figure shows, the representation given by Bell. The only respect in which it differs from the British form is a greater indistinctness of the regions of the carapace. It does not agree with the variety *subcorrugatus*, A. M.-Edw., 1861, from the Red Sea in the features in which that variety is unlike the type. Specimens from Australia and Japan have the regions of the carapace strongly marked, but show no constant difference from the British form.

Station 134.

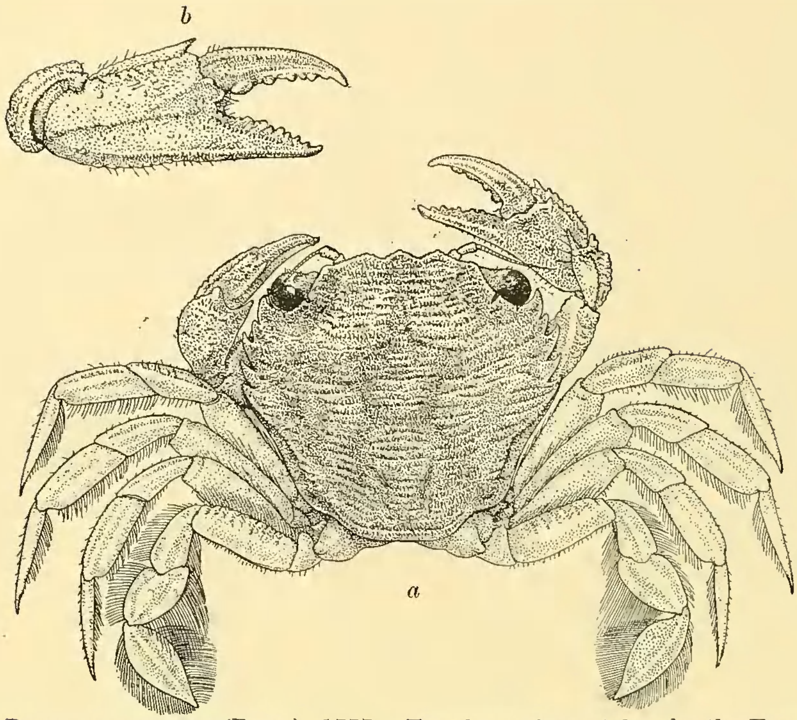

FIG. 9.—*Portunus corrugatus* (Penn.), 1777. Female specimen taken by the Expedition in New Zealand. (*a*) Dorsal view, × 5; (*b*) right cheliped from outer side, × 7½.

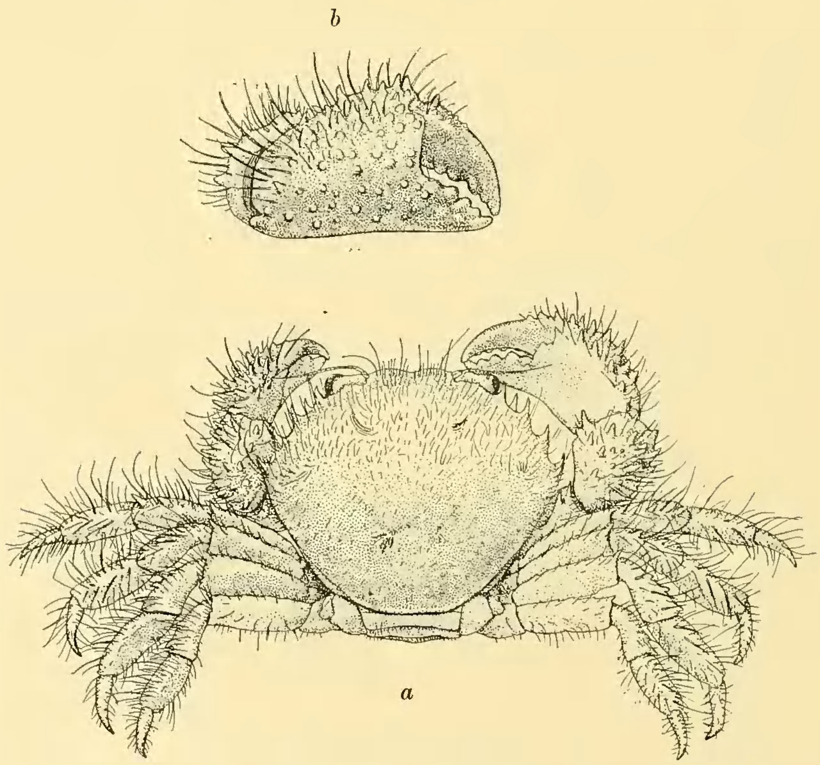

FIG. 10.—*Pilumnus maori*, n. sp. Male. (*a*) Dorsal view, × 5; (*b*) right cheliped from outer side, × 5.

33. *Neptunus* (*Hellenus*) *spinicarpus* (Stm.), 1870.

Achelous spinicarpus, Stimpson, Bull. Mus. Comp. Zool. II, p. 148 (1870).
Neptunus (*Hellenus*) *spinicarpus*, A. Milne-Edwards, Miss. Sci. Mexique, Crust., p. 221, pl. XL, fig. 1 (1879); Miers, "Challenger" Brachyura, p. 182 (1886).

Very numerous specimens taken at Station 42.

Family XANTHIDAE.

Sub-family MENIPPINAE.

34. *Pilumnus maori*, n. sp. Fig. 10.

A *Pilumnus*, dredged in 70 fathoms off New Zealand, does not appear to belong to any of the described species of the genus, and I am therefore reluctantly compelled to add one more to the already long list of local forms of these crabs.

Diagnosis.—Body and legs covered thickly in front and above, but more sparsely behind and below, with coarse hairs, yellowish in colour when preserved in spirit, some of the hairs much longer than the rest; body otherwise smooth save for five sharp anterolateral spines of the carapace, of which the first stands at the angle of the orbit, and the second is smaller than the rest, and very slightly more ventrally placed. Regions of carapace rather faintly marked. Length of carapace in middle line three-quarters of greatest breadth, which is at base of last side-spine; width between orbits rather more than one-third of greatest breadth. Distance from outer angle of orbit to base of last side-spine somewhat less than that from base of same spine to hinder edge of carapace. Carapace strongly convex in front. Upper surface of front marked by a shallow groove, its edge with a faint median notch, and at its ends a forward trend to orbital edge, which bears below some sharp teeth irregularly set, and above some blunt tubercles and a shallow notch. No subhepatic spine. Flagellum of antenna naked. Chelipeds alike, but unequal, the right the larger; arms with two spines near end of upper edge, wrists spinous on exposed surface, palms spinous above and on upper part of outer side, granulate on its lower part, the granules not in regular rows. Fingers black and distinctly toothed. Walking legs stout, with spine at end of upper edge of meropodite, two or three spines on upper edge of carpopodite, and a small, sharp end-claw.

Length of single specimen (a male), 6 mm.

Station 96.

Family GONEPLACIDAE.

Sub-family GONEPLACINAE.

35. *Goneplax hirsutus*, n. sp. Fig. 11.

Diagnosis.—Carapace about two-thirds as long as broad; its greatest width at base of extraorbital spines; its regions faintly marked except for a pronounced

H-shaped depression in the middle; its sides converging backwards from the sharp extraorbital spines, behind each of which, and nearer to it than in *G. angulatus*, stands a smaller, very sharp spine. Front almost straight, with a shallow median notch, in which stands a rostral prominence. Orbital margin sinuous, sloping backward; width of orbit about equal to that of front. Chelipeds almost equal, the right very slightly the larger; arm in female and (? young) male about two-thirds length of carapace, deep, with a spine a little beyond middle of upper edge; wrist about two-thirds length of arm, rather broader than long; hand longer than rest of limb; fingers about equal to palm, irregularly toothed, not gaping; a long and dense tuft of hair on outside of

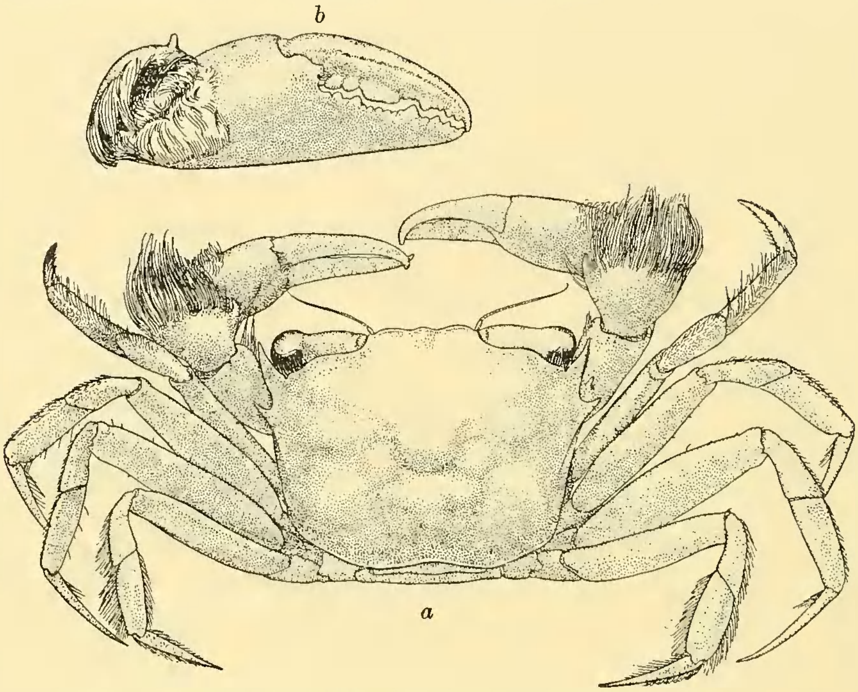

Fig. 11.—*Goneplax hirsutus*, n. sp. (*a*) Dorsal view, × $2\frac{1}{2}$; (*b*) right cheliped from outer side, × $2\frac{1}{2}$.

distal half of wrist and base of palm, and a fringe of similar hairs along inner side of arm. Walking legs slender, simple, fringed with hairs, much like those of *G. angulatus*, but without spine on meropodite. Abdomen of (? young) male narrow, like that of *G. maldivensis*, Rathb.

Length of largest specimen, 13 mm.

Two specimens (male and female) taken at Station 42.

Family PINNOTHERIDAE.

36. *Pinnotheres pisum* (L.), 1766. Fig. 12.

Cancer pisum, Linnaeus, Syst. Nat. XII, p. 1069 (1766).

Pinnotheres pisum, Latreille, Hist. Nat. Crust. VI, p. 85 (1803); Leach, Malacost. Pod. Brit. pl. XIV (1815); Miers, Cat. Crust. N. Zealand, p. 48 (1876).

Pinnotheres mytilorum, H. Milne-Edwards, Ann. Sci. Nat. (3) XX, p. 217, pl. X, fig. 1 (1853).

The figures given by Leach and Milne-Edwards do not accurately represent the third maxilliped of this species. The propodite is articulated to the outer angle of the distal end of the ischiomeropodite, and does not project beyond its inner edge. In this, as in all other respects, the New Zealand specimens agree with British examples.

Two female specimens from D'Urville Island, and one from Nelson, New Zealand, all taken in mussels.

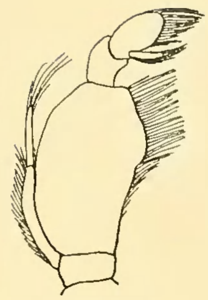

FIG. 12. *Pinnotheres pisum* (L.), 1766. Third maxilliped, × 9.

FAMILY GRAPSIDAE.

SUB-FAMILY GRAPSINAE.

37. *Grapsus* (*Leptograpsus*) *variegatus* (Fabr.), 1793.

Cancer variegatus, Fabricius, Ent. Syst., p. 450 (1793).
Grapsus variegatus, H. Milne-Edwards, Hist. Nat. Crust. II, p. 87 (1837); Miers, Cat. Crust. N. Zealand, p. 36 (1876).
Leptograpsus variegatus, H. Milne-Edwards, Ann. Sci. Nat. (3), X, p. 171 (1853); Kingsley, Proc. Ac. Philadelphia, 1880, p. 196.

One male specimen from the Bay of Islands, New Zealand.

SUB-FAMILY PLAGUSIINAE.

38. *Plagusia chabrus* (L.), 1764.

Cancer chabrus, Linnaeus, Mus. Lud. Ulr., p. 438 (1764).
Plagusia tomentosa, H. Milne-Edwards, Hist. Nat. Crust. II, p. 92 (1837).
Plagusia chabrus, Miers, Ann. Mag. Nat. Hist. (5), I, p. 152 (1878); Cat. Crust. N. Zealand, p. 45 (1876).

Alcock (J. As. Soc. Bengal LXIX, ii, 3, p. 437, 1900) states that the exognath of the third maxilliped of *Plagusia* has no flagellum. In the present species a small but distinct flagellum is present.

One male specimen from Elmsley Bay, New Zealand.

FAMILY GECARCINIDAE.

39. *Gecarcinus lagostoma*, H. M.-Edw., 1837.

Gecarcinus lagostoma, H. Milne-Edwards, Hist. Nat. Crust. II, p. 27; Miers, "Challenger" Brachyura, p. 218, pl. XVIII, fig. 2 (1886).

One male specimen from South Trinidad Island (Station 36).

SUPER-FAMILY OXYRHYNCHA.

FAMILY HYMENOSOMATIDAE.

40. *Elamena longirostris*, Filhol, 1885.

Elamena longirostris, Filhol, Miss. Ile Campbell, p. 403, pl. XLVI, fig. 7.

A small and much damaged specimen which appears to belong to this species was taken with plankton near New Zealand, probably clinging to the body of some pelagic organism or other floating object. The surface of its body is not hairy, but this may be due to immaturity, or the hairs may have been rubbed off. There are traces of longish hairs on the legs.

One specimen, Station 109.

Family MAIIDAE.

Sub-family INACHINAE.

Genus ECHINOMAIA, n. gen.

Two male specimens, dredged in 100 fathoms north of New Zealand, belong to a species new to science, related to those of *Cyrtomaia* and *Platymaia*, but differing from each of them in points which appear important enough to demand the institution of a new genus for its reception. This may be diagnosed as follows:—

Carapace subpyriform, as broad as long, with well-marked and somewhat swollen regions, naked, porcellanous, sprinkled irregularly with granules of various sizes, and bearing also large and small, blunt spines. Sternum and abdomen also sprinkled with granules, among which small, sharp spines are regularly arranged. Abdomen of male seven-jointed. Rostrum three-toothed; its middle tooth a spout-like outgrowth of the interantennulary septum directed obliquely downwards; its other two teeth sharp, hooked, and standing erect on the hood-like antennulary fossettes. Eye-hood prominent. No pre- or supra-ocular, but a strong postocular spine, not hollowed to receive the eye. Epistome broader than long, concave, lozenge-shaped. Edges of mouth-frame projecting strongly, and rising at each outer angle into a lobe. Eyestalks long; cornea somewhat ventral, bearing a papilla at the end and [2] others on the upper side. Basal joint of antenna of moderate width, reaching fore edge of eye-hood, not fused with surrounding structures, but firmly fixed; its ventral side flat, bearing at end two jagged lobes; last two joints of stalk spreading on their outer sides each into a large, leaf-like flange [flagella wanting in both specimens]. Third maxilliped subpediform, merognathite being narrower than ischiognathite and palp strong; exognathite well developed and only its flagellum hidden. Legs long, slender, subcylindrical, with compressed end-joints; first two bearing many sharp spines, fourth smooth [fifth wanting in both specimens]. Chelipeds shorter than walking legs, stouter, though still slender, and more spiny. Hands narrow, subprismatic, with fingers bent somewhat downwards on palm.

In the shape of the rostrum and the compression of the last joint of the walking legs, *Echinomaia* resembles *Platymaia*. The profile of its carapace is much like that of *P. turbynei*, Stebb., 1902. In regard to the eyes, the spines of the carapace, and the shape of the hands, it is more like *Cyrtomaia*. In the stalk of its antenna it differs considerably from both genera. *Echinoplax* appears to be a related genus, and so perhaps is *Macrocheira*. It would be interesting to know the habits of this remarkable group of crabs, but on account of their deep-water habitat little more than conjecture is possible. As they have not the characteristic hooked hairs of the Maiidae, it cannot be their practice to cover themselves with sessile organisms. Nor is the texture of their carapace that of a weed- or sponge-haunting crab. In that respect they are far more like the sand- and mud-dwelling Oxystomes or Parthenopids, which they also resemble not a little in the shape of their chelipeds, while the forepart of the carapace

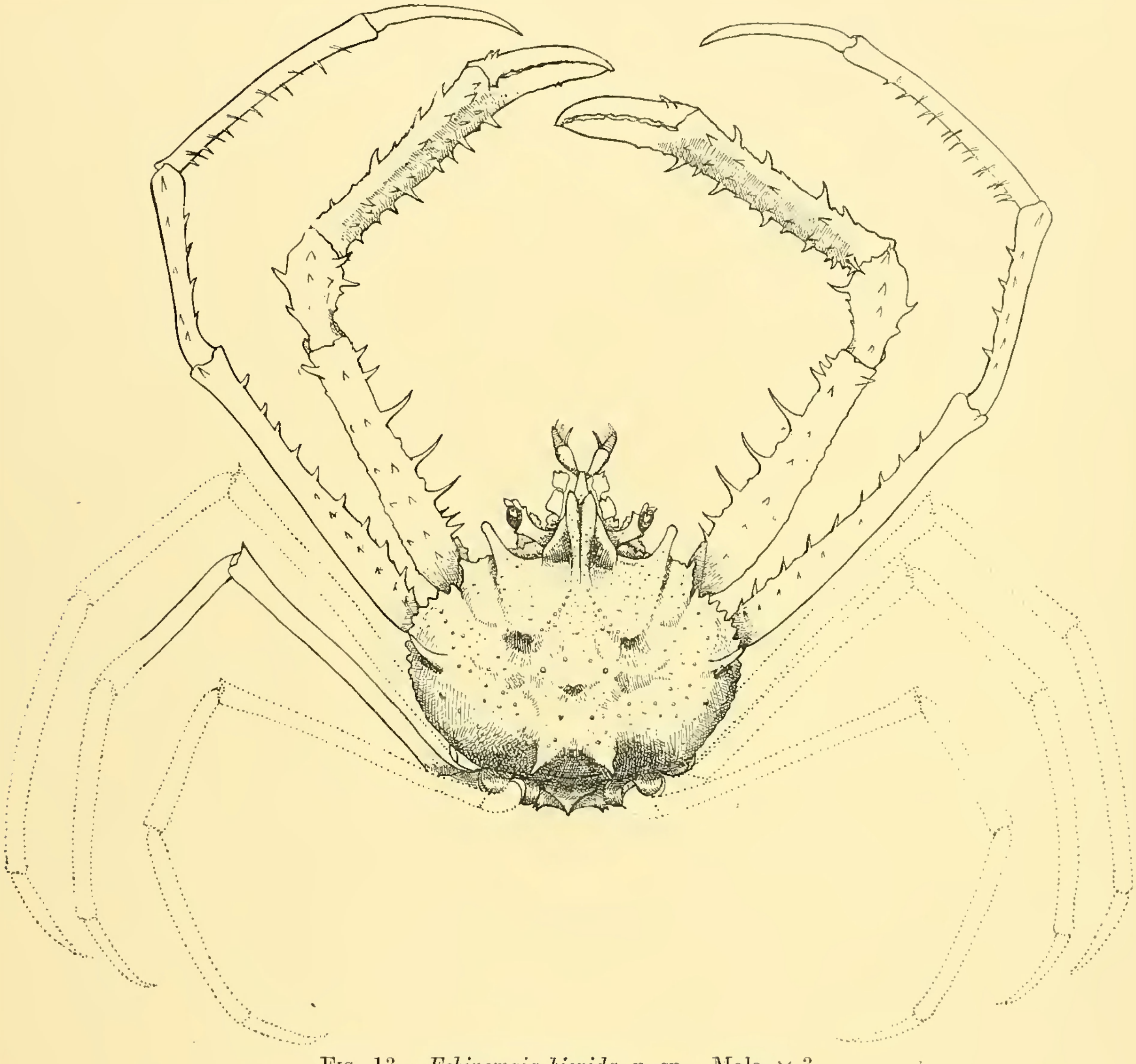

Fig. 13.—*Echinomaia hispida*, n. sp. Male, × 3.

is strongly reminiscent of the snout-like region that *Leucosia* thrusts up to the surface of the sand. The kind of ground upon which specimens have been taken has not always been recorded, but in the instances I have been able to trace it has always been "mud" of some sort, except in the present case. The new crabs were taken by the "Terra Nova" on "rock," but such a bottom often contains pockets of sand in which a characteristic sand fauna lives.

41. *Echinomaia hispida*, n. sp. Fig. 13.

Diagnosis.—Large spines of carapace, nine in number, arranged as follows: two postocular, two at the sides of the gastric region, each joined by a ridge to the postocular of the same side, two on the branchial regions, one median on the hinder part of the gastric region, two on the cardiac region. A somewhat smaller spine on the first abdominal segment, and three smaller still on the second. On each hepatic region, postocular succeeded by a smaller tooth. On each branchial region a row of about fifteen small regular teeth. Cheliped of male reaching middle of propodite of first walking leg; its fingers shorter than palm, very slightly gaping, irregularly toothed; palm with six rows of spines—two above, two below, one on inner and one on outer surface. Wrist about half length of palm, bearing a number of spines; arm with three rows of spines on inner side and a spine above near end. Meropodite of first walking leg similarly provided, but with smaller spines; those on carpopodite and propodite similarly placed, but still smaller; dactylopodite about half length of propodite, smooth. Third walking leg smooth, except for a spine above at end of meropodite. Second and fourth walking leg wanting in both specimens.

Length of longer specimen, 16 mm.

Two specimens, Station 90.

42. *Eurypodius latreillei*, Guérin, 1828.

Eurypodius latreillei, Guérin, Mem. Mus. Hist. Nat. Paris, XVI, p. 384, pl. XIV; Miers, Proc. Zool. Soc. Lond. 1881, p. 64.

In the three specimens (one male and two female) the rostrum is straight, its spines diverging a little at the tip, the spines on the branchial region rather small, the propodites of the walking legs longer than the carpopodites and moderately dilated. The male belongs to Miers' form A.

Station 42.

Sub-family MAIINAE.

43. *Paramithrax* (*Paramithrax*) *latreillei*, Miers, 1879.

Paramithrax barbicornis or *P. latreillei*, Miers, Cat. Crust. N. Zealand, p. 6, pl. I, fig. 2.
Paramithrax latreillei, Chilton, Rec. Canterbury Mus. I, iii, p. 289 (1911).
Paramithrax latreillei, Thomson, Trans. N. Zealand Inst. XLV, p. 236 (1912).

Two male specimens from Elmsley Bay, New Zealand.

44. *Paramithrax* (*Leptomithrax*) *affinis*, n. sp. Fig. 14.

A female specimen dredged in 100 fathoms north of New Zealand, resembles *P.* (*L.*) *longimanus*, Filhol, 1885, but differs from it in the following respects:—

(i) The cheliped is barely as long as the first walking leg, its wrist is smooth, and its arm less tuberculate than in Filhol's species. These may be merely sexual differences.

(ii) The rostral horns are wider apart, and show no tendency to converge distally. Unfortunately their tips are broken off in the specimen.

(iii) Each of the meropodites of the legs, including that of the cheliped, bears a small spine above at the distal end.

(iv) There is a sharp spine on the edge of the merognathite of the third maxilliped, just outside the articulation of the carpopodite.

It seems probable that the specimen represents a form which is related to, but specifically distinct from, *P. longimanus*, and I am accordingly proposing for it the above name.

Its length is 34 mm.

Station 90.

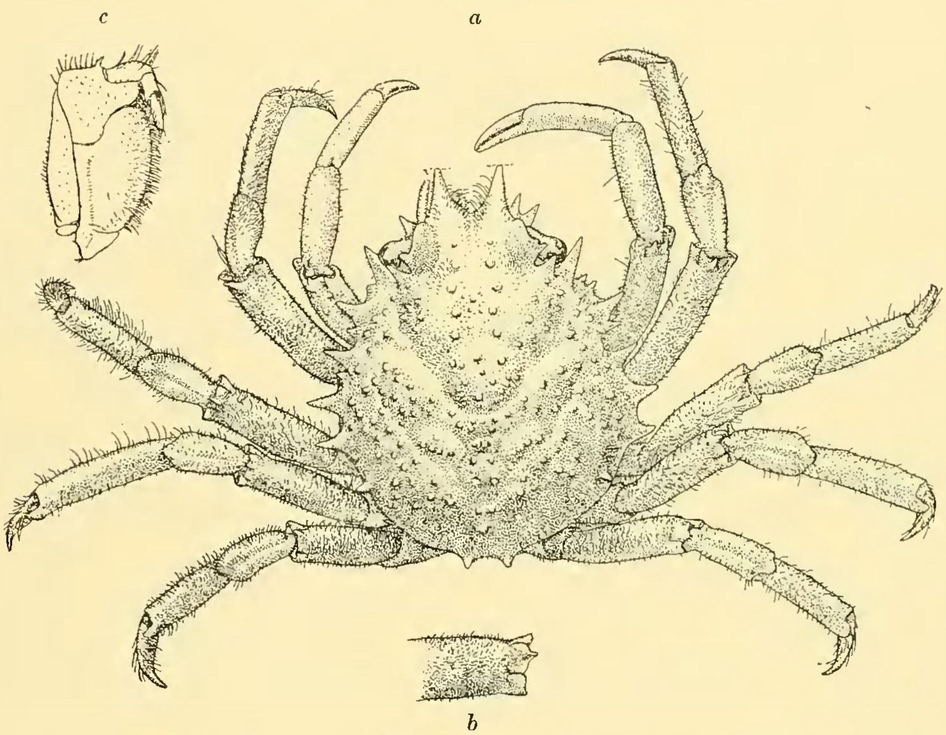

Fig. 14.—*Paramithrax* (*Leptomithrax*) *affinis*, n. sp. Female. (*a*) Dorsal view, × $1\frac{1}{2}$; (*b*) end of meropodite of walking leg, × 2; (*c*) third maxilliped, × 3.

45. *Paramithrax parvus*, n. sp. Fig. 15.

A small *Paramithrax*, dredged in 70 fathoms off the North Cape of New Zealand, is probably closely related to *P. minor*, Filhol, 1888 (Miss. Ile Campbell, III, ii, p. 356, pl. XL, fig. 4), but is clearly of a distinct species. It differs from Filhol's species in the following points:—

(i) The rostral horns are shorter (about one-sixth the length of the rest of the carapace) and broader.

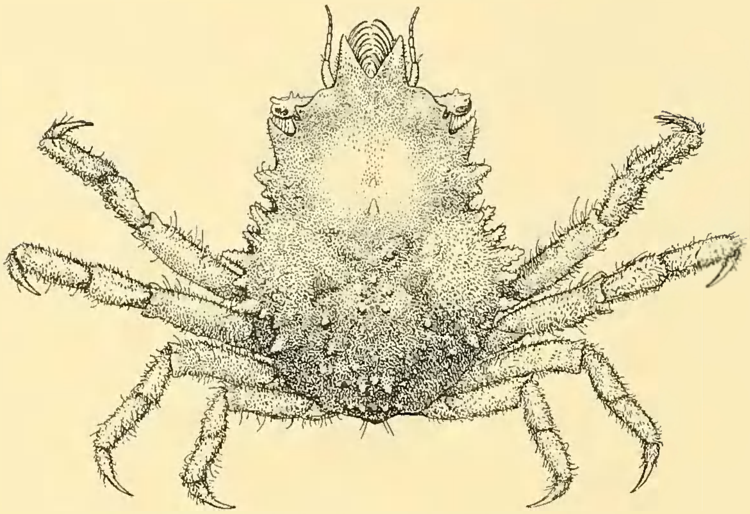

Fig. 15.—*Paramithrax parvus*, n. sp. Female, × 5.

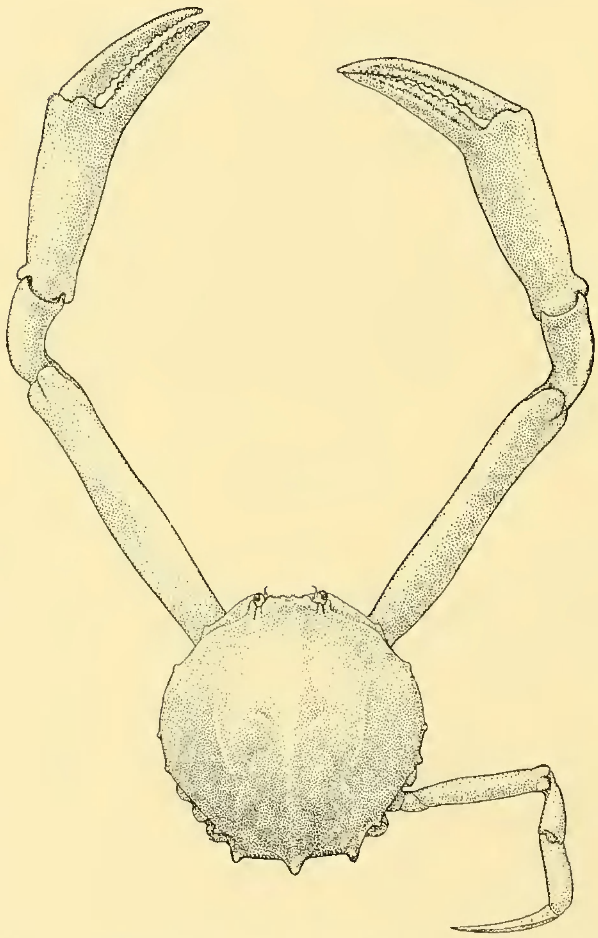

Fig. 16.—*Persephona (Myropsis) laevis*, n. sp. Male, × $1\frac{3}{4}$.

(ii) The postocular spines are shorter (not reaching the tip of the spine of the eye-hood) and stouter.

(iii) The gastric region of the carapace is only very faintly tuberculate.

(iv) The last spine on the hepatic region is smaller than that before it.

(v) The basal joint of the antennal stalk has a strong spine directed forwards as well as outwards, and serrate on its outer side.

The specimen (a female) measures 1 cm. in length.

Unfortunately the chelipeds are wanting. Probably the species belongs to the type-subgenus.

Station 96.

Sub-tribe OXYSTOMATA.

Family LEUCOSIIDAE.

Sub-family LEUCOSIINAE.

46. *Persephona* (*Myropsis*) *laevis*, n. sp. Fig. 16.

Diagnosis.—Carapace longer than broad, smooth and minutely pitted, except on the hinder edge, where it is granulate, with a marked median keel, indications of the regions, and a very shallow notch between the hepatic and branchial regions. Front with a median notch between two slightly swollen projections; its edge fringed with hair, barely hiding mouth-frame. Fissures of orbit well marked. Of five spines in hinder region of carapace all somewhat upcurved, median and laterals fairly slender, intermediates little more than rectangular corners of hinder edge. Besides these, three blunt spines on branchial and one on hepatic region. Exopodite of third maxilliped about as wide as endopodite, its outer edge gently curved. All legs quite smooth and unarmed. Chelipeds of male a little less than three times length of carapace, fingers finely but irregularly toothed, gaping a little at base, nearly as long as palm, which is about one-third as wide again as wrist. Walking legs short, slender, about one-fifth longer than arm of cheliped; dactylopodite equal to propodite with about half of carpopodite.

Length of single (male) specimen, 24 mm.

Placed in a bottle with *Gecarcinus* from South Trinidad Island, and therefore probably taken near the island. Its condition somewhat suggests its having been picked up dead on the shore.

INDEX.

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CRUSTACEA.

PART II.—PORCELLANOPAGURUS: AN INSTANCE OF CARCINIZATION.

BY

L. A. BORRADAILE, M.A.

Fellow, Dean and Lecturer of Selwyn College, Cambridge; Lecturer in Zoology in the University.

WITH THIRTEEN FIGURES IN THE TEXT.

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CRUSTACEA.

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WITH THIRTEEN FIGURES IN THE TEXT.

The "Terra Nova" Expedition captured off the northern end of New Zealand a berried female specimen* of *Porcellanopagurus*. Although four members of this genus have already been described,† our knowledge of the exceedingly interesting crustaceans which compose it is as yet very incomplete. The "Terra Nova" example (which I have provisionally referred to the type species *P. edwardsi*, Filhol) is in rather bad condition, all but the last pair of the legs being detached from the body, while the left cheliped and both legs of the fourth pair are missing. From this specimen, however, it is possible to gather certain facts which have not yet been stated, and to draw certain conclusions. The authorities of the Zoological Department of the British Museum have very kindly afforded me facilities for examining also two male specimens of *P. tridentatus*, Whitelegge, from the Kermadec Islands, and for comparing them with various other Paguridea. The following communication embodies the results of my observations upon this material.

Porcellanopagurus (Fig. 1) is one of the many attempts of Nature to evolve a crab. The material, in this instance, seems to have been an ordinary hermit-crab of the subfamily Eupagurinae, and the method followed was not only, as in other such cases, a broadening and depression of the cephalothorax, as though a weight had been placed upon it, together with reduction of the abdomen, but also a drawing out horizontally of the edges of that hard plate which roofs the forepart of the body of a hermit-crab. This plate is bounded at each side by the front part of the *linea anomurica*—the "line

* The specimen is mentioned on p. 97 of the systematic account of the Decapoda collected by the "Terra Nova" (Vol. III, No. 2).

† *P. edwardsi*, Filhol, 1885; *P. platei*, Lenz, 1902; *P. tridentatus*, Whitelegge, 1904; *P. japonicus*, Balss, 1914. The literature of the genus and its species is as follows: *Porcellanopagurus*, Filhol, Bull. Soc. Philomath. Paris (7), IX, p. 47 (1885); Miss. Ile Campbell, III, ii, p. 410 (1885). Thomson, Trans. N.Z. Inst., XXXI, p. 187 (1899). Alcock, Cat. Ind. Decap. Crust. II, i, pp. 27, 191 (1905). Chilton, Subant. Is. N.Z., XXVI, p. 610 (1909). Balss, Abh. K. Bayer. Ak. Wiss., math.-phys. Kl., Suppl. II, ix, p. 66 (1913). *P. edwardsi*, Filhol, Thomson, Alcock, Chilton, ll.c. *P. platei*, Lenz, Zool. Jahrb. Syst., Suppl. V, p. 740 (1902). *P. tridentatus*, Whitelegge, Mem. Austral. Mus. IV, p. 180 (1904). Chilton, Trans. N.Z. Inst. XLIII, p. 552 (1911). *P. japonicus*, Balss, l.c. *P. edwardsi?*, Borradaile, "Terra Nova" Nat. Hist. Rep., Zool., III, No. 2, p. 97 (1916).

b" of Boas*—and extends backwards a little way beyond the cervical groove. In *Porcellanopagurus* (Fig. 5) its edges have grown out into a series of lobes, by which the spread of the back is increased. One of these lobes is a large, triangular rostrum, and there are on each side four others, which vary in size and shape according to the species. The rostrum bears a low median ridge. The first side-lobe stands at the angle of the carapace, above the antenna. The second has, in *P. edwardsi*, three cusps, of which the foremost is low and blunt, the middle long and sharp, and the hinder a mere knob. The third and fourth lobes, like the first, are simple. The fourth stands behind the

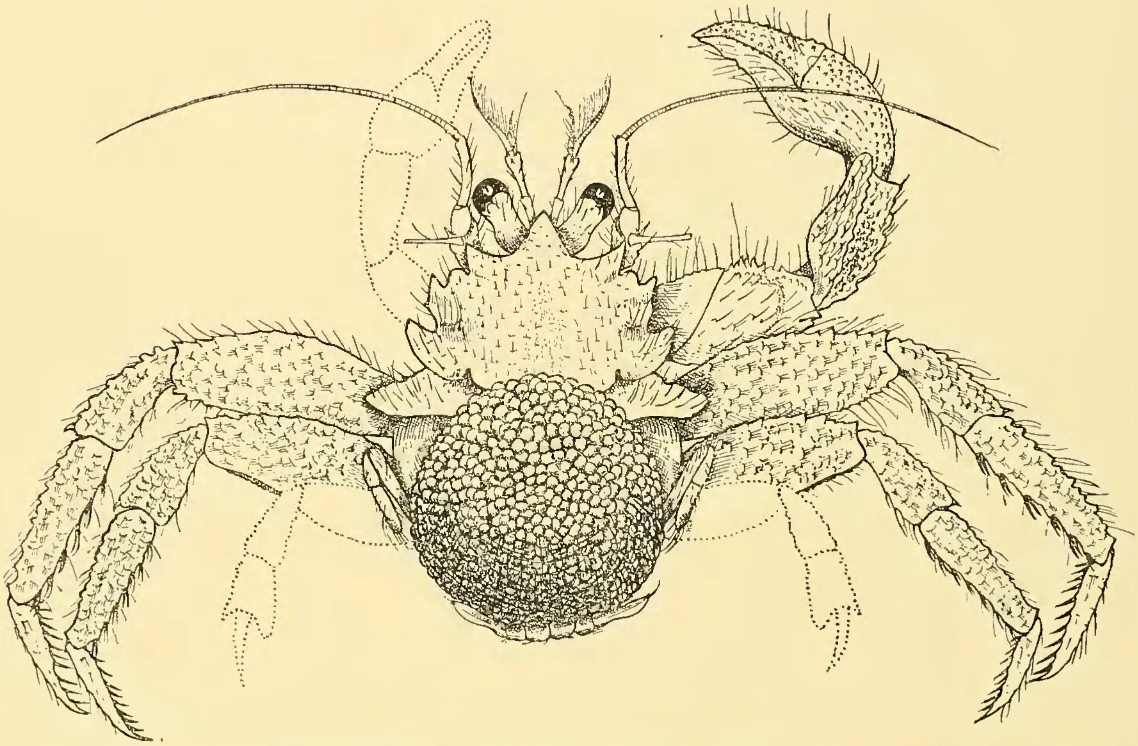

Fig. 1.—*Porcellanopagurus* sp., probably *P. edwardsi*, taken by the "Terra Nova" north of New Zealand: dorsal view of a berried female, × 3.

cervical groove on a fairly wide piece of hard cuticle, which in ordinary hermit-crabs is represented by a much narrower strip. Besides the ossicles of the fourth pair of lobes there is a little post-cervical calcification in the cardiac region. The cervical groove which separates this hinder series of small pieces from the main part of the back-plate is undoubtedly here, as in other hermit-crabs, the hinder of the two furrows to which that name has been applied,† the anterior cervical groove being absent in all Paguridea. The horizontal "line *d*" of Boas—the anterior part of the *linea thalassinica*—of which a trace exists in other Paguridae, in the form of a groove of varying depth

* K. Dansk Vidensk. Selsk. Skr. (6) I, p. iv.

† See Gardiner's "Fauna of the Maldives," Art. "On the Classification and Genealogy of the Reptant Decapods," vol. II, p. 690.

and length, is represented in *Porcellanopagurus* by a short, deep, forward branch from the cervical groove above the third lobe of each side, and perhaps by a faint forward continuation.

The substance of the dorsal plate, and of the armour of the first three pairs of legs, is very hard, porcellanous, and a little translucent, not at all like that of most hermit-crabs, but its surface is roughened by many short, transverse ridges, and somewhat sparsely covered with hairs, placed in little rows, each in front of one of the ridges, an arrangement which, developed in various degrees, is not uncommon in Eupagurinae. Below the projecting lobes of the back-plate, the sides of the cephalothorax (Fig. 2) are almost vertical, though rather low, and they and the hinder part of the thorax are soft, as in an ordinary hermit-crab. The post-cervical region is shorter and wider than in other Paguridae, and the concavity of its hinder edge is semicircular, not deep and narrow, as is usual in the family. In correspondence with this shortening of the region behind and above it, the hinder part of the *linea anomurica* is directed more downwards than usual. The "line *la*" of Boas branches as a Y at its upper end, the forward branch joining the *linea anomurica* opposite the cervical groove, the hinder branch behind the last side lobe.

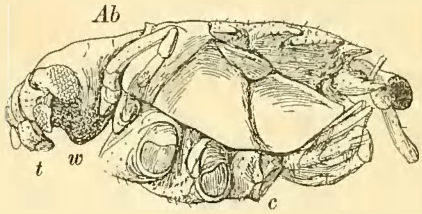

Fig. 2.—*Porcellanopagurus:* side view of the specimen shown in Fig. 1, × 3. *Ab*, Abdomen; *c*, base of cheliped; *s*, sixth abdominal tergum; *t*, telson; *w*, waist.

On the underside of the thorax (Fig. 3) the legs are set wider apart than in an ordinary hermit-crab, and the sternal series of plates is better developed, though in number and position its pieces faithfully resemble those of *Eupagurus*. The widely separated bases of the third maxillipeds are connected by a slender sternum, rather wider in the middle than at its ends. The two small sternal pieces on the segment of the chelipeds are fused, though their limits are still visible. They are not quite symmetrical, the left being rather more prominent than the right. The second pair of legs has a pair of large sternal plates. Behind them stands a transverse piece of good size, which appears to belong to the same segment as the two rather small ossicles at the bases of the third pair of legs. The sternum of the fourth pair of legs is a very narrow bar, placed more dorsally than that of *Eupagurus*, on the anterior wall of a deep furrow which separates from the cephalothorax a region consisting of the last thoracic segment together with the abdomen. On the hinder side of this furrow, thus seeming to belong to the abdomen, stands the sternum of the fifth pair of legs, which is also a very narrow bar. The oviducal opening is placed, not, as usual, on the ventral side of the coxopodite of the third leg, but on the hinder face of the joint, which is directed towards the furrow between the last

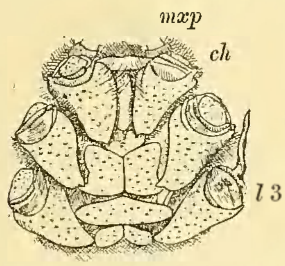

Fig. 3.—*Porcellanopagurus:* third to sixth thoracic sterna of the specimen shown in Fig. 1, × 3. *ch*, Cheliped; *l* 3, third leg; *mxp*, base of third maxilliped.

two thoracic segments, and is not covered by the sternum of the fourth pair of legs because the latter has receded to a more dorsal position than that which it usually occupies.

The condition of the abdomen in the living animal has, unfortunately, not been described. In spirit specimens (Figs. 2, 5, 13*a*) it forms a rounded sack, placed behind the cephalothorax. From the last thoracic segment it is separated by a groove, fairly deep on the ventral side, but little marked above. In front of that segment, however, there is a greater furrow, by which, as by a waist, the body is divided into two regions, one consisting of the major part of the cephalothorax, the other of the abdomen together with the last thoracic segment. The waist also is deepest on the ventral side. The abdomen is a good deal flattened above but bellies below. It is possible, though perhaps not likely, that its length is greater in living than in preserved specimens, in which case the true aspect of the animal might be considerably less crab-like than that under which it is at present known.

Where the thorax joins the abdomen there lies across the back a narrow transverse strip of hard cuticle (Fig. 13*a*), which has at least the appearance of being the tergite of the last thoracic somite. Its ends abut on a pair of oval plates of like substance, placed one above the base of each of the legs of the segment, and perhaps to be regarded as pleural structures. A similar arrangement is found in *Eupagurus*, where Boas* describes the transverse strip as part of the first abdominal tergite. That, however, it is not, either in *Eupagurus* or in *Porcellanopagurus*. It can hardly be a persistent thoracic tergite, since it is not found in lower Decapoda, and may perhaps be more correctly described as a structure *sui generis* than as a tergite at all; but in both genera it lies clearly in the thoracic region, and can be distinguished from the first abdominal tergite, which lies behind it, and from which is formed the opposite face of the thoraco-abdominal groove, along whose floor in *Eupagurus* there runs a fine, white, transverse line like a suture. The two tergal sclerites are, however, firmly united, and together provide a necessary strengthening of the back in the region of the attachment of the last pair of legs. The true tergite of the first abdominal segment has in *Porcellanopagurus* the form of a moderately broad transverse plate, lacking the median backward expansion which is found in *Eupagurus*. A pair of independent plates, of which the left bears a limb, stand in the female for the second tergite; a smaller plate bearing a limb is the remains of the third tergite, while at the base of the limb of the fourth segment there is barely a trace of such a thickening. The fifth segment is altogether soft. This arrangement is derived from that of *Eupagurus*† by the disappearance of the plate on the right hand side of the third and fourth segments, and of the whole tergite of the fifth. In the male (of *P. tridentatus*) there are no abdominal tergites, save a vestige on the first segment. But, although calcified remnants of the terga are

* *Loc. cit.*, p. 112.

† The shapes and sizes of the hard pieces of the abdomen vary a good deal from species to species in *Eupagurus*.

thus scanty, the segmentation of the abdomen is distinctly, though not strongly, marked by shallow grooves on the dorsal side, separating strips of slightly stouter cuticle on which stand the tergal pieces already described. The hinder edge of the fifth segment is sharply marked, and stands out as a half ring, under which the stout tergite of the sixth segment is telescoped for a short distance. This may also be seen

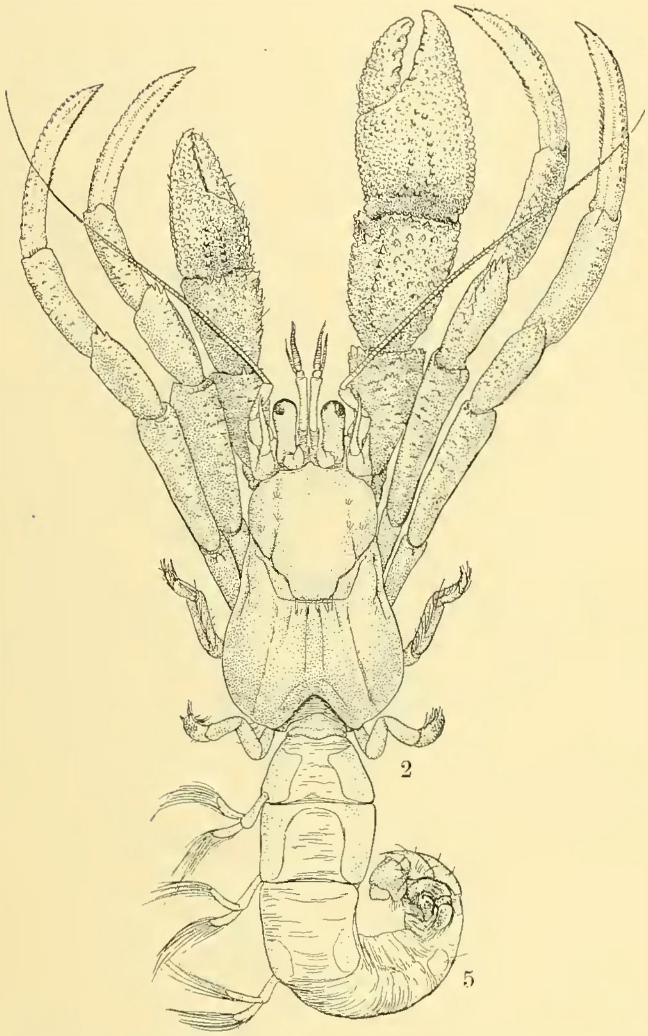

Fig. 4.—*Eupagurus bernhardus*: dorsal view of a female specimen, nat. size. 2, 5, Second and fifth terga.

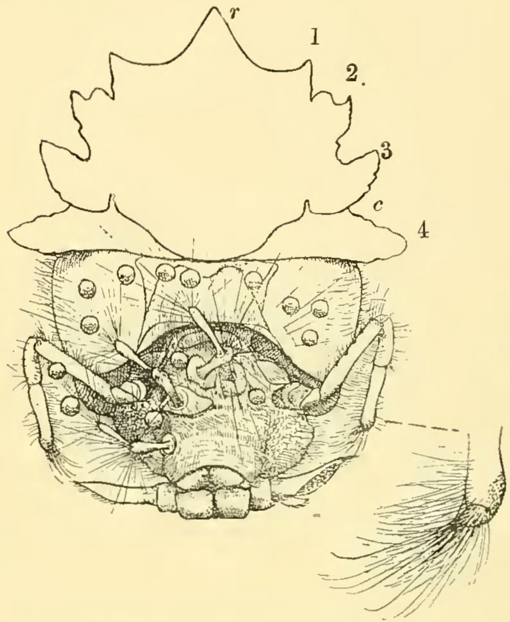

Fig. 5.—*Porcellanopagurus:* dorsal view of the specimen shown in Fig. 1, after removal of most of the eggs, × 4. The end of the fifth leg is also shown enlarged. The limbs of the second, third, and fourth abdominal segments are exposed by the removal of the eggs which they earried; a few of the eggs remain attached to the long hairs of the appendages. The tergal vestiges upon which these limbs stand are shown. The tergum of the first abdominal segment may be seen in front of the foremost egg-bearing limb. The fifth segment has no hard tergite. That of the sixth segment, composed of four large and two small pieces, is seen behind, between the uropods. *c*, Cervical groove; *r*, rostrum; 1–4, side-lobes of the cephalothorax.

in *Eupagurus*. In the male, only the slightest traces of segmentation are recognisable. The sixth tergite in both sexes is represented by two stout plates, one behind the other, each divided by a deep median groove into two, with a pair of small nodules at the sides against the junction of the main plates. In *Eupagurus* each pair of plates is represented by a single structure. The tergite of the telson is softer than that of the

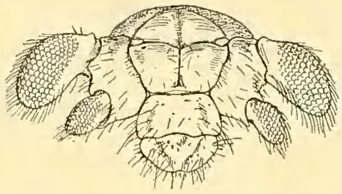

Fig. 6.—*Porcellanopagurus*: dorsal view of the end of the abdomen of the specimen shown in Fig. 1, × 5.

sixth segment, and consists of two successive plates. The two lateral pieces of the hinder edge are less independent than in *Eupagurus*, and there is a median notch, not a point, as in Chilton's and Lenz's figures. The sub-anal valve* is present, though soft. The telson is carried folded under the sixth segment. The dorsal side of the abdomen, which in life is covered by the flat shell of a mollusc, as will be explained later, is smooth and only sparsely hairy, but the sides and ventral surface, which are exposed, are rough-skinned and much more hairy. I can detect no trace of sterna.

The eyes, antennules, and antennae (Figs. 1 and 2) closely resemble those of *Eupagurus*. The scales on the bases of the eyestalks are present, but hidden by the

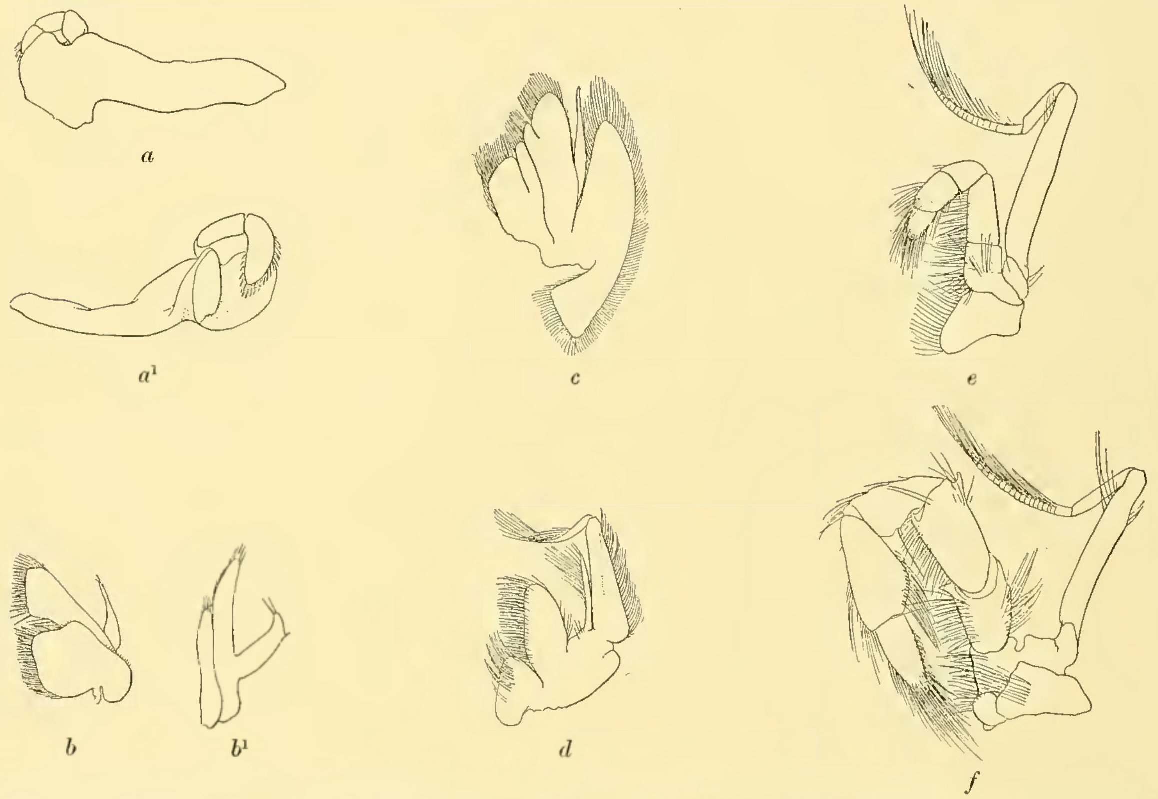

Fig. 7.—*Porcellanopagurus*: mouth-limbs of the left side of the specimen shown in Fig. 1.—*a*, Mandible, ventral view; *a*¹, the same, dorsal view; *b*, maxillule, ventral view; *b*¹, the same, lateral view; *c*, maxilla; *d*, first maxilliped; *e*, second maxilliped; *f*, third maxilliped.

rostrum. The antennary exopodite, by an extraordinary error, is figured by Filhol (*loc. cit.* fig. 2) on the ventral side of the limb, and Lenz omits it altogether in his figure of *P. platei*. In *P. edwardsi* and *P. tridentatus* it is, as a matter of fact, situated in the

* See Gardiner's "Fauna of the Maldives," Art. "Land Crustaceans," vol. I, pp. 73, 81.

ordinary position, and well developed, as a blunt-ended and sparsely hairy, movable spine. The fixed basal spine of the antenna is also present, and is shorter than the exopodite, directed almost straight forwards, and provided with several teeth. The mouth-limbs (Fig. 7) also show no remarkable features. The molar process of the mandible is fairly wide, and the cutting edge has one low tooth near the middle and another at the hinder angle. As in *Eupagurus*, the outer edge of the endopodite of the maxillule is turned forwards. The small process on this edge, which perhaps represents the true end of the limb, is directed forwards, not backwards as in *Eupagurus bernhardus*. In *E. prideauxi* it is wanting. The first pair of legs, incorrectly figured by Filhol as equal, has been shown by subsequent writers to be unequal, the right the larger. The hand of this limb (Fig. 8) is much broader and heavier than in *Eupagurus*. The fingers are white-tipped, not spoon-shaped, and open nearly vertically. The legs of the second and third pairs are those of an ordinary hermit-crab, but rather stouter than usual, and symmetrical. The little ridges to which allusion has been made cover them on both sides, and, standing out in profile along the anterior edge, make it seem toothed. In fact, only one ridge, situated at the end of the carpopodite, is drawn out into a tooth. Under the propodite of each leg is a double row of movable spines, under the dactylopodite a single row. The fourth pair are subchelate as in an ordinary hermit-crab, and have the usual scaly patch on the palm. The fifth pair are like those of *Eupagurus* (Fig. 9), with a clumsy chela, whose fingers are spoon-shaped, lined with hair, and finely toothed around the edge. Whitelegge is incorrect in stating this limb to be simple in *P. tridentatus*, but the mistake is an easy one to make, for when the fingers are closed the dactylopodite, hidden among the long hairs at the end of the leg, looks merely like a low mound upon the tip of the propodite. This leg also has the scaly patch by which it is characterized in hermit-crabs, only somewhat reduced.

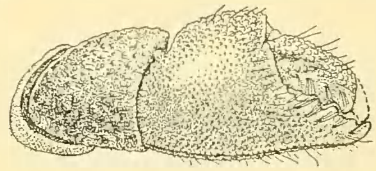

FIG. 8.—*Porcellanopagurus:* outer view of the great cheliped of the specimen shown in Fig. 1, × 3.

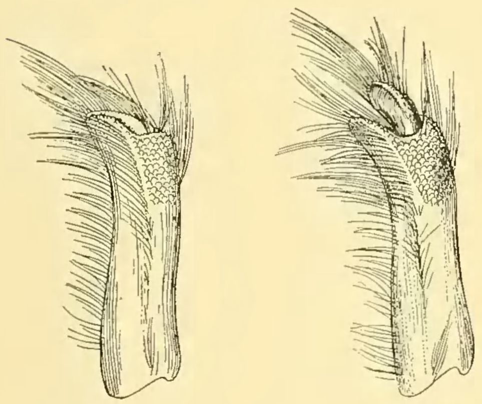

FIG. 9.—*Eupagurus bernhardus:* end of the last leg—*a*, from the inner side, with the chela closed; *b*, slightly different view, with the chela open, × 7½.

The gill-formula is the same as that of *Eupagurus*, consisting of eleven gills on each side—five pairs of arthrobranchiae and a pleurobranchia. The gills are phyllobranchiae.

The abdomen of the female bears, besides the uropods, three limbs, placed on the second, third, and fourth segments (Fig. 5). I make this statement on the evidence of the "Terra Nova" specimen, which is a female. Filhol, describing what may have been either a male, or a female deprived of her egg-bearing limbs, mentions a pair of small appendages on the forepart of the abdomen, presumably on the first abdominal segment, though they do not appear in his figure. Lenz even figures such limbs in *P. platei*, of which his specimens were females. I am unable to find any traces of appendages in this position in the "Terra Nova" specimen, nor are they mentioned or figured by any other author. Probably they do not exist.* In *Eupagurus* this segment is without limbs in either sex: in various other Eupagurinae it bears them, sometimes in the female, sometimes in the male. The limbs of the second, third, and fourth segments of the female *Porcellanopagurus* (Fig. 10*a*) resemble those of the same sex of *Eupagurus* (Fig. 10*b*) in being biramous, and in the shape of both branches, but not in the size of the exopodite, which is so minute that the limb appears at first sight to be uniramous. Outside (that is, above) the exopodite, the end of the protopodite has a strong, blunt angle, upon which is a bunch of long hairs, whose function is to supplement those of the endopodite in bearing the eggs. The position of these limbs is interesting. They are all dorsal, and the first is almost median: the other two lie successively more to the left, so that the three form a slanting row. Here is a reminiscence of the relation which the same appendages bear to one another in an ordinary hermit-crab, where, although they lie directly one behind the other if the abdomen be untwisted, yet in its normal spiral position they form a row slanting to the left. In correspondence with this is the fact that in *Porcellanopagurus* the exopodite, which stands in front of as well as above the endopodite in the limb of the second segment, is more dorsally placed in that of the third, and directly above the other branch in that of the fourth segment, and thus has in each case the position which it would have if the abdomen were spirally twisted. It would appear, therefore, that the secondary straightening of the abdomen of *Porcellanopagurus* has been brought about by a process of telescoping rather than by untwisting, so far as the greater part of its length is concerned: the telson and sixth segment have to a considerable extent been rotated backwards into their original position. That the limbs are more dorsal in position than usual, is no doubt in connection with the manner in which the abdomen is protected, and serves to bring the eggs under shelter of the shallow shell which the animal carries over its back. I have been unable to find in this genus any trace of the little appendage which is borne on the fifth abdominal segment in *Eupagurus*.

The only male *Porcellanopagurus* which I have been able to examine is that of *P. tridentatus*. In it the abdomen bears no limbs on any segment but the sixth. This is a sharp distinction from some species of *Eupagurus*, but not from others.

---

* It is not clear that Filhol is not alluding to the limb of the second abdominal segment, or even to the last thoracic appendage. Lenz's figure is probably very inaccurate. I have already stated that it omits the antennal exopodite. It also shows a pair of appendages in the first abdominal segment, but none on the second, third or fourth. If these be not serious errors, *P. platei* differs very remarkably from the other species of the genus to which it has been assigned.

E. bernhardus (Fig. 10*c*) has appendages of moderate size on the third, fourth, and fifth segments of the male. *E. prideauxi* (Fig. 10*d*), however, shows only simple, microscopic vestiges of these limbs. It is interesting to note that in the male *E. bernhardus* the appendages in question are biramous with one branch reduced, but that this is the endopodite, whereas in the female of *Porcellanopagurus* it is the exopodite that has undergone reduction. Chilton describes the male of *P. edwardsi*, and as he makes no reference to any abdominal limbs save the uropods, it is probable that the latter alone are present. Balss, however, figuring what he states to be the male of *P. japonicus*, shows three unequally biramous limbs on the same segments as in the female. It is

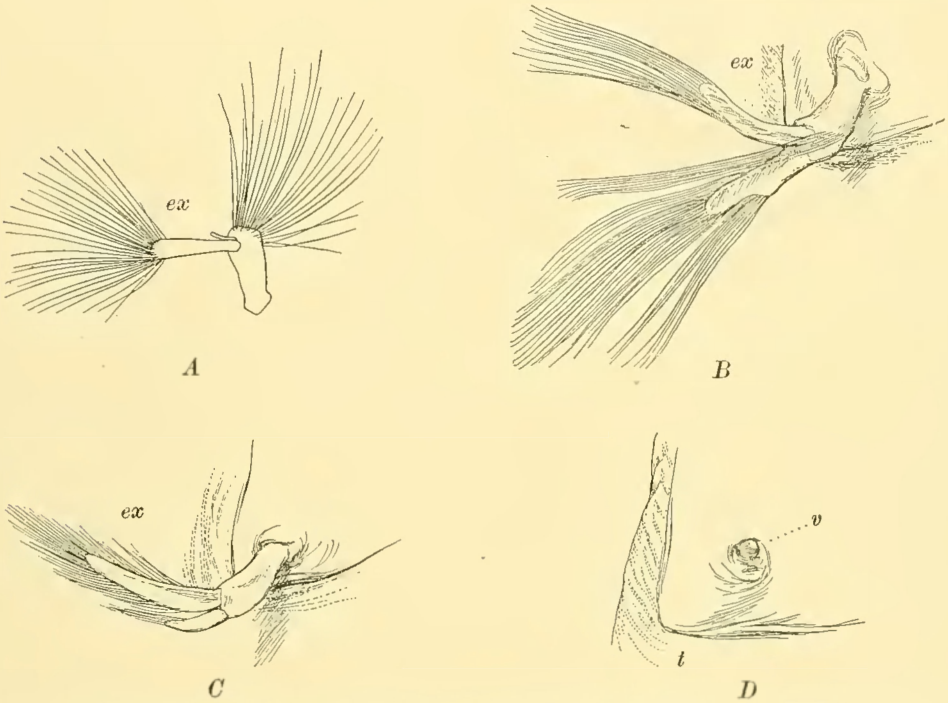

FIG. 10.—Dorsal views of the limb of the third abdominal segment in Eupagurinae—*A*, *Porcellanopagurus*, sp., ♀, × 6; *B*, *Eupagurus bernhardus*, ♀, × 5; *C*, the same, ♂, × 5; *D*, *Eupagurus prideauxi*, ♂, × 8. *ex*, Exopodite; *v*, vestige of pleopod; *t*, postero-external angle of tergum.

possible that he may be mistaken in the sex of his specimen, but in that case it is to be observed that, as they are represented in his figure, the reduced rami appear to be the endopodites as in male *E. bernhardus*. If the male of *P. japonicus* be rightly figured by Balss, then there is in *Porcellanopagurus* a difference between species in regard to the development of the abdominal limbs of the male, as there is in *Eupagurus*. The question needs reinvestigation.

The uropods (Fig. 6) of the two sexes are alike, and resemble those of the ordinary hermit-crabs, except in that they are almost completely symmetrical in shape and not very asymmetrical in position, though they are still obviously placed at an angle with the horizontal plane. It is noticeable that they retain the scaly patches on both rami which are used, by the hermit-crabs which inhabit hollow objects, to give foothold on the inside of their homes.

With regard to the habits of *Porcellanopagurus*, some information may be gained from the statements of the naturalists who collected the specimens at present known to science. *P. edwardsi* was originally taken in shallow water (down to 5 m.) at Campbell Island and Stewart Island, living among sea-weeds, and was expressly stated by Filhol not to live in a shell. Chilton records it dredged at the Snares in 60 fathoms. The "Terra Nova" specimen, which I have rather doubtfully referred to the same species, was trawled in 70 fathoms off the North of New Zealand, on a bottom of sand and rock. *P. platei* was obtained on the shore at Juan Fernandez, and Plate, who collected it, stated that it *deckt die Eier mit einer Muschelschale zu.* Lenz, for no very obvious reason, distrusted Plate's statement, and held that the animal's abdomen *kann nach vorn auf den Rücken geklappt werden*, and in that position was mistaken by Plate for the shell of a bivalve mollusc! This very improbable supposition may be dismissed, in view of the subsequent evidence by which Plate's statement is confirmed for other species. *P. tridentatus* has been obtained in 54–59 fathoms off Wata Mooli in New South Wales, and between tidemarks in the Kermadec Islands. Oliver, by whom it was collected in the latter locality, found it under stones, and states that it was not common, and that it never uses a spiral shell, but manages to keep on its back a single valve of a bivalve mollusc's shell, or a vacant *Siphonaria* or limpet shell. *P. japonicus* is as yet only reported from the Uraga Channel in Japan, where a single specimen was taken. No information is available as to the depth or nature of the habitat in which it was found, but it is stated to have carried over its back a *Cardium* shell, held in position by the telson of the crab fixed in the umbo.

It appears that *Porcellanopagurus* has a wide distribution in the extra-tropical parts of the Pacific, that each of the several as yet widely separated localities in which it has been taken possesses its own representative of the genus, that it ranges from near high-water mark to a depth of at least 70 fathoms, and that the same species may extend throughout this vertical range. As will be explained later, while the distinctions and affinities of the species are as yet obscure, it seems that the New Zealand, Chilian, and Japanese forms resemble one another more closely than any of them resembles the Australian–Kermadec species. In most respects there is no indication that the habits of the genus differ substantially from those of the ordinary hermit-crabs, but the mode in which the abdomen is protected is unique among Paguridea. Some kind of shallow, non-spiral shell found by the animal is held over the back, covering, to judge by the extent of the egg-mass, the abdomen and the soft part of the cephalothorax. How the shell is kept in position is not clear. That the telson and uropods should be wedged into the umbo suggests itself at once, and this was the case in Balss' specimen, but if, as Oliver states, a limpet shell is sometimes used, the abdominal organs alone will not suffice to retain the protecting structure. It may well be that the hinder two pairs of legs take part in holding the shell in position. Speculation as to how this may be done, and whether their scaly pads are used for the purpose, does not at present seem likely to be profitable. The eggs, which are of rather small size (·5 mm.) in my specimen, must pass into the deep furrow on the ventral side to which I have already alluded. Thence they must by some means, perhaps by the last pair of legs, be transferred to the back and attached to the hairs of the abdominal limbs. The mass which they then form is moulded to the shape of the covering shell.

The species of *Porcellanopagurus* have as yet been very inadequately described for systematic purposes, with the exception of *P. tridentatus*, of which Whitelegge's account is full and good. This member of the genus differs from the rest more, as it seems at present, than they do from one another. It is smaller, measuring 10 mm. in length, whereas the others probably all reach a length of 15 mm. or more. Its scaly sculpture is finer and its hairs shorter, the lobes of its carapace-edge are less marked, and probably its great chela has a more swollen hand. *P. platei* and *P. japonicus*, to judge by the figures of them which have been published, lack the third cusp of the second carapace-lobe and have the point of the third lobe more forwardly directed than in *P. edwardsi*. *P. japonicus* has a small, sharp spine at the tip of each of the lobes, which is wanting in Lenz's figure of *P. platei*, and the two species differ also in the greater smoothness of the legs of the latter. I have already alluded to the question of the abdominal limbs. The "Terra Nova" specimen agrees pretty well with the descriptions of *P. edwardsi*, but its great chela shows considerable unlikeness to that of the male of Filhol's species as described and figured by Chilton. The scales on the wrist are coarser and less regular, the upper edge of the palm has a well-marked, though irregular, crest of sharp granules or teeth, and along the lower edge there runs a strong, regular line of fine granules. This is evidently also present in *P. japonicus*. Possibly, however, these differences are sexual, and in any case the examination of a series of specimens would be necessary before a new species could be established for the form taken by the "Terra Nova."

Porcellanopagurus is a quite independent case of the phenomenon which may be called "carcinization," and which consists essentially in a reduction of the abdomen of a macrurous crustacean, together with a depression and broadening of its cephalothorax, so that the animal assumes the general habit of body of a crab. To this end, by devious routes, evolution has proceeded throughout the Anomura. In the lower members of most divisions of that tribe the abdomen is a strong and important organ, and the cephalothorax little, if at all, depressed. Their higher members are "crabs." Among the Paguridea, the widening of the region between the bases of the third maxillipeds of the Eupagurinae may perhaps be regarded as a first step in this direction, the broad-backed *Eupagurus splendescens* (Fig. 11) represents a further advance, and besides *Porcellanopagurus* two other members of the sub-family—*Tylaspis* and *Ostraconotus* *—may fairly be said to have become carcinized. It would be natural to expect that these three genera would be closely related, but, in fact, that is not the case. As regards the mode of reduction of the abdomen, *Tylaspis* and *Ostraconotus* do show some resemblance, though the process has been carried much further in the latter genus than in the former. In both of them the abdomen is straight and slender, and carries its unpaired limbs in the usual position on the ventral side. But when the appendages of the male are regarded it becomes evident that *Tylaspis* belongs to the group of genera which have paired limbs on the forepart of the abdomen (in point of fact it has two pairs), whereas *Ostraconotus* resembles *Eupagurus* in having no paired pleopods at all. The condition of *Porcellanopagurus* in this respect is, as we have seen, at present still a little doubtful, but in any case, with its unique arrangement in the female of three limbs dorsally placed in a slanting row, it is obviously the result of an entirely different process from that which produced either of the others, so that, even if there were any grounds on which it could be supposed to be related to one of them, its carcinization must have occurred independently. The cephalothorax tells the same tale. In *Tylaspis* the soft hinder region found in an ordinary hermit-crab has become inflated and then hardened.† In *Ostraconotus* the whole cephalothorax has taken something of the shape of that of a Galatheid, the hinder region being hardened as in *Tylaspis*. In *Porcellanopagurus*, while the hinder region remains soft, the forepart is quite unlike that of either of the others, as will be gathered from the description I have given of it. In the shape of the legs there is again the widest difference between the three. The sole point of resemblance between them lies in the fact that the last leg of each has the same minute, clumsy, spoon-fingered chela, and this they share with other Eupagurinae. The fourth leg is subchelate in *Porcellanopagurus*; simple, with a wide propodite for the protection of

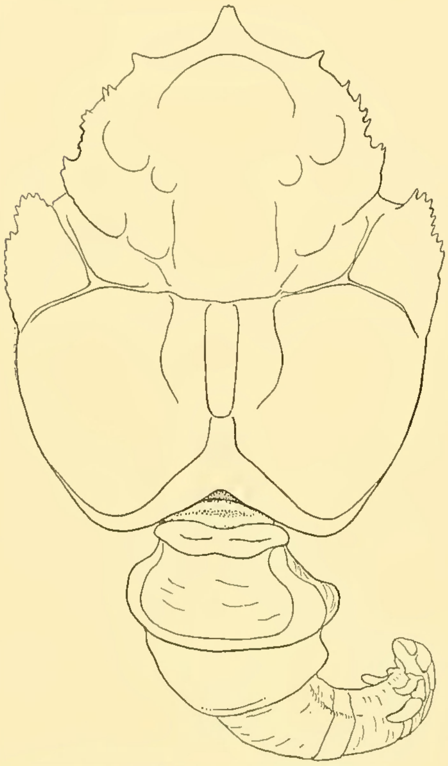

FIG. 11.—*Eupagurus splendescens*: outline dorsal view, × 2½.

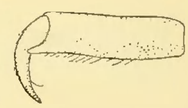

FIG. 12.—End of fourth leg of *Tylaspis*, × 7½.

* For descriptions and figures of these crustaceans, see Henderson, "Challenger" Anomura, p. 81, pl. VIII, fig. 5, 1888 (*Tylaspis*), and Milne-Edwards and Bouvier, Mem. Mus. Harvard, XIV, iii, p. 167, pl. XII, 1893 (*Ostraconotus*).

† This is also the case in *Eupagurus splendescens*.

the eggs, in *Ostraconotus*; simple,* slender, and unusually small in *Tylaspis*. The walking legs (pairs 3 and 2) in *Ostraconotus* have very remarkable flattened dactylopodites that almost suggest a swimming function; in *Tylaspis* they are very long and slender; in *Porcellanopagurus* little modified from those of an ordinary hermit-crab. The chelipeds are of quite different types in all three, as inspection of the figures will show. In short, there is not the least resemblance between the three cases, and when all the facts are known, there is little doubt that it will appear that the crab-like habit of body has arisen in different circumstances, and is made viable by different modes of life, in all of them. I have indicated the explanation of the case of *Porcellanopagurus*. In the other two genera there is great likelihood that the soft abdomen is somehow protected in life. Perhaps, as they are both deep-water animals, it is merely buried in the ooze of the sea floor. Certainly in *Ostraconotus* it is not carried under the cephalothorax, and its unarmoured dorsal side makes it unlikely that this is the case in *Tylaspis*.

Superficially, the abdomen of *Porcellanopagurus* resembles that of *Birgus* more than that of any other pagurid, but the position of its egg-bearing limbs is different, and in any case *Birgus* belongs undoubtedly to the Pagurine stock, while *Porcellanopagurus* and the other genera we have been discussing are as certainly Eupagurine, so that there can be no question of relationship in this case.

The Lithodidae,† with their flat, hard-backed abdomen, deprived of uropods and pressed against the sterna of a very crab-like cephalothorax, present a more advanced case of the carcinization of Paguridea than those we have hitherto mentioned, but there appears no likelihood that any of them are connected with those less highly modified forms. They are, in truth, probably diphyletic, the Lomisinae being derived from primitive, trichobranchiate Pagurinae, and the Lithodinae from Eupagurinae, which differed from *Eupagurus* in keeping a pair of limbs on the first abdominal segment of the female, although they had lost that feature in the male. They must therefore have left the Pagurid stock at a point not very far removed from that at which *Porcellanopagurus* took origin, but there is no possibility of reconciling the two cases in the crucial matter of the course of evolution of the abdomen.

Still less, of course, can the Hippidea, the Porcellanidae, or the true crabs, all primarily symmetrical groups, be supposed to have arisen either from a hermit-crab—or, for that matter, from one another. The descent of the true crabs, indeed, must be traced from a decapod which, though its structural features would bring it under the Anomura, as that group must be defined,‡ was more primitive than any existing member of the tribe.

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* At the end of the propodite of the fourth leg of *Tylaspis* (Fig. 12) there is a slender process, but this is not in the plane in which the dactylopodite works, so that there is no chela.

† The evolution of this group is discussed by Bouvier, Ann. Sci. Nat. (7), XVIII, p. 157 (1895).

‡ See Ann. Mag. Nat. Hist. (7), XIX, p. 473 (1907).

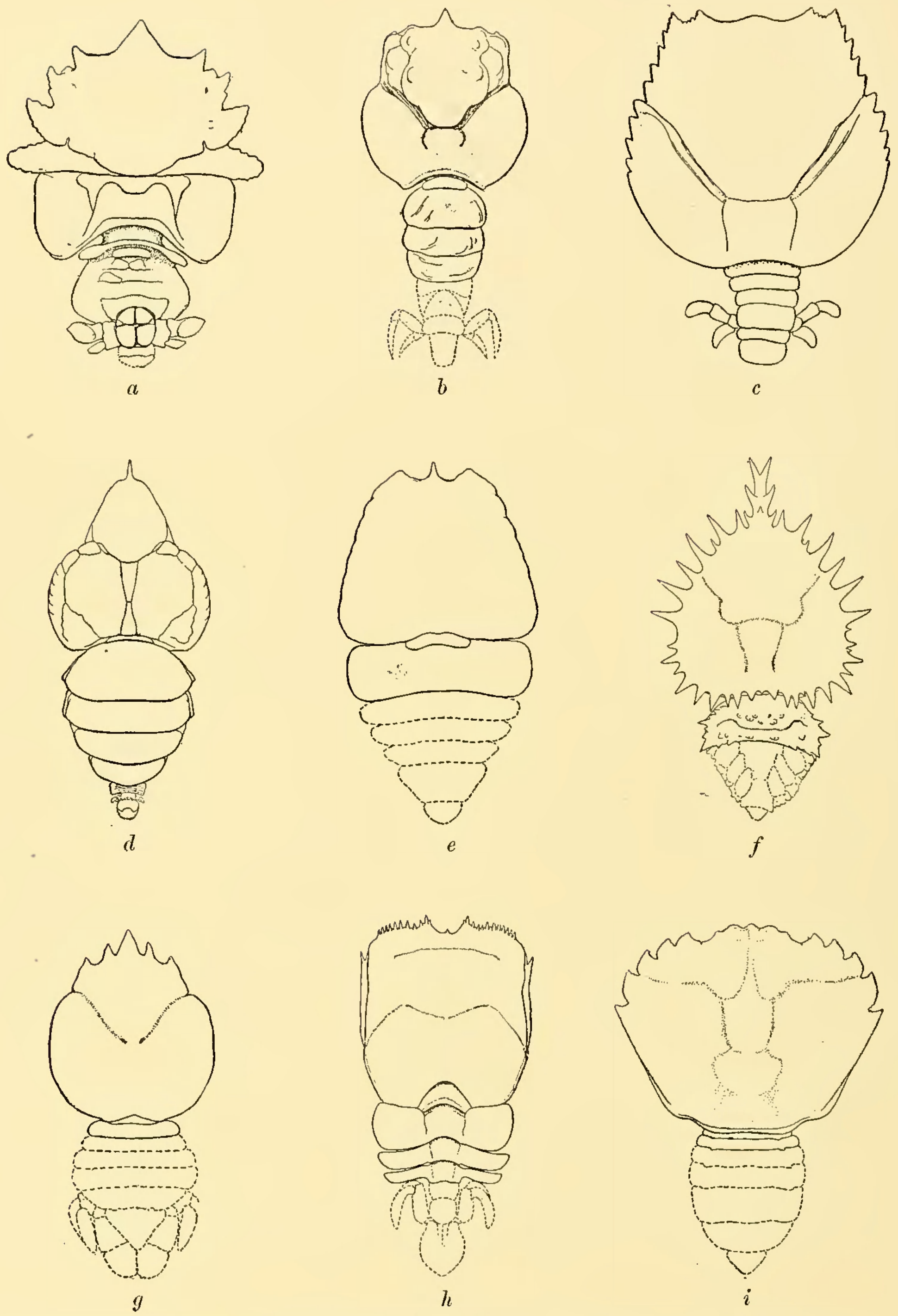

Fig. 13.—Outline dorsal views of the bodies of a series of "crabs"—*a*, *Porcellanopagurus*; *b*, *Tylaspis*; *c*, *Ostraconotus* (after Milne-Edwards); *d*, *Birgus*; *e*, *Lomis*; *f*, *Lithodes*; *g*, *Porcellana*; *h*, *Albunea*; *i*, *Carcinus*. Not drawn to scale. In each case the part indicated by a dotted line is normally carried under the rest of the body.

Discussion of the affinities of *Porcellanopagurus* has brought into view all the various crab-like Crustacea. It is not possible to make such a survey without being struck, on the one hand, by the persistence with which their habit recurs quite independently, and, on the other, by the fact that examples of it are found solely upon one branch of the decapod tree. I have elsewhere* shown reason for regarding the Anomura and the Brachyura as ultimately forming a single stock of the Reptantia. Outside that stock crabs do not occur. Now this fact cannot be attributed to special conditions of life. The Anomura are subject to no common conditions which they do not share with other Reptantia, and, if conditions of life have induced the origin of crabs among Anomura, we are faced with the question why they have not done so among other groups of Reptantia or among such reptant Caridea as many Alpheidae and Pontoniinae. The habit of body of these Macrura does not, upon the face of things, present any greater difficulty to the evolution of something like a crab than that of the hermit-crab which gave rise to *Lithodes*. The conclusion seems inevitable that there is in the constitution of the Anomura a disposition or tendency—only the vaguest terms can be used here—to achieve that special conformation of body which constitutes a crab, and such is not the case with other Decapoda. Whether this tendency be primarily one of morphology or of habits is another question; but seeing that a similar form of body has been reached independently in circumstances which must have needed very different changes in the habits of the animals, it would appear likely that a morphogenetic tendency is the primary factor, but that it can only be realized in the event of the development of suitable habits.

It may be doubted whether the conditions of life play any part other than a purely permissive one in the realization of the tendency to carcinization. The circumstances in which the life of reptant Decapoda is passed cannot be supposed to have in this respect the kind of stringency which dictates, for instance, the special features which are common to the pelagic or to the endoparasitic fauna. An incalculable number of modes of life is open to them, to be taken advantage of according to the special physique of each. The tendency to carcinization, emerging independently from time to time, has led in each case to different habits, but the obligation to the change must have lain always within, not without the organism. The history of the abandonment by hermit-crabs of their habit of living in a shell when they became Lithodidae must have been very different from that of the case in which certain Galatheidea, perhaps when the broadening of the thorax was permitted by the habit of placing their bodies upside down with the flexed abdomen pressed against a stone, became Porcellanidae. The true crabs, again, must have arisen in a different manner, perhaps when a lobster took to backing into shallow crevices with the abdomen doubled under the thorax—a habit which would naturally lead on the one hand

* The subject of the genealogy of the Reptantia is discussed in the article in Gardiner's "Fauna of the Maldives," already quoted above.

to that of the Dromiacea and Dorippidae of carrying their shelter with them by means of the hinder legs, and on the other to that of the free-wandering crabs. But none of these organisms lives in a habitat locally removed from that of other Reptantia. Crabs and lobsters, *Porcellanopagurus* and ordinary hermit-crabs may be taken in the same locality. It is with their habits rather than with their habitats that their structure is correlated. Nor is it possible, in view of the fact that they possess free larvae, and those of the same type, and therefore persistent from their common ancestor, to construct any hypothesis which shall account for their unlikeness by supposing that at some former time they were isolated in unlike conditions of life. They owe their differences to themselves alone.

There are few better instances than those afforded by carcinization of the fact that the organism is, after all, the dominant factor in evolution. What is bred in the bone will come out in the flesh, and Nature is no more able than Man to make silk purses out of sows' ears.

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CRUSTACEA.

PART III. CIRRIPEDIA.

BY

L. A. BORRADAILE, M.A.
(Fellow, Dean and Lecturer of Selwyn College, Cambridge; Lecturer in Zoology in the University.)

WITH SEVEN FIGURES IN THE TEXT.

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CRUSTACEA.

PART III.—CIRRIPEDIA.

BY L. A. BORRADAILE, M.A.

(*Fellow, Dean and Lecturer of Selwyn College, Cambridge; Lecturer in Zoology in the University*).

WITH SEVEN FIGURES IN THE TEXT.

THE "Terra Nova" brought back specimens of fourteen species of barnacles.* Five of them appear to be new, though, as is explained below, there is room for doubt in the case of four of these, on account of our lack of knowledge of the range of variation and of the life-history of forms to which they are related. Seven species were taken at or near New Zealand, four in the Antarctic, two at South Trinidad Island, and one from the bottom of the "Terra Nova" herself, the locality in which the ship acquired it being, of course, impossible to determine. None of the species was taken in more than one of these places, and there is nothing of interest in the occurrence of any of them where the Expedition found it, except in the remarkable case of *Hexelasma antarcticum*, and perhaps also in the appearance of *Conchoderma auritum* in New Zealand waters.

The following is a list of the species found, arranged according to localities:

Antarctic:

Scalpellum (*Arcoscalpellum*) *discoveryi*, Gruvel, 1907.
Scalpellum (*Arcoscalpellum*) *nymphonis*, n. sp. (?).
Scalpellum (*Arcoscalpellum*) *compactum*, n. sp. (?).
Hexelasma antarcticum, n. sp.

* By an unfortunate oversight the Report on the Cirripedia collected by the "Discovery" Expedition (Nat. Antarct. Exp. 1901–1904, Nat. Hist., Vol. III, 1907) contains no record of the localities where the specimens were obtained. They were as follows:—

Balanus psittacus (Molina). Port Ross, Auckland Islands.
Elminius rugosus, Hutton. Enderby Island, Auckland Islands.
Scalpellum discoveryi, Gruvel. "Discovery's" Winter Quarters, 5 fathoms.
Scalpellum bouvieri, Gruvel. "Discovery's" Winter Quarters, 10–20 fathoms. —S. F. H. (ED.).

New Zealand:

Smilium spinosum, Ann., 1911.
Lepas pectinata, Spengler, 1793.
Lepas testudinata, Aur., 1894.
Conchoderma auritum (L.), 1767.
Balanus amphitrite, Darwin, 1854.
Chthamalus stellatus (Poli), 1795.
Coronula diadema (L.), 1767.

South Trinidad Island:

Lithotrya atlantica, n. sp.
Balanus improvisus, Darwin, 1854.

On the hull of the "Terra Nova":

Lepas affinis, n. sp.

The following is a systematic description of the collection.

SUB-ORDER PEDUNCULATA.

FAMILY POLLICIPEDIDÆ.

1. *Smilium spinosum*, Ann., 1911.

Scalpellum (Smilium) spinosum, Annandale, Tr. N. Zealand Inst., XLIII, p. 164 (1911).

I have opened several individuals of this species without finding a dwarf male. One specimen harboured in its mantle numerous nauplius larvae, somewhat clumsy in shape and with rather short limbs. Very young barnacles are often to be found scattered over the stalk and mantle of what was presumably their parent. Probably the larvae have little power of swimming. The case resembles that of *S. stearnsi*, described by Hoek (Siboga Exped. Rep., Cirrip. Ped., p. 73, 1907).

Station 96 (7 miles E. of North Cape, New Zealand, 70 fathoms).

2. *Scalpellum* (*Arcoscalpellum*) *discoveryi*, Gruvel, 1907. Fig. 1.

Scalpellum discoveryi, Gruvel, Nat. Antarct. Exped. 1901–1904 ["Discovery"], Nat. Hist., III, Crust. VI, p. 2, pl. figs. 4–6 (1907).

A specimen of this species was taken on the pycnogonid *Ammothea glacialis* in the Antarctic. It is intermediate in characters between the two individuals figured by Gruvel, and, like them, shows the features of the section *Mesoscalpellum*,* though there may well be a later stage of the species which has those of a *Neoscalpellum*.

* See Pilsbry, Proc. Ac. Philadelphia, LX, p. 110, 1908. *Mesoscalpellum* and *Neoscalpellum* are treated by Pilsbry as sections of the subgenus *Arcoscalpellum*, s. lat.

It was accompanied by a smaller specimen (Fig. 1), probably a young example of the same species. This, like the young stages of *S. larvale* and *S. japonicum*,* is indistinguishable in general features from the members of the section *Arcoscalpellum*, s.s. It may be recognized among the other forms assigned to that section by the following combination of characters: the carina is continuously curved; the lower border of the tergum is very oblique, and very slightly sinuous; the carinal border of the same plate is almost straight, very slightly convex in its lower part, about half of it projecting beyond the carina; the lateral border of the scutum is convex and notched distally for the reception of a projection of the adjacent angle of the upper lateral plate; this projection alone prevents the upper latus from having a pentagonal shape; the carino-lateral is deep, and notched where it meets the shoulder of the carina; the umbo of the carino-lateral does not project beyond the outline of the capitulum; the inframedian plate is tall and narrow, with slightly concave sides, and only a little broader at the base than at the distal end; the rostro-lateral is transversely oblong, its umbo not projecting beyond the outline of the capitulum. The scales of the peduncle are sub-triangular, and broad, but not imbricating. The length of the capitulum is 6 mm. These specimens are from Station 340 (7° 56′ S., 164° 12′ E., 160 fathoms). At Station 356 (off Granite Harbour, entrance to McMurdo Sound, 50 fathoms) there were taken three exactly resembling the smaller described above.

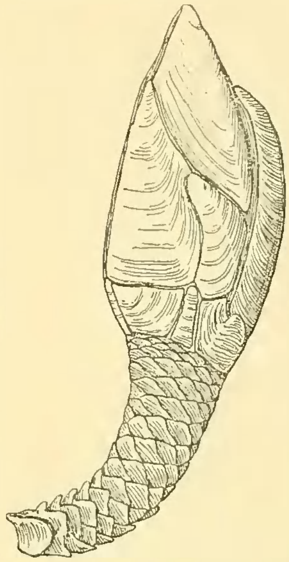

Fig. 1.—*Scalpellum* (*Arcoscalpellum*) *discoveryi*, juv. (?). × 8.

Scalpellum (*Arcoscalpellum*), spp. ? juv.

I am compelled to describe here as new species two small Scalpella related to, but, as it seems, quite distinct from, that which I have treated as the young of *S. discoveryi*. Very possibly they are the young of Mesoscalpella or Neoscalpella, and, it may be, of species already known to science. The same possibility exists in regard to other members of the section *Arcoscalpellum*, s. str., though it is necessary for purposes of reference that all such forms should receive, on their description, specific names of their own.

3. *S.* (*A.*) *nymphonis*, n. sp. (?). Fig. 2.

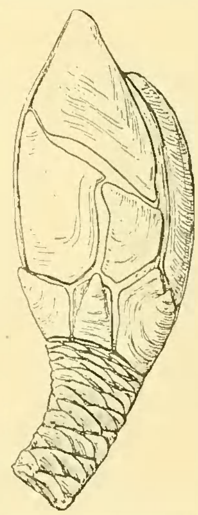

Fig. 2.—*Scalpellum* (*Arcoscalpellum*) *nymphonis*, n. sp. (?). × 10.

An *Arcoscalpellum* rather smaller than the early stage of *S. discoveryi* described above (length of capitulum 4·5 mm.), and differing from it as follows: the uncalcified strips between the plates are wider;

* Pilsbry, *loc. cit.* and Bull. Bur. Fish., XXVI, pl. VI, fig. 4, 1907.

the free part of the tergum is shorter; the lower border of the same plate is concave; the lateral border of the scutum is much less convex; the inframedian plate is pentagonal, with a thickened triangular area which leaves at the side structures like the radii of a *Balanus*; the umbo of the rostro-lateral projects beyond the outline of the capitulum; the scales of the peduncle are narrower.

One specimen was taken at Station 349 (off Butter Point, western shore of McMurdo Sound, 80 fathoms), growing on a pycnogonid of the genus *Nymphon*.

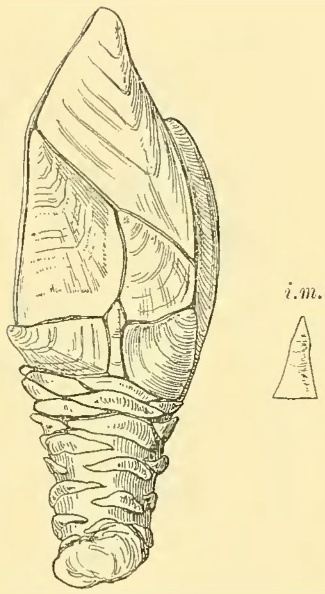

FIG. 3.—*Scalpellum* (*Arcoscalpellum*) *compactum*, n. sp. (?). × 9. *i.m.*, inframedian plate of opposite side.

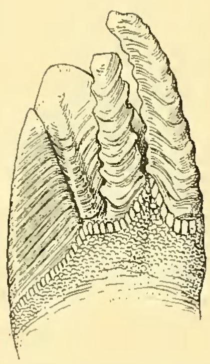

FIG. 4.—*Lithotrya atlantica*, n. sp. Capitulum. ×6.

FIG. 5.—Jaws of *Lithotrya*. *a*, mandible of *L. atlantica*; *a'*, mandible of *L. pacifica*; *b*, maxilla of *L. atlantica*; *b'*, maxilla of *L. pacifica*.

4. *S.* (*A.*) *compactum*, n. sp. (?). Fig. 3.

An *Arcoscalpellum* of about the same size as the supposed young stage of *S. discoveryi* (length of capitulum 5·5 mm.), but differing from it as follows: the lateral border of the scutum is not notched; the produced angle of the upper lateral plate is much sharper; the carino-lateral is not notched where it meets the shoulder of the carina; the umbo of the rostro-lateral projects beyond the outline of the capitulum, but transversely, not with an upward trend, as in *S. nymphonis*; the inframedian plate is triangular with the apex distal (except on one side of one specimen, where it is very narrow, with a spear-head at the distal end); the plates of the peduncle are narrower and more widely separated.

One specimen was taken at Station 356 (off Granite Harbour, western entrance to McMurdo Sound, 50 fathoms).

5. *Lithotrya atlantica*, n. sp. Fig. 4, Fig. 5, *a*, *b*.

Three specimens of a *Lithotrya*, taken in calcareous rock on the shore at South Trinidad Island, closely resemble *L. pacifica*, Borr., 1900, but differ from that species in having the distal row of scales of the peduncle much smaller and more numerous, and also in the mouth-parts (Fig. 5). The distance between the first and second teeth of the mandible is much greater than, instead of being nearly the same as, that between the second and third; and the lobes of the maxilla are not so distinct. The palps and maxillules, though not identical in the only two specimens I have been able to compare, are less unlike. The above-mentioned differences are probably specific.

Station 36.

Family LEPADIDAE.

Sub-Family LEPADINAE.

6. *Lepas pectinata*, Spengler, 1793.

Lepas pectinata, Spengler, Darwin, Lepadidae, p. 85, pl. I, fig. 3, Ray. Soc. (1851); Pilsbry, Bull. U.S. Nat. Mus. 60, p. 81, pl. VIII, figs. 4–8 (1907).

Half-a-dozen specimens with well-marked ribs and moderate pectination were taken on floating weed at Station 89 (off Three Kings Islands, surface).

7. *Lepas testudinata*, Aur., 1894 (?).

Lepas testudinata, Aurivillius, K. Svenska Vet. Ak. Handl. XXVI, no. 7, p. 7, pl. I, figs. 1–3; pl. VIII, fig. 4 (1894).

The "Terra Nova" example appears to belong to this species by every character except the absence of the second filamentary appendage. As, however, the specimen is somewhat damaged in the region of that structure, it is possible that the appendage was really present.

Station 143 (34° 58′ S., 170° 12′ E., surface).

8. *Lepas affinis*, n. sp. Fig. 6.

Numerous specimens of a *Lepas*, removed from the bottom of the "Terra Nova" while she was in Lyttelton Harbour, in October, 1911, are nearly related to *L. hilli*, but differ from that species in the following respects:—

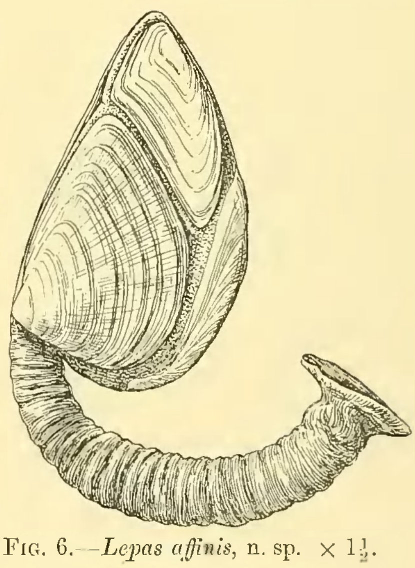

Fig. 6.—*Lepas affinis*, n. sp. × 1½.

1. The occludent edge of the scutum is either straight, or slightly concave, or slightly convex, not markedly convex, as in *L. hilli*.
2. There is less space than in *L. hilli* between the carina and scutum, and the branches of the forked end of the former extend further beneath the latter. This appears to be due to a greater width of the scutum.

3. There are only two pairs of filamentary appendages.
4. The peduncle is longer and narrower than that of *L. hilli.*
5. The skin is black. In *L. hilli* it is generally yellowish.

It is possible that this is merely a variety of *L. hilli*, but on the whole the differences between the two forms appear sufficiently pronounced to necessitate the recognition of a new species.

The plates of the shell are strong, white, and polished, with well-marked lines of growth, but very faint radial striae. The fork of the carina is at about the same angle as that of *L. anatifera*, but between its prongs is a small median prominence. The scuta have no umbonal teeth.

It is of course impossible to say in what quarter of the globe the "Terra Nova" received the larvae of this species.

9. *Conchoderma auritum* (L.), 1767.

Conchoderma aurita (L.), Darwin, Lepadidae, p. 141, pl. III, fig. 4 (1851).

Numerous specimens from *Megaptera nodosa* in the Bay of Islands and off Cape Brett, New Zealand.

Sub-order OPERCULATA.

Tribe SYMMETRICA.

Family BALANIDAE.

10. *Balanus amphitrite*, Darwin, 1854.

Balanus amphitrite, Darwin, Balanidae, p. 240, pl. V, fig. 2 (1854).

Several specimens of var. *communis*, on whelk-shells, associated with small anemones, were taken at Station 134 (11–20 fathoms, near N. Cape, New Zealand).

11. *Balanus improvisus*, Darwin, 1854.

Balanus improvisus, Darwin, Balanidae, p. 250, pl. VI, fig. 1 (1854).

Several small specimens from rock-pools in South Trinidad Island.

12. *Hexelasma antarcticum*, n. sp. Fig. 7.

A number of valves, some badly broken, others almost complete, belonging to several specimens of a large balanid barnacle were obtained under unusual circumstances. The original label reads, "Evans Cove, Terra Nova Bay, Victoria Land. In glacier, 30 feet above sea level. Collected by R. E. Priestley." The individuals to which they belonged were members of a species closely related to *H. aucklandicum*

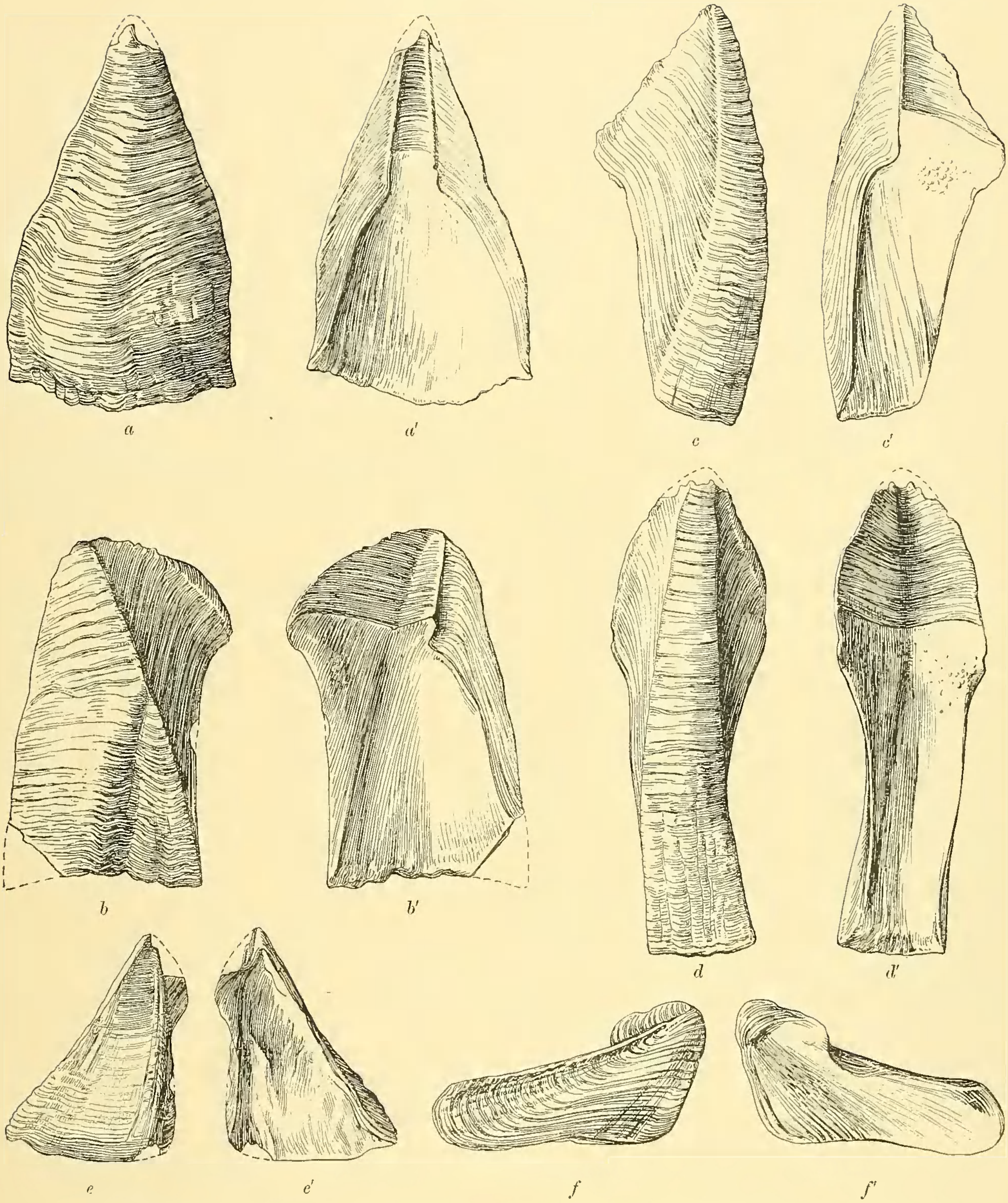

FIG. 7.—*Hexelasma antarcticum*, n. sp., nat. size. *a*, *a'*, external and internal views of rostrum; *b*, *b'*, the same of lateral; *c*, *c'*, the same of carino-lateral; *d*, *d'*, the same of carina; *e*, *e'*, the same of tergum; *f*, *f'*, the same of scutum. The valves figured are the most perfect specimens collected; they do not belong to the same individual.

(Hector), 1887 (Withers, P.Z.S., 1913, p. 840, pl. LXXXV), differing from it, however, in the following particulars :—

1. In the rostrum, the lateral strips marked with longitudinal lines extend to the base.

2. In the laterals, the ala is relatively wider, and the internal sculpture is a little different, the lines of the parietal margin lacking the downward bend where they meet the longitudinal ridge, and the transverse lines of the ala being stronger.

3. In the carino-laterals, the internal sculpture shows the same features as that of the laterals.

4. In the carina, the angles of the alae are nearer the apex of the valve, and the transverse sculpture of the inner side is stronger and more extensive.

The tergum and scutum are shown in Figs. 7*e*, *e'*, *f*, *f'*. The longest valve, a carina, would measure, if complete, nearly 90 mm. The rest are of the same order of magnitude.

The occurrence of this barnacle presents a very puzzling problem. It is not possible to judge from the appearance of the shells whether they are recent or fossil. The valves are all disarticulated, of a pure and brilliant whiteness, and without any trace of organic matter, but they are not imbedded in any matrix. They are covered with a very fine white dust, but this may be derived from the disintegration of their surface, though they are sharply sculptured, and retain *Spirorbis* shells that have grown upon them on both inner and outer surfaces. More probable traces of a matrix are minute sandy deposits which soil the surface here and there, but the meaning of these is doubtful. That the animals should be recent seems, however, hardly possible, for no trace of such a barnacle has been found in any dredging or collection either in the Ross Sea or elsewhere, nor—a stronger argument—can any satisfactory suggestion be made as to the way in which recent shells could have reached the position in which these were found. The nearest known relation of *H. antarcticum* is *H. aucklandicum* from the Miocene of New Zealand. The other described members of the genus are recent deep-sea species of small size. Withers thinks that the loose articulation and relative thinness of the shell of *H. aucklandicum* shows that it also lived below the littoral zone. The shell of *H. antarcticum* is similarly loosely articulated, though it is not particularly thin. If the new species be a fossil, it seems highly probable that it is, if not of Miocene age, at least Tertiary, for it is quite unlike any Cretaceous barnacle. Here, however, is the difficulty. No Tertiary rocks are known from the neighbourhood of the glacier in which the shells were found, nor, indeed, has anything later than the Carboniferous been reported in this region. It may be that somewhere in its course the glacier is in contact with Tertiary rocks. Decision upon this point must rest with the geologists. It is for them also to decide what bearing the facts here stated may have upon the history of the Antarctic Continent.*

* Hennig (Wiss. Ergebn. Schwed. Südpolar-Exped. III, X, p. 10, pl. XI, figs. 3–7, 1911) mentions the existence in the Pleistocene of Cockburn Island of a small *Balanus*, but this is quite unrelated to *Hexelasma antarcticum*.

13. *Chthamalus stellatus* (Poli), 1795.

Chthamalus stellatus (Poli), Darwin, Balanidae, p. 455, pl. XVIII, fig. 1 (1854).

With some doubt, I refer to this species six specimens, much eroded and with obliterated sutures, whose soft parts have not been preserved. They are from the Bay of Islands, New Zealand.

14. *Coronula diadema* (L.) 1767.

Coronula diadema (L.), Darwin, Balanidae, p. 417, pl. XV, fig. 3; pl. XVI, figs. 1, 2, 7 (1854).

The overlapping of the base of the shell of this species by the skin of the whale on which it stands might seem to be due to the growth of the epidermis of the host. A very interesting specimen in the British Museum shows that this is not the case. Some specimens of *Balanus crenatus* have settled upon a piece of oilcloth, and, no doubt by the growth of their shells, have scaled off the surface of the fabric and caused it to rise over their bases just as the skin of the whale is caused to rise.

Several specimens were taken on *Megaptera nodosa* off New Zealand, associated with *Conchoderma auritum*.

INDEX.

The more important references are indicated by black type.

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CRUSTACEA.

PART IV.—STOMATOPODA, CUMACEA, PHYLLOCARIDA, AND CLADOCERA.

BY

W. T. CALMAN, D.Sc.

(Assistant in the Department of Zoology, British Museum (Natural History)).

WITH [illegible] FIGURES IN THE TEXT.

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CRUSTACEA.

PART IV.—STOMATOPODA, CUMACEA, PHYLLOCARIDA, AND CLADOCERA.

BY W. T. CALMAN, D.Sc.

(*Assistant in the Department of Zoology, British Museum (Natural History)*).

WITH NINE FIGURES IN THE TEXT.

THIS report deals with four very diverse groups of Crustacea which are brought together here only for reasons of convenience, as they are represented in the "Terra Nova" collections by no great numbers of specimens or of species.

STOMATOPODA.

I.—INTRODUCTION.

The only species of Stomatopoda represented by adult specimens in the "Terra Nova" collection was obtained off the Brazilian coast, and is apparently undescribed. A considerable number of larvae and a few early post-larval specimens were collected by the tow-net in the Atlantic and off the north of New Zealand. It has not been thought necessary to give more than brief notes on these immature specimens. In most cases they can be identified with, or placed near to, larvae described by earlier authors, but the material does not enable the sequence of stages to be traced out for any species, and the mere description and naming of new larval "species" from scanty material seems unlikely to be of much value to future workers.

In the notes which follow, the larval names are distinguished by being enclosed within square brackets.

II.—LIST OF STATIONS AT WHICH STOMATOPODA WERE OBTAINED.

South and Equatorial Atlantic.

Station 39. Six miles off mouth of Rio de Janeiro Harbour. Plankton. 50-mesh net at 2 metres depth. April 27, 1913, 11.0 p.m. to 1.30 a.m.

,, 40. Same as Station 39. 2.30 to 5.0 a.m.

,, 42. 22° 56′ S., 41° 34′ W. 40 fathoms, Agassiz trawl. May 2, 1913.

,, 45. 21° S., 37° 50′ W. Plankton. 7-mesh net at surface. May 4, 1913, 12.50 to 1.30 a.m.

,, 46. 20° 30′ S., 36° 30′ W. Plankton. 7-mesh net at surface. May 4, 1913, 10.30 to 11.0 p.m.

,, 47. Same as Station 46. 50-mesh net.

,, 49. 18° 51′ S., 33° 40′ W. Plankton. 7-mesh net at surface. May 6, 1913, 4.30 to 5.0 a.m.

,, 50. 18° S., 31° 45′ W. Plankton. 50-mesh net at surface. May 7, 1913, 12.35 to 1.15 a.m.

,, 58. 0°, 25° 15′ W. Plankton. 50-mesh net at surface. May 16, 1913, 1.0 to 1.30 a.m.

,, 311. 35° 29′ S., 50° 26′ W. Plankton. Young fish trawl at 2 metres depth. Apr. 22, 1913, 8.0 to 10.0 a.m.

North of New Zealand.

Station 86. Off Three Kings Islands. Plankton. 50-mesh net at 3 metres depth. July 25, 1911, 8.0 p.m. to 5.0 a.m.

,, 110. 34° 4′ S., 171° 55′ E. Plankton. 24-mesh net at surface. Aug. 6, 1911, 9.0 p.m. to 4.0 a.m.

,, 126. 34° 13′ S., 172° 15′ E. Plankton. Square 18-mesh net at surface. Aug. 24, 1911, 9.0 a.m. to noon.

,, 127. Off Three Kings Islands. Plankton. 50-mesh net at surface. Aug. 25, 1911, 9.0 p.m. to 5.0 a.m.

,, 133. Spirits Bay, near North Cape. Plankton. Square 18-mesh net at 20 metres depth. Aug. 30, 1911, 8.0 p.m. to 6.0 a.m.

,, 135. Spirits Bay, near North Cape. Plankton. Square 18-mesh net at 3 metres depth. Sept. 1, 1911, 9.0 p.m. to 6.0 a.m.

,, 136. Spirits Bay, near North Cape. Plankton. Square 18-mesh net at surface. Sept. 2, 1911, 9.0 p.m. to 6.30 a.m.

III.—SYSTEMATIC NOTES AND DESCRIPTION OF A NEW SPECIES.

1. *Squilla brasiliensis*, n. sp. Figs. 1–3.

Occurrence.—Station 42 (near Cape Frio, Brazil). Bottom fauna, 40 fathoms. Three females (including holotype), four males.

Description.—Total length (holotype), about 106 mm. Length of carapace (excluding rostrum), 24 mm.

Dorsal surface between the carinae faintly rugose and polished. Breadth of carapace behind antero-lateral teeth about one-half of its length. Anterior margin on either side of rostral plate straight and sloping backward, so that the tips of the small antero-lateral teeth fall well behind the level of the frontal edge. Lateral margin angled posteriorly.

All carinae of carapace well marked. Median carina forked in front and behind, the posterior fork hardly visible in front of cervical groove. Dorsal pit equidistant from frontal margin and cervical groove; anterior fork of median carina extending not more than halfway from frontal margin to dorsal pit.

Rostral plate fully as long as it is broad at the base, sides converging to a rounded tip, which just reaches or slightly overlaps the hinder edge of the ocular somite; median carina indistinct.

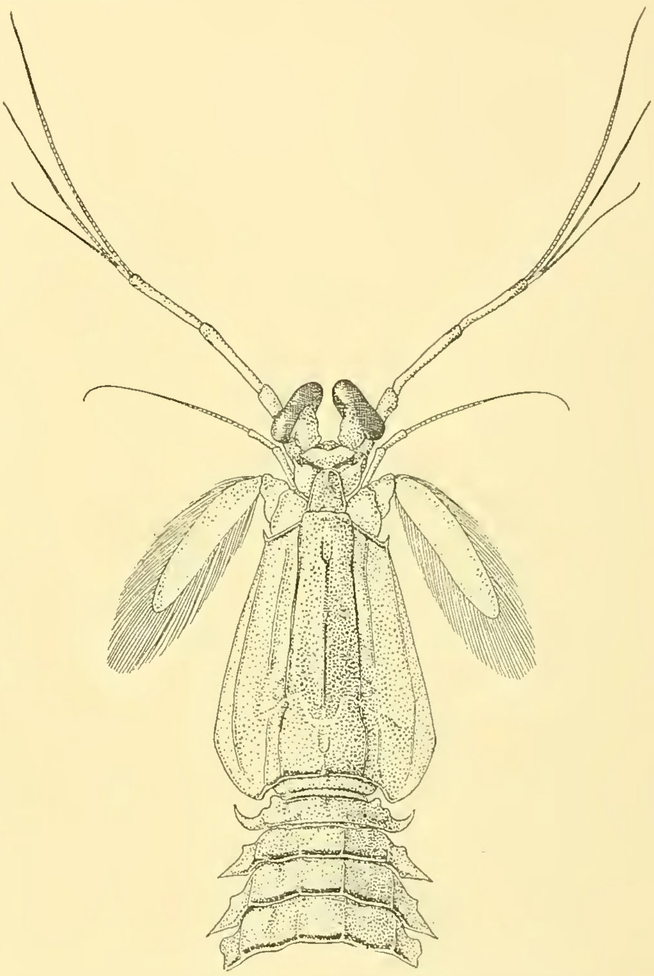

Fig. 1.—*Squilla brasiliensis*, n. sp. Female (holotype). Anterior portion of body from above. × $1\frac{1}{2}$.

Anterior lobe of ocular somite rounded, with a slight median emargination. Eyes with corneal axis longer by one-fourth than peduncular axis, set obliquely.

Dorsal processes of antennular somite with spiniform points, directed forwards. Antennular peduncle equal to, or slightly longer than, the carapace.

Third segment of mandibular palp little longer than the second.

Raptorial limb without a tooth on proximal segment; carpus with anterior ridge divided into two, rarely three, teeth; propodus more than three times as long as wide, without tubercle at distal end of pectinated edge; dactylus with six teeth including the terminal one.*

Epipodites are present on the first five thoracic limbs.

Free thoracic somites with well-marked submedian and intermediate carinae not ending in spines. Fifth somite with lateral processes undivided,† acute, and strongly curved with the points turned directly forwards. Lateral plates of sixth and seventh somites acutely pointed.

Abdominal somites with well-marked carinae; lateral carinae ending in spines on all the somites, the intermediate on the last four and sometimes on all, and the submedian on the fifth and sixth and sometimes on the fourth. Telson resembling that of *S. empusa;* four to eight denticles between submedian teeth, nine to eleven on each side between submedian and intermediate, and one between intermediate and

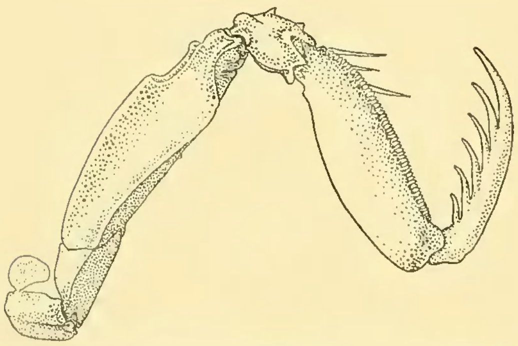

Fig. 2.—*Squilla brasiliensis*, n. sp. Female (holotype). Raptorial limb. × 1½.

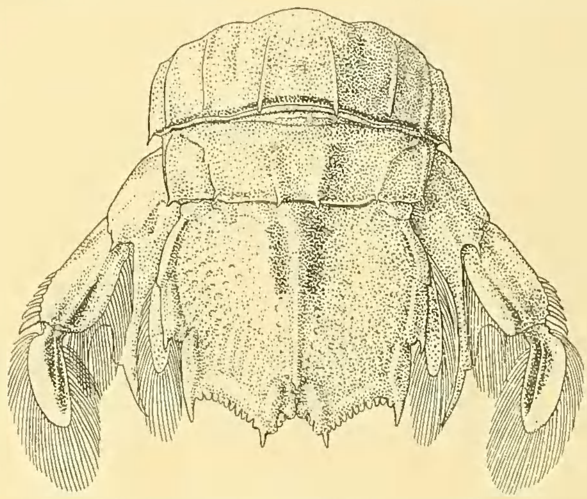

Fig. 3.—*Squilla brasiliensis*, n. sp. Female (holotype). Telson and uropods. × 1½.

lateral. Marginal thickenings rather less evident than in *S. empusa*, those at bases of denticles more or less confluent. A short but prominent post-anal keel. Exopod of uropods with six or seven spines on proximal segment.

Pigmentation resembling that of *S. africana*, Calman (1916, p. 373, figs.),‡ but with the marginal lines on the somites darker and more sharply defined, the blotch on the exopod of the uropods less extensive, and, in addition, a pair of dark spots near the base of the telson at the sides of the median crest.

Remarks.—It seems probable that the specimens described above belong to the same species as the young male recorded by Bigelow (1894, p. 529) from the same region (off Cape Frio, 59 fathoms), and regarded by him "with some hesitation" as

* In one specimen the raptorial limb of one side has seven teeth.

† In one specimen the lateral process of one side is forked.

‡ The numbers in brackets after names of authors refer to the list of papers at the end of the report.

representing a "Variety *C*" of his *Squilla panamensis*. Of this specimen he writes: "In the shape of its body, the arrangement of pigmented areas in the integument, and the form of its eyes, it resembles *S. panamensis* very much, and the edge of the telson appears to have begun to thicken, so it is probably better to regard it as belonging to this species rather than to *S. empusa*." In the "Terra Nova" specimens the marginal thickening is, at most, no greater than in specimens of *S. empusa* of similar size, but it is less distinctly broken up into separate swellings at the bases of the denticles, and so far it resembles the condition found in *S. panamensis*. The pigmentation of the body appears to agree with that described by Bigelow, more especially as regards the two dark spots on the telson. The characters given as distinguishing the variety *C* from the typical form of the species (from the Bay of Panama) are not of great importance, but they are all, with the exception possibly of the elongated rostrum, present in our specimens. The lateral processes of the fifth thoracic somite are not described in the variety, but in the typical form they are described and figured as only slightly curved, differing conspicuously from the strongly hooked processes in all the "Terra Nova" specimens. Bigelow does not mention the form of the anterior margin of the carapace, which appears to be the most conspicuous distinction between our specimens and *S. empusa*. Under these circumstances it appears best to record the Brazilian specimens under a new specific name, leaving it for future work to decide their precise relationship to the allied forms of the Pacific coast.

Among the characters that have been little used in classifying the species of this genus, the number of thoracic epipodites and the relative positions of the "dorsal pit" and the anterior bifurcation of the median carina of the carapace appear to deserve attention. The following key utilising these characters deals only with those Atlantic species nearly related to *S. mantis* that are represented by spirit-specimens in the Museum collection.

- A. Epipodites present on first five pairs of thoracic appendages.
  - a. Anterior margin of carapace on each side of rostrum concave and nearly transverse.
    - *a*. Anterior bifurcation of median carina of carapace extending two-thirds of distance from frontal margin to dorsal pit . . . . *S. mantis*, Latr.
    - *b*. Anterior bifurcation extending at least five-sixths of this distance . *S. empusa*, Say.
  - b. Anterior margin on each side of rostrum straight and sloping backwards *S. brasiliensis*, n. sp.
- B. Epipodites on first four pairs of thoracic appendages. Anterior margin on each side of rostrum concave and slightly oblique. Anterior bifurcation of median carina interrupted, extending two-thirds of distance from frontal margin to dorsal pit . . . *S. africana*, Calman.
- C. Epipodites on first three pairs of thoracic appendages. Anterior margin on each side of rostrum nearly straight and sloping backwards. Anterior bifurcation of median carina obscure, extending for less than half the distance from frontal margin to dorsal pit . . *S. dubia*, M.-Edw.

2. *Squilla*, sp. (near *S. quadridens*, Bigelow).

Occurrence.—Station 40. Six miles off mouth of Rio de Janeiro Harbour. Plankton at 2 metres depth. One male.

Remarks.—The specimen, which measures 11 mm. in total length, is in an early post-larval stage. The dactylus of the raptorial limb has four teeth, including the terminal one, and an external tubercle at the base. There is no mandibular palp and no epipodite on the fifth thoracic limb. Submedian and intermediate carinae are present only on the last abdominal somite. The telson has twenty-two denticles between the submedian teeth and nine on each side between submedian and lateral. The uropods have five spines on the first segment of the exopod, and the inner edge of the peduncular process is serrated with sharp teeth.

The specimen apparently belongs to a species related to *S. quadridens*, Bigelow, but, although it is of exactly the same length as a post-larval specimen figured by Bigelow (1894, p. 548, fig. 28) as belonging to that species, it differs in many details, the propodus of the raptorial limbs being relatively broader, the uropods longer, etc. Some of the differences may possibly indicate a more advanced stage of development.

3. *Squilla*, sp. [*Alima dilatata*, Hansen].

Alima dilatata, Hansen, 1895, p. 95, pl. viii, figs. 12, 12a, 13.

Occurrence.—Stations 39 and 40. Six miles off mouth of Rio de Janeiro Harbour. Plankton at 2 metres depth. Ten specimens.

Station 311. South Atlantic (off Rio de la Plata). Plankton at 2 metres depth. Two specimens.

Remarks.—The specimens, which range from 7 to 20 mm. in total length (including rostrum), differ in various small details from Hansen's description and figures, although they agree better with this than with any other larval form yet described. The largest specimen, exceeding in size the largest recorded by Hansen, has no trace of teeth yet visible on the dactylus of the raptorial limb. The uropod has six spines.

4. *Squilla*, sp. [*Alima macrophthalma*, Brooks].

Alima macrophthalma, Brooks, 1886, p. 93, pl. vii, figs. 1–6, pl. viii, figs. 1–3.

Occurrence.—Station 86. Off Three Kings Islands. Plankton at 3 metres depth. One specimen.

Station 110. (Near Three Kings Islands.) Surface-plankton. One specimen.

Remarks.—The larger of our two specimens (total length 21 mm.) agrees very well with that figured by Brooks in his Pl. viii, fig. 3, although somewhat exceeding it in size. The smaller (total length 16·5 mm.) has longer postero-lateral spines on the carapace, and approaches the *A. macrocephala* of Jurich (1904, p. 380, pl. xxvii, figs. 1, 1c).

5. *Pseudosquilla ciliata* (Fabr.) [*Pseuderichthus communis*, Hansen].

Pseuderichthus communis, Hansen, 1895, p. 86, pl. viii, figs. 5–5b.

Occurrence.—Stations 45, 47, and 49. South Atlantic, off Brazilian coast. Surface-plankton. Nine specimens.

Remarks.—The specimens, which do not exceed 11 mm. in total length, resemble the form figured by Claus (1872, p. 140, pl. vii, fig. 26) and by Hansen (*l.c.*), although they are in a less advanced stage of development. In some, but not in all, there is a small "zoea-spine" on the hind margin of the carapace.

6. *Pseudosquilla*, sp. [*Pseuderichthus elongatus*, Hansen].

Pseuderichthus elongatus, Hansen, 1895, p. 86.

Occurrence.—Stations 45, 46, 47, 49, 50. South Atlantic, off Brazilian coast. Surface-plankton. Nine specimens.

Remarks.—The specimens range from 12 to 20 mm. in total length. They differ from the specimen of 47 mm. length figured by Claus (1872, p. 140, pl. vi, fig. 25) in having a small denticle below the postero-lateral spine on each side of the carapace, and in the shorter ventral process of the uropods, which does not extend beyond the telson.

7. *Lysiosquilla glabriuscula* (Lamarck) [*Lysierichthus edwardsii* (Eydoux and Souleyet)].

Lysierichthus Edwardsii (Eyd. and Soul.), Hansen, 1895, p. 75, pl. vii, figs. 4–4e, 5–5c (with synonymy).

Occurrence.—Station 58. Equatorial Atlantic. Surface-plankton. One specimen (larva).

Remarks.—The specimen, which measures 20 mm. in total length (including rostrum), agrees very closely with Hansen's account of the later stages of *L. edwardsii*, although the number of teeth on the raptorial dactylus cannot yet be made out.

A post-larval specimen, 8·5 mm. in length, from Station 40 (off Rio de Janeiro Harbour, plankton at 2 metres depth), may be mentioned here, although its specific and even generic position remains obscure to me. It has the general characters of a *Lysiosquilla*, except that the chela of the fourth thoracic limb is of similar shape to, and little wider than, the fifth; the raptorial limb has eight teeth on the dactylus (including the terminal one), and the uropod has seven spines.

8. *Lysiosquilla*, sp. [*Lysierichthus*, sp.].

Occurrence.—Stations 126 and 127. Near Three Kings Islands, New Zealand. Surface-plankton. Three specimens (larvae).

Stations 133, 135, and 136. Spirits Bay, New Zealand. Plankton, surface to 20 metres depth. Many larvae, one post-larval specimen.

Remarks.—The post-larval specimen from Station 135 measures about 11 mm. in length. Its general characters and, in particular, the form of the last two pairs of chelipeds, indicate that it belongs to the genus *Lysiosquilla*. It has, however, only four teeth (including the terminal one) on the dactylus of the raptorial limbs, thus differing from all known species of the genus except the form described by Thomson (1882,

p. 230) as *Squilla tridentata.* Thomson's type-specimen was only three-quarters of an inch in length, and Chilton (1891, p. 61), who re-examined it, regarded it as a young specimen of *Lysiosquilla spinosa* (Wood-Mason). Kemp (1913, p. 119), while accepting the identification, remarks that "it is not very easy to account for the small number of dactylar teeth, for the specimens which Lanchester records from Penang, and which also were only ·75 inches in length, possess twelve to fourteen teeth. It is, however, not impossible that the post-larval development of the species may vary in different localities." While this possibility may be admitted, it must be pointed out that the present form appears to be distinguished by other characters besides the number of dactylar teeth (especially by having the rostral plate as long as it is broad) from the allied form with seven dactylar teeth found in the same locality and described below; further, its specific independence is supported by the fact that, out of a considerable number of larvae of the "*Lysierichthus*" type found in company with it, the largest specimen (about 10 mm. in length, including the rostrum) shows rudiments of three teeth (making, with the terminal one, four teeth in all) on the raptorial dactylus. The younger larvae may, or may not, belong to the same species; I cannot find any conspicuous characters in which they differ among themselves.

9. *Lysiosquilla*, sp.

Occurrence.—Stations 133 and 135. Spirits Bay, New Zealand. Plankton at 3 and 20 metres depth. Two specimens (post-larval).

Remarks.—The specimens are of the same size (about 11 mm. in length) as the post-larval specimen from Station 135 described above, and resemble it in general characters. They differ, however, in having seven teeth (including the terminal one) on the dactylus of the raptorial limbs, and in the much shorter rostral plate, the length of which is about two-thirds of its breadth at the base. As the number of dactylar teeth in the adult *L. spinosa* is stated to range from nine to fourteen, it is just possible that these specimens may belong to that species. The only other species of the genus recorded from New Zealand is *L. brazieri*, Miers, which Kemp identifies with *L. latifrons*, de Haan. In that species there are six, or, rarely, seven dactylar teeth, but the short ramus of the last thoracic appendage is almost linear, while in the specimens now examined it is only slightly narrower than that of the preceding limb.

10. *Coronida bradyi* (A. Milne-Edwards) [*Coronidcrichthus armatus* (Leach)].

Coronidcrichthus armatus (Leach), Hansen, 1895, p. 81, pl. viii, figs. 3–3d (with synonymy).

Occurrence.—Stations 46, 47, and 49. South Atlantic, off Brazilian coast. Surface-plankton. Four specimens.

Remarks.—The specimens agree closely with Hansen's account of this large and well-known larval form, the abundance of which in the warmer parts of the Atlantic is in striking contrast to the extreme rarity of the adult species to which Hansen refers it. In stating that the adult is known only by the unique type-specimen, however, Kemp (1913, p. 130) has overlooked Hansen's additional records (1895, p. 83).

11. *Odontodactylus*, sp. [*Odonterichthus*, sp.].

Occurrence.—Station 49. South Atlantic, off Brazilian coast. Surface-plankton. Two specimens.

Remarks.—The specimens, which measure about 14 mm. in total length, resemble a larva of 28 mm. length from the Canaries, figured by Claus (1872, p. 139, pl. v, fig. 21a), but differ from it in having a short "zoea-spine" on the hinder margin of the carapace, and in the very much shorter lateral and intermediate teeth of the telson. This larva, regarded by Claus as belonging to the genus *Gonodactylus*, is stated by Hansen (1895, p. 90) to be an *Odonterichthus* (larva of *Odontodactylus*). Somewhat similar larvae (possessing a zoea-spine) are figured by Brooks (1886, pl. xv, figs. 1, 5, 11) from Celebes and the West Pacific.

CUMACEA.

I.—INTRODUCTION.

The Cumacea brought back by the "Terra Nova" Expedition are few in number. From the Antarctic region only two species were procured, each represented by a solitary specimen. A considerable number of specimens belonging to nine species (two of which are described as new) were obtained in three plankton-gatherings from Spirits Bay in the extreme north of New Zealand. In the remainder of the collections no Cumacea have been detected.

A comparison with the results obtained by the German and the Swedish Antarctic expeditions might suggest that the Ross Sea area was relatively poor in species of Cumacea. It is probable, however, that the deficiency is more apparent than real, and is due to the fact that the two British expeditions to that area devoted less attention than the others to the special methods of collecting necessary for obtaining the more minute bottom-living Crustacea.

Of the Antarctic species, *Campylaspis antarctica* was obtained by the "Discovery" in the same region (McMurdo Sound), and by the "Gauss" at Wilhelm Land, while *Cyclaspis gigas*, described from the last-named locality, is now found to have a similarly extended range.

All the species from Spirits Bay (with the exception of a species of *Campylaspis* left for the present undetermined) are either identified with, or described as closely allied to, species already known only from New Zealand. It is worthy of note that the three plankton-gatherings in which they occurred were taken during the night, since it has already been observed that Cumacea commonly choose the hours of darkness for their excursions from the sea-bottom.

II.—LIST OF STATIONS AT WHICH CUMACEA WERE OBTAINED.

ANTARCTIC.

Station 355. 77° 46′ S., 166° 8′ E. (McMurdo Sound.) 300 fathoms, Agassiz trawl. Jan. 20, 1913.

NORTH OF NEW ZEALAND.

Station 133. Spirits Bay, near North Cape. Plankton. Square 18-mesh net at 20 metres depth. Aug. 30–31, 1911, 8.0 p.m. to 6.0 a.m.

,, 135. Spirits Bay. Plankton. Square 18-mesh net at 3 metres depth. Aug. 31–Sept. 1, 1911, 9.0 p.m. to 6.30 a.m.

,, 136. Spirits Bay. Plankton. Square 18-mesh net at surface. Sept. 1–2, 1911, 9.0 p.m. to 6.30 a.m.

III.—LIST OF SPECIES.

Antarctic and New Zealand species are distinguished by the letters A. and N.Z. respectively.

Family Bodotriidae.
Cyclaspis gigas, Zimmer. A.
,, *elegans*, Calman. N.Z.
,, *similis*, Calman. N.Z.
,, *argus*, Zimmer. N.Z.
,, *levis*, G. M. Thomson. N.Z.
,, *thomsoni*, Calman. N.Z.
,, *coelebs*, n. sp. N.Z.
,, Diastylidae.
Diastylis neozealanica, G. M. Thomson, N.Z.
Colurostylis lemurum, n. sp. N.Z.
,, Nannastacidae.
Campylaspis antarctica, Calman. A.
,, sp. N.Z.

IV.—SYSTEMATIC NOTES AND DESCRIPTIONS OF NEW SPECIES.

12. *Cyclaspis gigas*, Zimmer.

C. gigas, Zimmer, 1907, p. 368 ; *id.* 1913, p. 441, pl. i, figs. 1 and 2 ; Stebbing, 1913, p. 38.

Occurrence.—Station 355. McMurdo Sound. 300 fathoms, trawl. One immature male.

Remarks.—Although the specimen is immature, the pleopods having no natatory setae, it is of practically the same size (total length 14·88 mm.) as Zimmer's adult female, with which it agrees closely except in the points in which immature males of this genus usually differ from females. The ocular lobe is notched in front, but no definite corneal lenses can be detected. Zimmer expresses himself guardedly about these lenses, and in any case it is evident that the difference in the structure of the eye is not sufficient to justify the wide separation of this species from *C. glacialis*, Hansen (1908, p. 15, pl. iii, figs. 1a–1g), as in Stebbing's arrangement of the genus.

13. *Cyclaspis elegans*, Calman.

C. elegans, Calman, 1907b, p. 9, pl. ii.

Occurrence.—Station 135. Spirits Bay, near North Cape, New Zealand. Plankton, 3 metres depth. One male.

Remarks.—The solitary male specimen (total length 6·4 mm.) resembles the male syntypes of this species in the general disposition of the ridges on the carapace, but differs from them in having the ridges much less prominent, the tubercles at the lower corners of the lateral enclosed area inconspicuous, and the whole surface somewhat closely and coarsely granulated. The dorso-lateral ridges of the posterior thoracic and abdominal somites are also less pronounced. The slight development of the sculpturing of the carapace gives this specimen a certain resemblance to the males of *C. similis* described below.

14. *Cyclaspis similis*, Calman. Fig. 4.

C. similis, Calman, 1907b, p. 12, pl. iii, figs. 1–3.

Occurrence.—Stations 133, 135, and 136. Spirits Bay, near North Cape, New Zealand. Plankton, at 20 metres, 3 metres, and surface. Four females, two males.

Remarks.—The *female* specimens (total length 4·7 mm.) agree with the solitary holotype in general form, except that the sculpture of the carapace is a good deal

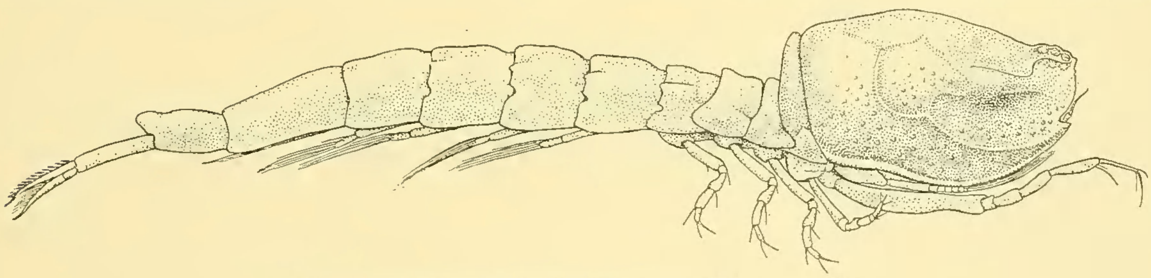

Fig. 4.—*Cyclaspis similis*, Calman. Male. × 22.

bolder; the lateral depressed area is more excavate, and the surrounding ridges are stronger and meet above so as to enclose the area completely, while the anterior lower and posterior upper corners of the area are marked by prominences. The surface is everywhere sparsely tuberculated. In ovigerous specimens the first leg-bearing somite, instead of being exposed only at the sides, is visible as a very narrow strip right across the dorsal surface.

The appendages, as far as they have been examined, are similar to those of *C. elegans*, with a tendency to greater elongation of the distal segments. In the third maxillipeds the distal lobe of the basis is more acute and much longer relatively to the basis itself, although its relation to the longer distal segments is much the same as in *C. elegans.* In the first legs the distal segments are together distinctly longer than the basis.

A *male* specimen has a total length of 5·6 mm. The general form agrees closely with that of the male *C. elegans,* but the disposition of the ridges of the carapace resembles that of the female described above. The lateral enclosed area is relatively smaller than in the female. The carapace differs from that of the male *C. elegans* in having no tubercle at the posterior lower corner of the enclosed area (although this tubercle may be inconspicuous in *C. elegans,* as in the specimen described above) and no ridge running thence to the hind margin, while the posterior vertical ridge forks at its upper end, the anterior limb of the fork forming part of the upper enclosing ridge. The surface between the ridges is somewhat coarsely but sparsely granulated.

15. *Cyclaspis argus,* Zimmer.

C. argus, Zimmer, 1902, p. 444, figs. A–C; *id.* 1913, p. 470, pl. xlvi, fig. 70.
C. bistriata, Zimmer, 1902, p. 447, figs. D–F; *id.* 1913, p. 470; Stebbing, 1913, p. 39.
C. biplicata, Calman, 1907b, p. 17, pl. iii, figs. 4–15; Zimmer, 1913, p. 470.

Occurrence.—Stations 133, 135, and 136. Spirits Bay, near North Cape, New Zealand. Plankton, at 20 metres, 3 metres, and surface. Many specimens.

Remarks.—The majority of the adult females in this collection differ from the syntypes of *C. biplicata* in their greater size (total length 5·1 mm., as against from 3·6 to 4·2 mm.) and less strongly calcified integument; in having the dorsal edge of the carapace more strongly arched, the lateral ridges much less marked, not converging above, and situated a little further forward on the carapace; and in having the abdominal somites relatively more robust. In all these characters they resemble the immature female described by Zimmer as *C. bistriata.* They further differ from the syntypes of *C. biplicata* in having the posterior tooth of the crest of the caparace less abruptly defined, and all the abdominal somites with a strong dorsal keel; this keel is elevated towards the hinder end of each somite, forming a blunt tooth, so that the dorsal outline of the abdomen appears serrated. The fifth abdominal somite is hardly more than twice as long as deep, while in *C. biplicata* the proportion is about two and a half to one.

These characters leave little doubt that the specimens belong to the same species as the holotype of Zimmer's *C. bistriata,* and they might have been urged as evidence for the distinctness of that species if it had not been for the presence of some distinctly smaller females from Station 136. One of these, an ovigerous female, measures only 4·6 mm. in total length, and while it agrees with the others in the outline of the carapace and in the character and approximate position of the lateral ridges, it has the dorsal keel of the abdomen much less conspicuous and the somites much more slender, the fifth, for instance, being 2·3 times as long as deep. In general appearance, as in size, this specimen is, to a great extent, intermediate between the syntypes of *C. biplicata* and the larger specimens of the present collection, and it leaves little justification for regarding them as belonging to distinct species.

This conclusion is supported by the characters of the adult males of the present collection. They are a good deal larger than the males of *C. biplicata* (total length 5·58 mm. as against 4·16 mm.); the dorsal outline of the carapace is perhaps a trifle more convex and has certainly a more marked depression at the base of the ocular lobe. The ridges of the carapace are very inconspicuous (even when the specimens are dried) as they are in the holotype of *C. argus*, where they were originally overlooked altogether (Zimmer, 1913, p. 470); they also seem to be a little further forward than in *C. biplicata*, although this difference is less than in the females. The dorsal tooth of the second leg-bearing somite is less strongly curved than in *C. biplicata*, although it is not so straight as in Zimmer's figure of *C. argus* (1913, pl. xlvi, fig. 70).

Zimmer considers it likely that *C. argus* is the male of *C. bistriata*, his observation of the lateral ridges of the carapace excluding the possibility of its being paired with *C. pusilla* as Stebbing has suggested (1913, p. 33); but Zimmer is inclined to uphold my separation of *C. biplicata*, a view which, after study of the "Terra Nova" specimens, I can no longer maintain.

16. *Cyclaspis levis*, G. M. Thomson.

C. levis, G. M. Thomson, 1892, p. 264, pls. xvi and xvii; Calman, 1907b, p. 8, pl. v, figs. 6–8.

Occurrence.—Station 133. Spirits Bay, near North Cape, New Zealand. Plankton, 20 metres depth. Eight females, one male.

Remarks.—The specimens recorded under this name differ in some small characters from those described in my former paper. The adult females are somewhat smaller (total length 6·32 mm.), the exoskeleton is less strongly calcified and more transparent, and the pitting of the surface of the carapace less distinct. The frontal region is slightly more produced, with a more distinct concavity of the dorsal outline at the base of the ocular lobe. Posteriorly, the dorsal edge of the carapace is more convex than in the specimen formerly figured, although not more so than in other specimens in the Museum collection. The appendages present only trifling differences. The basis of the first leg has a slight indication of a tooth at the distal inner corner, but I find this also in the specimens formerly referred to Thomson's species. The propodus of the same limb is subequal to the carpus, which is longer than the dactylus.

17. *Cyclaspis thomsoni*, Calman.

C. thomsoni, Calman, 1907b, p. 16, pl. v, figs. 12–16.

Occurrence.—Stations 133, 135, and 136. Spirits Bay, near North Cape, New Zealand. Plankton, at 20 metres, 3 metres, and surface. Many specimens.

Remarks.—The specimens described above as belonging to *C. levis*, G. M. Thomson, diminish, although they do not altogether obliterate, the difference formerly stated to exist between that species and this as regards the dorsal outline of the carapace. The specimens now recorded tend to depreciate another of the characters separating the two species, inasmuch as the oblique ridge of the carapace becomes so merged in the general rugosity of the surface as to be, in certain specimens, altogether indistinguishable. Nevertheless, the specimens are at once easily separable from those referred to *C. levis*, even when occurring in the same gathering, by the strong pitting of the surface of the carapace. The pits are so large and so close together that the intervening surface forms an irregular raised network and the carapace may be described either as pitted or as reticulately rugose. This sculpturing is, of course, to be distinguished from the minute reticulate texture which the whole of the exoskeleton shows, as it does in many other Cumacea.

The remaining differences formerly enumerated between this species and *C. levis* concern chiefly the proportions of the distal segments of the first leg and of the peduncle of the uropod. In both cases careful measurements of specimens in the present collection show differences of the same kind, though somewhat less than those stated in my former description ; the dactylus of the first leg is three-fourths as long as the propodus as against a proportion of four-fifths or a little more in *C. levis*, and the peduncle of the uropod is longer than the last somite by nearly one-fourth in the female and one-third in the male. In *C. levis* the peduncle is only about one-sixth longer than the last somite.

The double lateral ridge of the last thoracic somite, mentioned only for the male sex in the original description, is present also in the female.

18. *Cyclaspis coelebs*, n. sp. Fig. 5.

Occurrence.—Stations 133, 135, and 136. Spirits Bay, near North Cape, New Zealand. Plankton, at 20 metres, 3 metres, and surface. Five males (incl. holotype).

Description.—Adult male. Total length 5·6 mm.

Resembling in general form the male of *C. thomsoni* but with the carapace shorter and deeper, its height being about two-thirds instead of little over half its length. Surface of carapace obscurely and irregularly rugose or pitted. On either side, just below the lateral limbs of the frontal suture, is a broadly rounded prominence, somewhat elongated antero-posteriorly, very conspicuous when seen from above, occupying the position of the anterior upper tubercle of *C. elegans*. Behind the middle of the carapace is a faintly marked oblique ridge inclined backwards and downwards and dying out below in the general rugosity of the surface. A curved ridge running backwards from the antennal tooth is very prominent. The ocular lenses are conspicuous ; three very large ones form a triangle dorsally and a pair are set close together at the tip of the ocular lobe, while three others on each side, overlapped by the upper margin of the lateral plate, are only indistinctly seen.

There is a median dorsal keel on the last thoracic and on all the abdominal somites, but there are no lateral keels.

First legs with basis longer, by nearly one-fourth, than the distal segments together, propodus longer than carpus, dactylus less than two-thirds as long as propodus.

Peduncle of uropods longer by one-third than last somite and slightly longer than the rami. Exopod with an apical spine and plumose setae on inner edge. Endopod sharply pointed, serrate on inner edge, with a series of pectinate setae followed by five or six spines. Peduncle with plumose setae on inner edge.

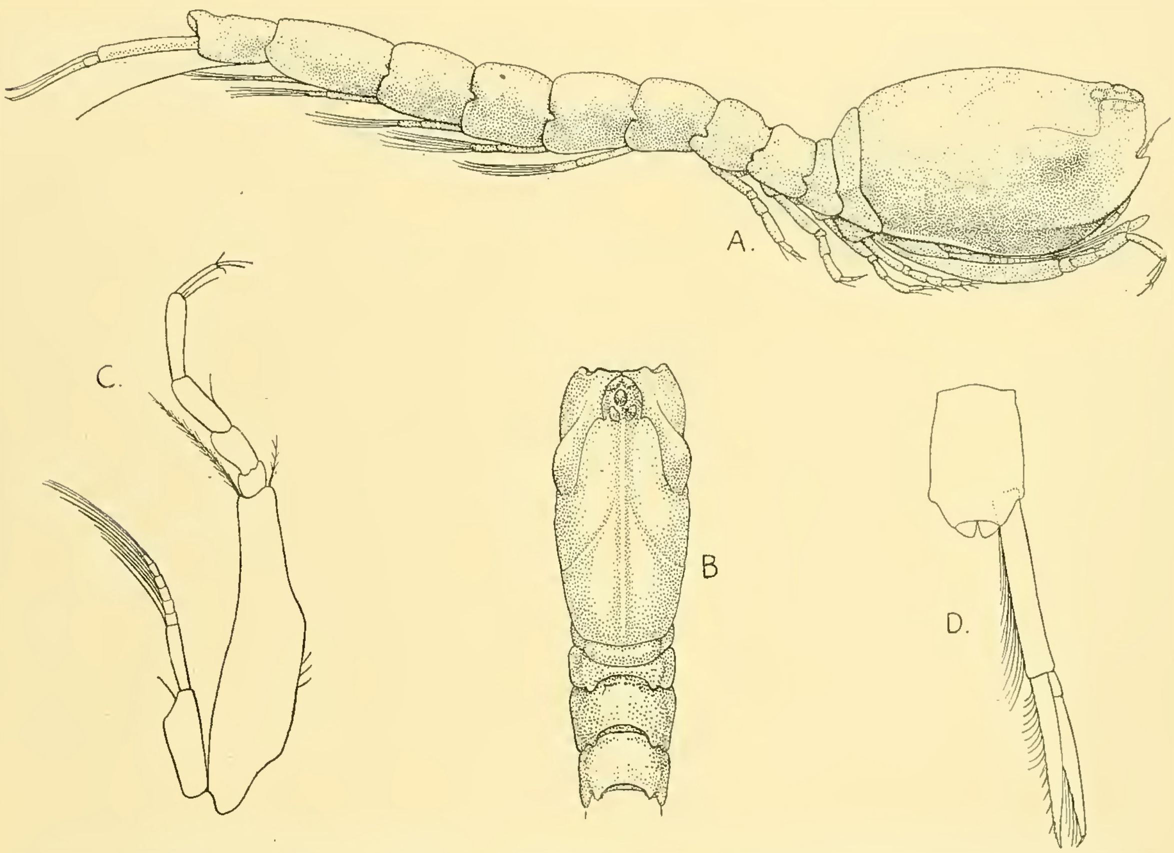

FIG. 5.—*Cyclaspis coelebs*, n. sp. Male. A. Side view. × 22. B. Anterior portion of body, from above. × 22. C. First leg. × 45. D. Last somite and uropod. × 45.

The exoskeleton is strongly calcified and, when dried, of a dull white appearance, contrasting with the glossy surface of *C. thomsoni*.

Remarks.—The oblique ridge on the carapace suggests a comparison of this species with *C. thomsoni*, from which, however, it is at once separated by the antero-lateral prominences as well as by the slightly different outline of the carapace and the shorter dactylus of the first legs. The specific name refers to the fact that the males on which the description is based were unaccompanied by females.

19. *Diastylis neozealanica*, G. M. Thomson. Fig. 6.

D. neo-zealanica, G. M. Thomson, 1892, p. 268, pl. xviii, figs. 1–11; Calman, 1908, p. 239.
Diastylopsis neozealanica, Stebbing, 1913, p. 110.

Occurrence.—Station 133. Spirits Bay, near North Cape, New Zealand. Plankton, 20 metres depth. One male.

Remarks.—The solitary male specimen is imperfectly preserved, and is only referred to Thomson's species (of which no male has yet been recorded) because the ridges on the carapace are arranged as in the female specimen in the Museum collection which I have mentioned (*l.c.*) as belonging to this species. From the female it differs in the characters proper to its sex, and it is to be noted, in particular, that the flagellum of the antennule has the conspicuous spurs described in *D. insularum* at the end of the basal segment (Calman, 1908, p. 237, figs. 5 and 5a). The accompanying figures show the disposition of the ridges of the carapace in the "Terra Nova" specimen.

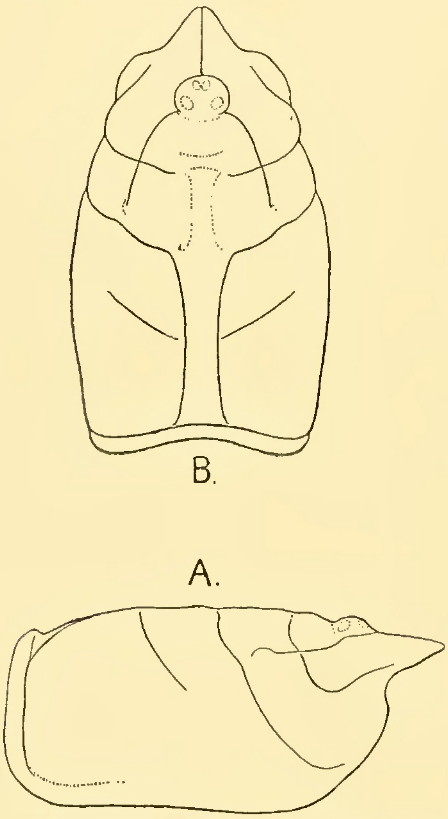

Fig. 6.—*Diastylis neozealanica*, G. M. Thomson. Male. A. Side view, B. Dorsal view, of carapace. × 25.

In the neighbourhood of this species I would place a specimen obtained by the "Discovery" at the Auckland Islands, and mentioned but not described in my report on the Cumacea of that expedition. The specimen is in very poor condition, having apparently suffered drying, and the carapace, in particular, is so crumpled that its sculpturing can no longer be distinctly traced. All that can be said is that the appendages show a general agreement with *D. neozealanica* and *D. insularum*, but that the carapace is not minutely spinous as in the latter species, while the ridges are apparently much less conspicuous than in the former.

Stebbing (*l.c.*) states of *D. insularum* that it "seems to be a variety of *D. neozealanica*." I do not know on what grounds this opinion is based, and it would require the examination of better-preserved and more abundant material than is at my disposal to confirm or disprove it. The species are certainly closely allied, as is shown by the characters of their appendages, but in the form which I described as *D. insularum* the carapace is minutely spinous, with a scarcely perceptible ridge or line of spinules on the side of the carapace, while in the specimens that I refer to *D. neozealanica* the surface of the carapace has three oblique lateral ridges, and apart from these is quite smooth.

Stebbing, following a suggestion made by Zimmer (1908, p. 190) but afterwards abandoned by him (1913, p. 478), has placed this species in the genus *Diastylopsis*. In Mr. Stebbing's classification *Diastylopsis* is distinguished from *Diastylis* mainly by the wide separation of the second and third pairs of legs in the adult females of the former genus. In this respect *D. neozealanica* and *D. insularum* do not differ from a number of species included by Stebbing in *Diastylis*, and their exclusion from *Diastylopsis* leaves that genus more sharply delimited.

20. *Colurostylis lemurum*, n. sp. Figs. 7, 8.

Occurrence.—Station 135. Spirits Bay, near North Cape, New Zealand. Plankton, 3 metres depth. Six females (incl. holotype), one male.

Description.—Ovigerous female. Total length 4 mm.

Carapace rather more elongate than in *C. pseudocuma* and having the pseudo-rostrum, in most specimens, distinctly longer and more acute. There is a strong oblique ridge running forwards and downwards on the side of the carapace; in front of this a weaker ridge, running more horizontally, defines a somewhat depressed area occupying the lateral region of the frontal lobe; these ridges unite with a narrow U-shaped ridge on the dorsal surface. There is a strong ridge running parallel with and close to the hind margin of the carapace. Between the ridges the surface is pitted with shallow depressions, less marked than those of *C. pseudocuma.* The ocular lobe is large, about twice as wide as long, with visual elements apparently well-developed, in four groups, without pigment, and without conspicuous corneal lenses.

The separation of the second from the third pair of legs, while well-marked, is not quite so extensive as in *C. pseudocuma.* The third and fourth free somites are more firmly united than in that species, being only defined from each other by a superficial groove.

Telson a little less than half the length of the last somite, shaped as in *C. pseudocuma.*

Antennules with the third segment of peduncle narrower and longer than second. Antennae apparently consisting of four segments, each bearing a single seta.

Branchial apparatus with about ten finger-shaped lobules.

First legs rather stout, distal segments longer by one-third than the basis, propodus nearly equal to carpus and twice as long as dactylus.

Second legs with basis nearly as long as distal segments together, dactylus less than one and a half times as long as propodus.

Exopods of third and fourth legs less than one-third as long as the basis.

Peduncle of uropods from twice to two and a half times as long as last somite, endopod a little longer than exopod and less than two-thirds as long as peduncle; proximal segment of endopod three-fourths of length of distal segment or a little more; peduncle and exopod serrated on inner edge, endopod with a close-set row of fine setae.

Adult male. Total length 4·2 mm.

The single adult male specimen agrees with the female as regards the arrangement of the ridges on the carapace, although they are less strongly marked. In other

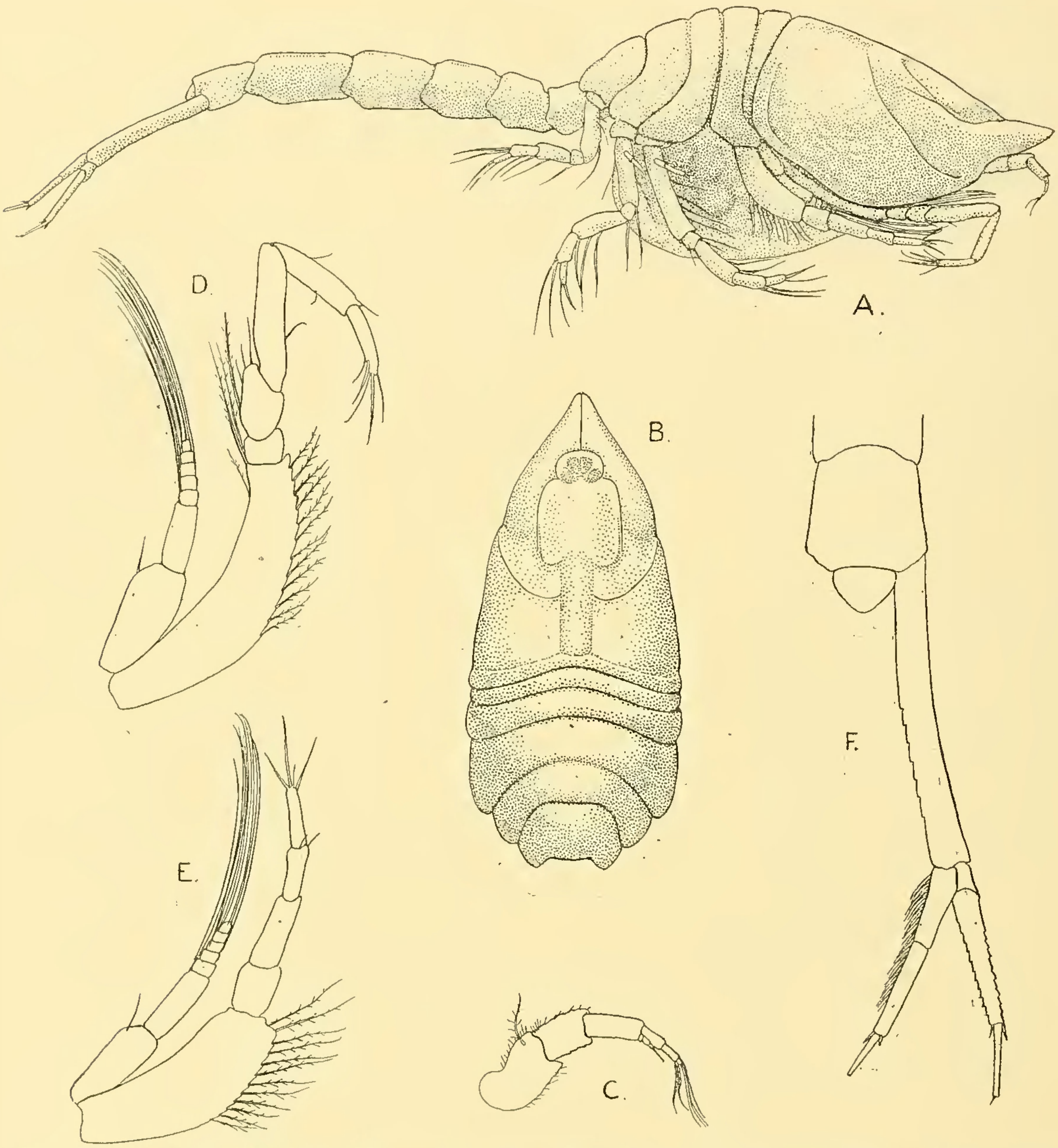

Fig. 7.—*Colurostylis lemurum*, n. sp. Female. A. Side view. × 30. B. Anterior portion of body from above. × 30. C. Antennule. × 75. D. First leg. × 75. E. Second leg. × 75. F. Last somite and uropod. × 75.

respects, apart from its larger size, it does not present any noteworthy differences from the male of *C. pseudocuma*; in particular, the proportions of the uropods are almost exactly as described for that species, although the spines on their inner edges are a little more numerous.

Remarks.—Some of the female specimens of this species have the pseudorostrum shorter and blunter than in the female figured, but although in this respect they

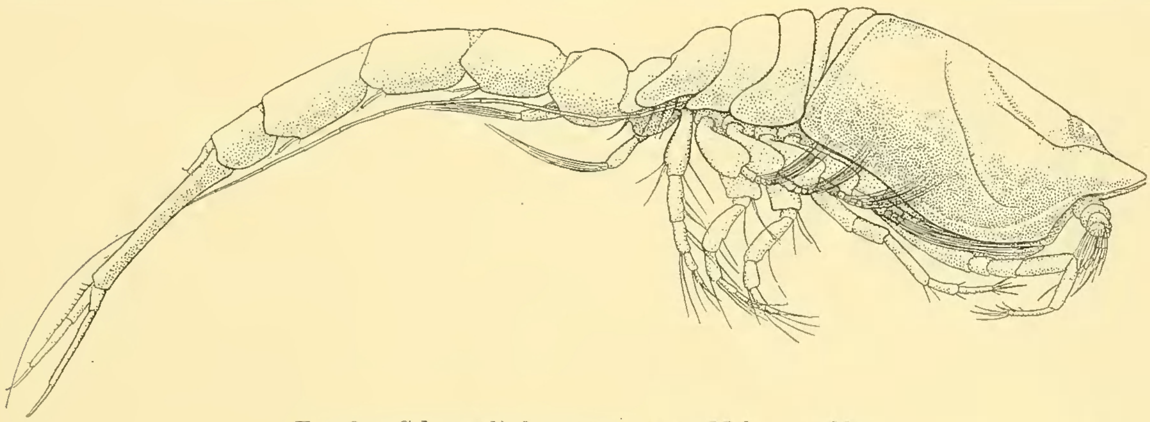

Fig. 8.—*Colurostylis lemurum*, n. sp. Male. × 30.

approach *C. pseudocuma*, they differ in having ridges on the carapace of which no trace can be seen in the much smaller syntypes of that species.

The specific name is chosen in allusion to the name of the bay where the specimens were taken.

21. *Campylaspis antarctica*, Calman. Fig. 9.

C. verrucosa, var. *antarctica*, Calman, 1907a, p. 5, pl. figs. 14–16, text-fig. 4; Zimmer, 1913, p. 454.
C. antarctica, Stebbing, 1913, p. 199.

Occurrence.—Station 355. McMurdo Sound. 300 fathoms, trawl. One female.

Remarks.—The single specimen is badly preserved, and does not enable any particulars to be added to those previously given. As the form of the third maxillipeds helps to distinguish this species from Hansen's *C. frigida* (1908, p. 16, pl. iii, figs. 2a–2n) I give a figure of this appendage from one of the "Discovery" syntypes.

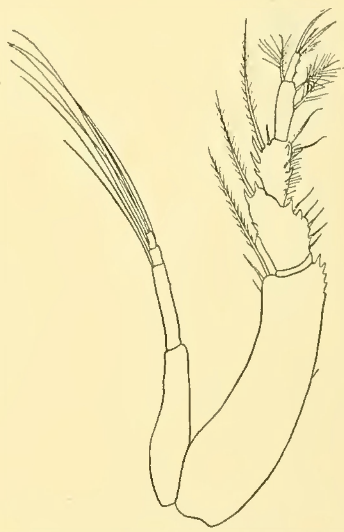

Fig. 9.—*Campylaspis antarctica*, Calman. Female. Third maxilliped. Syntype from "Discovery" collection. × 45.

22. *Campylaspis*, sp.

Occurrence.—Station 135. Spirits Bay, near North Cape, New Zealand. Plankton, 3 metres depth. One immature female.

Remarks.—The specimen here recorded resembles somewhat closely *C. undata*, G. O. Sars, with specimens of which, determined by Prof. Sars, I have compared it. It differs from these in certain details of sculpturing on the carapace, but the evidence afforded by a solitary immature specimen is insufficient to justify either the establishment of a new species or an extension of the known range of *C. undata* from Norway to New Zealand.

PHYLLOCARIDA.

23. *Nebalia longicornis*, G. M. Thomson.

Nebalia longicornis, G. M. Thomson, 1879, p. 418, pl. xix, figs. 7–9; *N. l.* with var. *magellanica*, etc., Thiele, 1904, p. 9, figs. on pl. iv; *N. l. magellanica*, Thiele, 1905, p. 66, pl. ii, figs. 14–17; Thiele, 1907, p. 1, text-figs.

Occurrence.—Station 130. Off Three Kings Islands, New Zealand. Plankton. Square 18-mesh net at surface. Aug. 26–27, 1911, 8 p.m. to 6.30 a.m. One specimen.

Station 135. Spirits Bay, New Zealand. Plankton. Square 18-mesh net at 3 metres depth. Aug. 31 to Sept. 1, 1911, 9 p.m. to 6.30 am. One specimen.

Station 331. Off Cape Bird Peninsula, entrance to McMurdo Sound. 250 fathoms, dredge. Jan. 14, 1912. One specimen.

Remarks.—In the proportions of the rostral plate (2·1 : 1), in the form of the ocular peduncle with its "sensory" tubercle, and in the armature of the fourth segment of the antennule (1 spine, 7 or 8 setae), the specimen from McMurdo Sound agrees almost exactly with Thiele's account of the "Discovery" specimens, and gives evidence, as far as a solitary specimen may, for constancy in the characters of the local race which Thiele refers to his subspecies *magellanica*.

The two specimens from the north of New Zealand are noteworthy, in the first place, for the fact that they were taken with the surface-net. We have no record of the depth of water over which they were swimming, but it is not likely to have been great, and indeed many of the plankton-gatherings from this region contain animals that are, at most, temporary migrants from the bottom-fauna.

Both the New Zealand specimens appear to be immature, and one of them retains the mucronate termination of the rostral plate regarded by Thiele as a juvenile character. Both specimens have on the anterior margin of the fourth antennular segment one strong spine followed by three or four setae, and so far agree with Thiele's definition of *N. longicornis* as against the northern *N. bipes*. They diverge remarkably from this definition, however, in the narrow form of the rostral plate. In the specimen which is presumably the more mature of the two, the proportion of length to breadth is 2·76 : 1, that is to say, the plate is considerably narrower than that which Thiele figures (1904, pl. iv, fig. 7) as typical for *N. bipes*, the proportion measured from his figure being about 2·3 : 1. In both specimens the eyestalk is short, the corneal area occupies about half of its length, and the "sensory" tubercle is insignificant.

If we attach primary importance (as Thiele seems to do) to the form of the rostral plate as distinctive between *N. bipes* and *N. longicornis*, then these New Zealand specimens would have to be classed under the former name. On the other hand, the armature of the antennules is decidedly that of *N. longicornis*, and in view of their place of origin they may, for the present, be referred to that species. It is evident, however, not only from these facts but also from the observations of Thiele himself, that the classification of the "forms" of *Nebalia* will have to be studied in greater detail and with more abundant material before it is possible to say how many species can be recognised or how far these can be subdivided into subspecies or varieties.

CLADOCERA.

I.—INTRODUCTION.

The known species of Cladocera inhabiting the sea are few and their number is not increased by the "Terra Nova" collections. A search through all the plankton-gatherings has only resulted in the discovery of three species from five stations. One of the species occurred both to the north of New Zealand and off Rio de Janeiro. No Cladocera were obtained in Antarctic waters.

II.—LIST OF STATIONS AT WHICH CLADOCERA WERE OBTAINED.

Station 17. 26° 17′ N., 20° 54′ W. Plankton. 50-mesh net at 10 metres depth. June 30, 1910, 7.30 to 7.50 a.m.

,, 39 and 40. Six miles off mouth of Rio de Janeiro Harbour. Plankton. 50-mesh net at 2 metres depth. Apr. 27, 1913, 11.0 p.m. to 1.30 a.m. and 2.30 to 5.0 a.m.

,, 65. 23° 28′ N., 34° 45′ W. Plankton. 50-mesh net at surface. May 26, 1913, 1.30 to 2.0 a.m.

,, 148. Bay of Islands, New Zealand. Plankton. 50-mesh net at 1½ to 7 fathoms. Aug. 27–Sept. 15, 1912.

III.—SYSTEMATIC NOTES.

24. *Penilia avirostris*, Dana.

Penilia avirostris, Dana, 1849, p. 47; *id.* 1852, p. 1269, pl. lxxxix, figs. 2a–b; Richard, 1894, p. 351, pl. xv, fig. 9.

P. orientalis, Dana, 1849, p. 47; *id.* 1852, p. 1270, pl. lxxxix, figs. 3a–e; Poppe, 1888, p. 295; Scott, 1894, p. 133; Richard, 1894, p. 350, pl. xv, fig. 12.

P. schmackeri, Richard, 1894, p. 344, pl. xv, figs. 5, 7, 11, 15, pl. xvi, fig. 8; Hansen, 1899, p. 4, pl. i, figs. 1–1b; Sudler, 1899, p. 109, 3 pls.; Richard, 1905, p. 9; Calman, 1908, p. 232; Žernov, 1909, p. 500, 1 fig.; Brady, 1915, p. 136, pl. ix, fig. 1; Leder, 1915, p. 350, 4 figs.

P. pacifica, Krämer, 1895, p. 222, pl. xxiii, figs. 1–5.

P. sp.?, Richard, 1894, p. 352.

Occurrence.—Stations 39 and 40. Six miles off mouth of Rio de Janeiro Harbour. Plankton at 2 metres depth. Many specimens.

Station 148. Bay of Islands, New Zealand. Plankton at 1½ to 7 metres depth. Several separate hauls. Many specimens.

Remarks.—The specimens from the two widely separated localities mentioned above agree equally well with the descriptions and figures of *P. schmackeri* given by

Richard and by Hansen. Since Rio de Janeiro Harbour is the type-locality for *P. avirostris*, Dana, our specimens taken a few miles away practically fulfil the condition laid down by Richard (1905, p. 10) for the identification of his species with that of Dana, and there seems to be no need to wait for further specimens from the Straits of Sunda before withdrawing *P. orientalis*, Dana, also as a synonym.

The genus *Penilia*, therefore, appears to include only a single known species which has been recorded from Beaufort (North Carolina), Vera Cruz (Gulf of Mexico), Rio de Janeiro, Mediterranean off S.E. Spain, Trieste, the Black Sea, various localities in the Gulf of Guinea as far south as Loanda, Durban, Straits of Sunda, Hong Kong, Port Jackson, Auckland, and Bay of Islands. It seems to be strictly neritic or coastal in habitat, and, as Leder has shown, it is tolerant of large changes in salinity. With the exception of its occurrences at Trieste and in the Black Sea, and possibly also of the New Zealand stations, its range to north and south is limited by the mean annual surface isotherms of 18° C.

25. *Evadne tergestina*, Claus.

Evadne tergestina, Claus, 1877, p. 140, pl. v, figs. 15–16, etc.; Hansen, 1899, p. 11; Juday, 1907, p. 157, fig.; Scott, 1912, p. 580.
E. aspinosa, Krämer, 1895, p. 222, pl. xxii, figs. 1–8.
? *E. gibsoni*, Brady, 1914, p. 2, pl. i, figs. 1–5.

Occurrence.—Station 39. Six miles off mouth of Rio de Janeiro Harbour. Plankton at 2 metres depth. One specimen.

Remarks.—The solitary specimen appears to belong to this species, with which it agrees in the numbers of setae on the exopodites of the legs. It presents, however, a slight but distinct notch on the dorsal edge behind the cervical organ, as in Brady's figure of *E. gibsoni*, a species which may prove to be identical with the present one. *E. tergestina* is known from many localities in the Tropical and South Atlantic, as well as from the Mediterranean, the Indian Ocean, Australia, New Zealand, and Southern California (Hansen, 1899, and later references given above).

26. *Evadne spinifera*, P. E. Müller.

Evadne spinifera, P. E. Müller, 1868, p. 225, pl. vi, figs. 11–13; Claus, 1877, pl. vi, fig. 21; Hansen, 1899, p. 10; Lilljeborg, 1900, p. 647, pl. lxxxvi, fig. 18, pl. lxxxvii, figs. 1–3; Apstein, 1910, p. 43; Scott, 1912, p. 580.

Occurrence.—Station 17. 26° 17′ N., 20° 54′ W. Plankton, at 10 metres depth. Many specimens.

Station 65. 23° 28′ N., 34° 45′ W. Plankton, surface. Two specimens.

Remarks.—According to Hansen, this widely-distributed species is especially characteristic of and abundant in the central southern area of the North Atlantic. Apstein states that its occurrence in the oceanic plankton is associated with the presence of Sargasso weed.

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Dana, J. D.—1849. Conspectus Crustaceorum quae in orbis terrarum circumnavigatione, Carolo Wilkes e classe Reipublicae Foederatae duce, lexit et descripsit. Pars. II. Proc. Amer. Acad. Arts Sci., Boston, II, pp. 9–61.

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The more important references are indicated by black type.

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ARACHNIDA.

PART I.—ARANEAE (SPIDERS).

BY

H. R. HOGG, M.A., F.Z.S.

(WITH THREE FIGURES IN THE TEXT.)

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ARACHNIDA.

PART I.—ARANEAE (SPIDERS).

BY H. R. HOGG, M.A., F.Z.S.

WITH THREE FIGURES IN THE TEXT.

I.—INTRODUCTION.

THE British Expedition to the Antarctic Continent under the command of the late Capt. R. F. Scott, C.V.O., R.N., sailed from England in the early summer of 1910, and on July 26, passing South Trinidad, a rocky island about lat. 20° S. and long. 29° W., sent boats ashore to investigate. The small collection of spiders below described was brought back with the other material thus obtained.

Two specimens from New Zealand were also taken on the return journey in June and October, 1912.

Unfortunately, nearly one-half of the specimens have not reached maturity. This renders their determination uncertain, and consequently precludes any clear indication of the source from which the fauna has had its origin. The island is situated in the belt traversed by the south-east trade winds, and the families are mostly those whose members are carried long distances by the aid of the wind.

The following is a complete list :—

From South Trinidad.

	PAGE
Uloborus geniculatus, Oliver	164
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Meta ? flava, O. P. Cambr.	165
Argiope trifasciata, Forskål	165
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II.—DESCRIPTIONS OF SPECIES.

1. SOUTH TRINIDAD.

Family ULOBORIDAE.

Genus ULOBORUS, Latreille.

Uloborus, P. A. Latreille, Gen. Crust. Ins., Vol. I, 1806, p. 109.
,, P. A. Latreille, L'Ordre Nat. des Crust. Arachn. et Ins., 1810, p. 125.
,, E. Simon, Hist. Nat. Araign., Vol. I, 1892, p. 214.

1. *Uloborus geniculatus*, Oliver.

Araneus geniculatus, Oliver, Encycl. Méthod. ii, 1789, p. 214.
Uloborus zosis, Walckenaer, Ins. Apt. II, 1841, p. 231. Antilles and Martinique.
Orithyia williamsii, Blackwall, Ann. Mag. Nat. Hist. 3 Ser. VIII, 1861, p. 443.
Uloborus borbonicus, Vinson, Aran. Réunion, Maurice et Madag., 1863, p. 258, fig. 3.
? ,, *zosis*, L. Koch, Die Arachn. Austral., Vol. I, 1872, p. 221, Tab. XIX, fig. 3. Upolu.
,, ,, T. Thorell, Rag. di Amboina, 1878, p. 129. Java, Amboina, Upolu.
,, *geniculatus*, E. Simon, Ann. Soc. Ent. Fr., 1890, p. 131. Ladrone Islands.
,, ,, H. C. McCook, American Spiders, Vol. III, 1894, p. 273. West Indies and U.S. Coast.

One female only, adult. One male and one female, immature.

These agree with specimens in the British Museum under the above title from the W. Indies, the coloration of which is black and white or pale yellow.

Walckenaer's and McCook's illustrations are red-brown and yellow, but Thorell (*loc. cit.*) says that his specimens vary from brown and yellow to black and white.

L. Koch's *U. zosis* has a distinct hump in the middle of the fore part of the abdomen and is probably not the same, especially as his drawing of eyes differs also, but there seems evidence of the species being spread over nearly every part of the tropics.

Family ARGIOPIDAE.

Sub-family TETRAGNATHINAE.

Group TETRAGNATHEAE.

Genus TETRAGNATHA, Latreille.

Tetragnatha, P. A. Latreille, Nouv. Dict. Hist. Nat., XXIV, 1804, p. 135.
,, E. Simon, Hist. Nat. Araign., Vol. I, p. 723 ; et auctt.

2. *Tetragnatha ferox*, L. Koch.

Tetragnatha ferox, L. Koch, Die Arachn. Austral., Vol. I, 1872, p. 173, Tab. XIV, figs. 4–5.

One male and two females agree almost entirely with descriptions of this species, only differing in the smaller size of some of the mandibular teeth.

They have previously been recorded from the eastern and southern coasts of Australia only.

Group METEAE.

Genus META, C. Koch.

3. *Meta ? flava*, O. P. Cambr.

Meta flava, O. P. Cambridge, Biol. Centr. Amer., Arachn. Aran., Vol. I, 1894, p. 135, Tab. XVII, fig. 8.

The Rev. O. P. Cambridge, in the volume written by him of the "Biologia Centrali-Americana," described a male from Mexico under the above title, and I think the "Terra Nova" specimens must be females of the same.

The cephalothorax is yellow, the mandibles dark yellow-grey, the sternum broad heart-shaped, dark brown. The legs very fine, yellow, with fine pale yellow-brown bristles. The abdomen above is black-brown with scattered pale yellowish white hair. Underneath, it has two faint longitudinal yellowish stripes. The measurement (in millimetres) of the largest is as follows:—

	Long.	Broad.
Ceph. . .	$1\frac{3}{4}$	1 (in front). $1\frac{5}{8}$
Abd. . .	$2\frac{1}{2}$	$1\frac{1}{2}$
Mand. . .	1	

	Coxae.	Tr. and Fem.	Pat. and Tib.	Metat. and Tars.		
Legs—1 . .	$\frac{1}{2}$	3	3	4	=	$10\frac{1}{2}$
2 . .	$\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{4}$	=	$8\frac{3}{4}$
3 . .	$\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{4}$	2	=	5
4 . .	$\frac{3}{8}$	$2\frac{3}{8}$	2	$2\frac{1}{2}$	=	$7\frac{1}{4}$
Palpi . .	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	=	$2\frac{1}{4}$

Of four specimens, only one is adult and the others are quite small.

Sub-family ARGIOPINAE.

Group ARGIOPEAE.

Genus ARGIOPE, Aud.

Argiope, V. Audouin, in Savigny's Egypt, Arachn. (2nd Edit.), Vol. XXII, 1825–7, p. 328.
,, E. Simon, Hist. Nat. Araign., Vol. I, 1895, p. 769; et auctt. omn.

4. *A. trifasciata*, Forsk.

Epeira trifasciata, P. Forskål, Icon. rer. nat., etc., 1776, Tab. XXV.C.
Argiope plana, L. Koch, Verh. der K. K. Zool.-bot. Ges. Wien, 1867, p. 9.
,, ,, ,, Die Arachn. Austral., Vol. I, 1871, p. 31, Tab. III, fig. 1–2.
,, ,, E. v. Keyserling, Die Arachn. Austral. Supplt., p. 133, Tab. X, fig. 5.
,, *trifasciata*, E. Simon, *loc. cit.*, p. 766, note; et auctt.

A non-adult female of this widely-spread species was found in the boat on its return to the ship. The upper side of the abdomen is a plain yellowish grey, but in other respects the eyes and the pattern of the underside of the abdomen seem to indicate the above species. *A. trifasciata* has been recorded from Africa, the Canaries, St. Helena, Chili, etc., as well as from Asia, Polynesia, Australia, etc.; in fact, all round the globe.

Group ARANEAE.

Genus ARANEUS, Clerck.

Araneus, C. Clerck, Svenska Spindlar, etc., 1757, p. 22.
Aranea, P. A. Latreille, Nouv. Dict. Hist. Nat., XXIV, 1804, p. 135.
Epeira, C. A. Walckenaer, Tabl. Aran., 1805, p. 53; et auctt.
Araneus, E. Simon, Hist. Nat. Araign., Vol. I, 1895, p. 829.

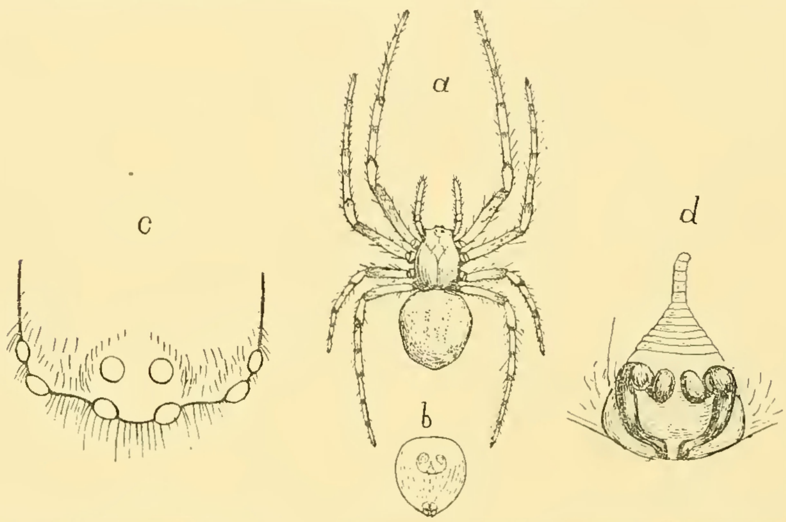

Fig. 1.—*Araneus trinitatis*, sp. nov. *a*, Female, × 2; *b*, ventral surface of abdomen; *c*, dorsal view of eyes; *d*, epigyne.

5. *Araneus trinitatis*, sp. nov.

Female.—The cephalothorax is greyish yellow; a curved brown transverse streak reaching from the middle of the cephalic part to the side depressions (which are also brown) forms with the latter a broad ring. The moderately fine forwardly-pointing hair is yellowish grey. A deep longitudinal fovea divides the whole of the thoracic part. The mandibles are yellow with long pale yellow bristly hair. The lip and maxillae are brown with broad yellow margins and pink fringes. The sternum is dark yellow-brown at the sides, paler in the middle, with long upstanding yellowish grey hair. The legs have the coxae yellow, the basal half of femora I and II the same, and the anterior half brown. In III and IV this joint is wholly yellow, the other joints yellow ringed with brown or dark grey. The abdomen above is black-brown, mottled all over with yellow, and on either shoulder is a more prominently brown spot. On the underside it is similarly black and yellow, with paler patches on a median longitudinal area. On both surfaces is fine down-lying yellow hair and upstanding brown and yellow bristles. The eyes of the median quadrilateral are equal in size, the rear pair their diameter apart, the front pair one and a half diameters apart and the same distance from the rear ones. The abdomen is globular, without shoulder-humps, slightly longer than broad. The epigyne has a moderately long upstanding stylus bent over at the distal end, transversely corrugated and narrowing from the base, where it springs from a circular plaque in which are embedded long brown convex chitinous lobes at the sides and base.

The measurements (in millimetres) are as follows :—

	Long.	Broad.
Ceph. . .	4	$1\frac{1}{2}$ (in front).
		3
Abd. . .	5	$4\frac{1}{2}$
Mand. . .	$1\frac{1}{2}$	

	Coxae.	Tr. and Fem.	Pat. and Tib.	Metat. and Tars.		
Legs—1 . .	$1\frac{1}{8}$	5	$5\frac{1}{2}$	6	=	$17\frac{5}{8}$
2 . .	1	$4\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{1}{2}$	=	$16\frac{1}{2}$
3 . .	$\frac{3}{4}$	$2\frac{1}{2}$	3	$2\frac{1}{2}$	=	$8\frac{3}{4}$
4 . .	$\frac{7}{8}$	$3\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	=	$13\frac{3}{8}$
Palpi . .	$\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{4}$	=	$4\frac{1}{4}$

The male is coloured like the female.

There are one male and a number of females, of which only three females are fully grown.

This species is near the very variable *Araneus anasterus*, Walck. (Ins. Apt. II, p. 33. McCook, Amer. Spiders, III, p. 172, Pl. VIII, figs. 1, 2), common in Central America and North and South of the same, which in its epigyne it somewhat resembles. In this, however, the scape distinctly curls over at the apex, and the chitinous lobes on the base are more prominent and separate. The cephalothorax and legs are longer by one half, and the cephalic part of the cephalothorax bears a dark horseshoe mark, the sides of which reach to the cephalic fovea, not apparent in the other species.

These points serve to distinguish it from the above-named species of many synonyms. M. Simon has made for it a new genus, *Eustala* (*loc. cit.* p. 295), seemingly on somewhat slight grounds.

Family THOMISIDAE.

Group DIAEEAE.

Genus DIAEA, Thor.

Thomisus, C. A. Walckenaer, Tabl. Aran., 1805, p. 28 (ad partem).
Diaea, T. Thorell, Europ. Spiders, etc., 1870, p. 184.
,, E. Simon, Hist. Nat. Araign., Vol. I, 1895, p. 1035.

6. *Diaea*, ? sp.

One quite small very young female, $2\frac{2}{5}$ mm. long, too small for specific determination. Pale yellow all over.

Family CLUBIONIDAE.

Sub-family SPARASSINAE.

Group HETEROPODEAE.

Genus HETEROPODA, Latr.

Heteropoda, P. A. Latreille, Nouv. Dict. Hist. Nat., XXIV, 1804, p. 135.
Sarotes, Sundevall, Consp. Arach., 1833, p. 28.
,, L. Koch (non *Heteropoda* L. Koch), Arachn. Austr., Vol. II, 1875, p. 709.
Heteropoda, E. Simon, Rev. Sparass., 1880, p. 47.
,, ,, Hist. Nat. Araign., Vol. II, 1897, p. 54; et auctt.

7. *Heteropoda regia*, Fabr.

? *Aranea ocellata*, Linnaeus, Syst. Nat., ed. 12, 1758, p. 1035. (Male.)
Aranea regia, J. C. Fabricius, Ent. Syst., Vol. II, 1793, p. 408. (Female.)
Heteropoda regia, L. Koch, E. Simon, R. I. Pocock, et auctorum.

One non-adult female.

Family SALTICIDAE.

Group BELLIENEAE.

Genus BELLIENA, Sim.

Belliena, E. Simon, Ann. Soc. Ent. Belg., XLVI, 1902, p. 403.
,, ,, Hist. Nat. Araign., Vol. II, 1903, p. 858.

8. *Belliena scotti*, sp. nov.*

Female.—The cephalothorax is black-brown in the median area and round the margin, red-brown between the two, with grey and yellow hair, the mandibles dark brown; the lip, maxillae and sternum brown with long coarse grey hair; the abdomen grey-brown with long, thick, coarse, grey hair, and two longitudinal rows of brown spots on the upper side, reaching from base to rear.

The legs are yellow all over, darkening on the metatarsal and tarsal joints.

The *male* has a white hair-patch behind the eyespace and at the base of the abdomen, otherwise the hairing and coloration are the same as in the female.

The *cephalothorax* is convex, highest at the rear row of eyes, whence it slopes slightly both forwards and rearwards, and then steeply at the sides and rear; the skin is smooth without any sign of a thoracic fovea.

The *eyespace* is one-fifth broader than long, the rear row slightly narrower than the front row. The side eyes of the front row, half the diameter of the median eyes

* Named after the intrepid leader of the Expedition.

and separated therefrom by one-fourth their diameter, stand a short distance back, but their upper points are on a level with the top of the front median eyes. The clypeus is rather more than half as wide as the diameter of the latter. The small median pair are situated half-way between the front side eyes and the rear row. The eyes of the latter are a little larger than the front side eyes.

The *mandibles* are short, square, and transversely corrugated, the fangs well curved. On the outer falx-sheath margin are two teeth, and two on a single base on the inner.

The *lip* is slightly longer than broad, truncate in front, rounded at the sides, more than half the length of the *maxillae*, which are upright, rounded anteriorly, and on the outer margin.

The *sternum* is ovate, longer than broad, and thickly covered with bristly hair.

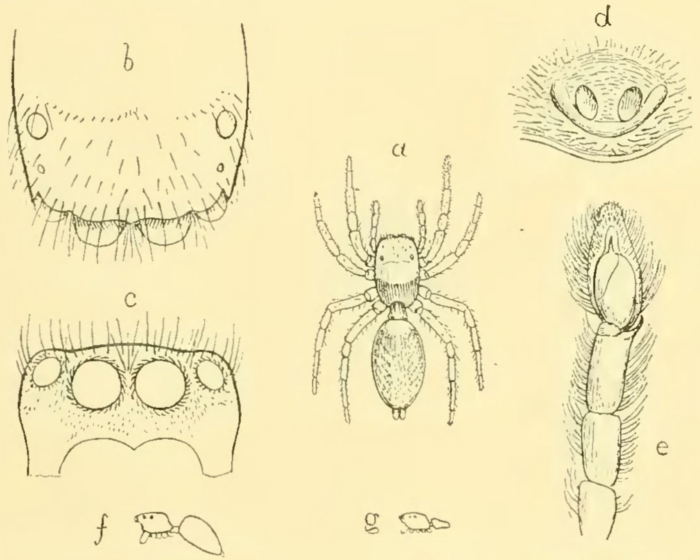

FIG. 2.—*Belliena scotti*, sp. nov. *a*, Female, × 2; *b*, dorsal view of eyes; *c*, anterior view of eyes; *d*, epigyne; *e*, palp of male; *f*, body of female, in profile; *g*, similar view of body of male.

The front coxae are separated by the width of the lip, and the rear pair are contiguous.

The *abdomen* is oval, joined to the cephalothorax in the female by a broad stout pedicule visible from above. In the male this is shorter and less apparent. The spinnerets are long, single-jointed, cylindrical, the inferior pair contiguous and standing on a common membranous base.

The epigyne of the female consists of two oval hollows with a space between, but connected along the lower edges by a narrow chitinous rim.

The tibial joint of the male *palp* is longer than the patellar; the distal joint, of simple oval form, with a short curved stylus. The whole palp is thickly covered with long bristly hair.

The *legs* are short, moderately and evenly stout, the fourth pair longest, patella and tibia IV not shorter than patella and tibia III; all metatarsi and tarsi fine, and thinner than tibiae.

On the male are two spines underneath and two on inner side of tibia I, two underneath metat. I, a pair, short and stout, at anterior end of patellae III and IV (none on I and II), three on outer side of tibia IV, one on inner, three pairs on metat. IV, three on metat. III.

The measurements (in millimetres) are as follows:—

Female.

	Long.	Broad.
Ceph. . .	4	2 (in front).
		$2\frac{1}{2}$
Abd. . .	$4\frac{1}{2}$	$2\frac{1}{2}$
Mand. . .	$1\frac{1}{4}$	

	Coxae.	Tr. and Fem.	Pat. and Tib.	Metat. and Tars.		
Legs—1 . .	1	$2\frac{1}{2}$	$2\frac{3}{4}$	$1\frac{1}{2}$	=	$7\frac{3}{4}$
2 . .	$\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{2}$	=	$7\frac{1}{4}$
3 . .	$\frac{3}{4}$	$2\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{4}$	=	$8\frac{1}{4}$
4 . .	1	3	$2\frac{1}{2}$	$2\frac{3}{4}$	=	$9\frac{1}{4}$
Palpi . .	$\frac{1}{2}$	1	$1\frac{1}{4}$	$\frac{3}{4}$	=	$3\frac{1}{2}$

Male.

	Long.	Broad.
Ceph. . .	3	2 (in front).
		$2\frac{1}{2}$
Abd. . .	$2\frac{1}{2}$	2
Mand. . .	$1\frac{1}{4}$	

	Coxae.	Tr. and Fem.	Pat. and Tib.	Metat. and Tars.		
Legs—1 . .	$\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{1}{4}$	$1\frac{1}{2}$	=	$6\frac{3}{4}$
2 . .	$\frac{3}{4}$	2	2	$1\frac{1}{2}$	=	$6\frac{1}{4}$
3 . .	$\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	=	$5\frac{1}{2}$
4 . .	$\frac{3}{4}$	$2\frac{1}{4}$	2	$2\frac{1}{4}$	=	$7\frac{1}{4}$
Palpi . .	$\frac{1}{4}$	1	1	$\frac{3}{4}$	=	3

The above specimens are all larger than M. Simon's three species from Venezuela: *B. biocellosa*, *B. phalerata*, and *B. flavimana*. They would seem to be the only ones recorded, but these certainly come into the same genus as M. Simon's species.

2. NEW ZEALAND.

The two species which follow were collected on the return journey of the Expedition, which in June, 1912, passed along the west coast to the northernmost point of the North Island of New Zealand.

SUB-ORDER MYGALOMORPHAE.

SUB-FAMILY DIPLURINAE.

GROUP MACROTHELEAE.

GENUS PORRHOTHELE, Simon.

Mygale, C. A. Walckenaer, Ins. Apt., Vol. I, 1837 (ad part. *antipodiana*).
Cteniza, A. White, Proc. Zool. Soc., 1849, p. 3 (ad part. *hexops* and *antipodum*).
Hexops, A. Ausserer, 1871 (ad part. *whitei*), Verh. Zool.-bot. Ges. Wien, 1871, p. 155.
Macrothele, A. Ausserer (ad part. *huttonii*, Cambr.).
,, E. Simon, Ann. Soc. Ent. Fr., 1891, p. 307 (ad part. *insignipes*).
Porrhothele, E. Simon, Hist. Nat. Araign., Vol. I, 1892, p. 185.

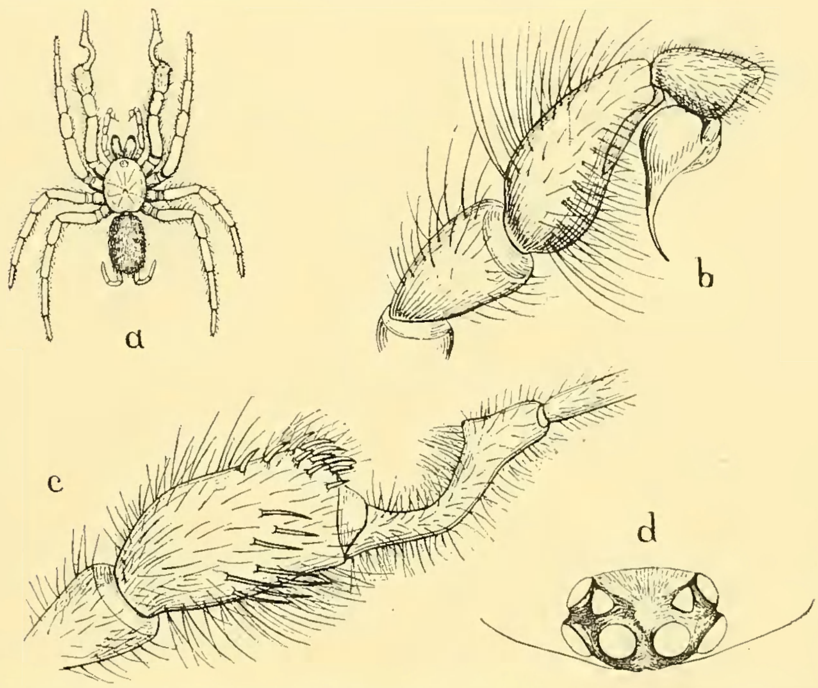

FIG. 3.—*Porrhothele antipodiana*, Walck. *a*, Male, × 1; *b*, palp of male; *c*, tibia and metatarsus of leg of first pair; *d*, dorsal view of eyes.

1. *P. antipodiana*, Walck.

Mygale antipodiana, Walck., *loc. cit.*, p. 230.
,, *quoyi*, H. Lucas, in d'Orbigny, Dict. d'Hist. Nat., VIII, 1846, p. 503.
Cteniza hexops, White, *loc. cit.*, supra.
,, *antipodum*, White, *loc. cit.*, supra.
Hexops whitei, Ausserer, *loc. cit.*, supra.
Macrothele huttonii, Cambridge, Trans. & Proc. N.Z. Inst., Vol. VI, 1873, p. 200.
,, ,, A. T. Urquhart, ibid., Vol. XXIV, 1891, p. 221.
,, *insignipes*, Simon, *loc. cit.*, supra, p. 308.
Porrhothele antipodiana, Walck., E. Simon, *loc. cit.*, supra.
,, ,, H. R. Hogg, Proc. Zool. Soc. Lond., 1901, Vol. II, p. 266.

One male and one female from Hamilton Bay, The Sounds, South Island, New Zealand.

Family ARGIOPIDAE.

Genus ARANEUS, Clerck.

2. *A. verrucosus*, Walck.

Epeira verrucosa, C. A. Walckenaer, Ins. Apt., 1841, p. 135, Tab. II.
,, ,, L. Koch, Arachn. Austral., Vol. I, 1871, p. 112, Tab. IX, fig. 4.

One non-adult male from Spirits Bay, north coast of North Island, New Zealand. Widely spread in New Zealand and the southern half of Australia.

INDEX.

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NATURAL HISTORY REPORT.

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CRUSTACEA.

PART V. OSTRACODA.

BY

R. W. BARNEY, B.A.

(Lecturer in Biology, University of Hong Kong.)

WITH SIX FIGURES IN THE TEXT.

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"TERRA NOVA" REPORT.

This is No. 23. *of* 25 *copies of Zoology, Vol. III., No.* 7, *Crustacea, Part V., printed on Special paper.*

CRUSTACEA.

PART V.—OSTRACODA.

BY R. W. BARNEY, B.A.

(*Lecturer in Biology, University of Hong Kong*).

WITH SIX FIGURES IN THE TEXT.

I.—INTRODUCTION.

The material collected by the "Terra Nova" Expedition was received in fifty-one tubes of various sizes, some containing only one or two, others many hundreds of specimens. It was entirely preserved in formalin. Many of the plankton jars were also examined, and yielded ten additional species. Altogether twenty-two species, representing six genera, have been identified.

The examination of the collection was carried out in the laboratory of Prof. E. W. MacBride, F.R.S., in the Imperial College of Science and Technology, South Kensington.

II.—METHODS.

The specimen was placed in four per cent. formalin in a watch glass, and the entire animal removed from its shell by means of fine needles. To accomplish this, the occlusor muscle was cut through on one side, and the valve thus freed was turned back. Next the muscles attached along the hinge-line were cut, and lastly the occlusor muscle on the other side. The shell was usually none the worse for this operation, and frequently the shape of the rostral tooth and notch and occasionally the sculpture could be made out more clearly. The shell was now balanced against the sloping side of the watch glass, so that the uppermost valve was in a horizontal position for drawing. The valves could generally be separated along the hinge-line, simply by opening them out fully and gently pulling them apart at one end. The specimen could then be dissected, and drawings of the parts made in formalin or spirit.

For permanent preparations the dissection could most conveniently be done in oil of cloves after staining. The best results were obtained by staining in Congo Red, which stains the chitin remarkably well, showing the fine teeth and hairs very clearly. Specimens may be stained for thirty seconds in a half per cent. solution of Congo Red in ninety per cent. alcohol. Better results were obtained by diluting this solution with two to ten times its volume of ninety per cent. alcohol, and staining for a longer time. Oil of cloves was used for clearing, and permanent preparations were made of all the species by mounting in Canada Balsam, using a cavity-slide for the larger species in order to minimise distortion. The shells were stained in the same way and mounted along with the dissection.

The measurements of length were made parallel to the hinge-line from the most anterior point below the rostral notch, and do not include the rostral tooth.

III.—LIST OF SPECIES.

Codonocera cruenta, Brady.
Philomedes assimilis, Brady.
Cyclasterope lobiancoi, Müller.
Halocypris globosa, Claus.
,, *inflata*, Dana.
Conchoecia acuticosta, Müller.
,, *alata*, Müller.
,, *antipoda*, Müller.
,, *belgicae*, Müller.
,, *bispinosa*, Claus.
,, *chuni*, Müller.
Conchoecia daphnoides, Claus.
,, *discophora*, Müller.
,, *edentata*, Müller.
,, *hettacra*, Müller.
,, *imbricata* (*pars* Brady) Müller.
,, *oblonga*, Claus.
,, *serrulata*, Claus.
,, *spinirostris*, Claus.
,, *stigmatica*, Müller.
,, *subarcuata*, Claus.
Euconchoecia chierchiae, Müller.

IV.—LIST OF STATIONS AT WHICH OSTRACODA WERE OBTAINED.

ATLANTIC (MOSTLY TROPICAL).

Station 39.	April	26/27,	1913,	6 miles off mouth of Rio de Janeiro, 2 metres,	11 p.m–1.30 a.m.
,, 40.	,,	27,	,,	,, ,, ,, ,, ,, ,,	2.30–5 a.m.
,, 49.	May	6,	,,	18° 51′ S., 33° 40′ W., surface,	4.30–5 a.m.
,, 50.	,,	7,	,,	18° S., 31° 45′ W., surface,	12.35–1.15 a.m.
,, 64.	,,	26,	,,	23° 28′ N., 34° 45′ W., surface,	1.30–2 a.m.
,, 65.	,,	26,	,,	23° 28′ N., 34° 45′ W., ,,	,,
,, 66.	,,	27,	,,	25° 35′ N., 34° 10′ W., ,,	,,
,, 67.	,,	27,	,,	25° 35′ N., 34° 10′ W., ,,	,,
,, 68.	,,	28,	,,	27° 22′ N., 33° 40′ W., ,,	,,

New Zealand (off north end of).

Station 85.	July	24,	1911,	From C. Maria van Diemen Light, W.N.W., 24 miles, 2 metres 1–5 a.m.
,, 87.	,,	25,	,,	From Summit, Gt. King, S. ½° W., 10 miles, 30 metres, Noon.
,, 92.	,,	26/27,	,,	From Summit, Gt. King, S. by W., 24 miles, surface, 9 p.m.–4 a.m.
,, 103.	Aug.	4,	,,	From West Island, Three Kings Islands, S.W., 5 miles, surface, 5–6 p.m.
,, 106.	,,	4,	,,	Same locality, surface, 7–8 p.m.
,, 107.	,,	4/5,	,,	,, ,, ,, 8 p.m.–5.30 a.m.
,, 110.	,,	6/7,	,,	34° 4′ S., 171° 55′ E., surface, 9 p.m.–4 a.m.
,, 111.	,,	7,	,,	Off Three Kings Islands, surface, 10 a.m.–1 p.m.
,, 112.	,,	8,	,,	33° 37′ S., 171° 30′ E., 3 metres, Noon–4 p.m.
,, 133.	,,	30/31,	,,	Spirits Bay, near North Cape, 20 metres, 8 p.m.–6 a.m.
,, 135.	Aug.	31/Sept. 1	,,	,, ,, ,, 3 metres, 9 p.m.–6.30 a.m.
,, 136.	Sept.	1/2,	,,	,, ,, ,, surface, 9 p.m.–6.30 a.m.

South of New Zealand to Ross Sea.

Station 172.	Dec.	10,	1910,	66° 38′ S., 178° 47′ W., 0–400 metres, 10 a.m.
,, 178.	,,	15,	,,	67° 23′ S., 177° 59′ W., 0–500 metres, 9 p.m.
,, 180.	,,	22,	,,	68° 26′ S., 179° 08′ W., 100 metres, 5 p.m.
,, 235.	Mar.	26,	1912,	52° 41′ S., 168° 15′ E., 10 metres, 7–10 p.m.
,, 238.	,,	27,	,,	52° 11′ S., 167° 25′ E., 30 metres, 10–10.30 a.m.
,, 240.	,,	28,	,,	51° 57′ S., 167° 38′ E., 4 metres, 8.30–9 a.m.
,, 248.	Dec.	18,	,,	51° 22′ S., 179° 18′ W., surface, 7 p.m.
,, 259.	,,	22,	,,	55° 34′ S., 174° 35′ W., 20 metres, 9 p.m.
,, 267.	,,	27,	,,	66° 30′ S., 166° 8′ W., surface, 8–8.30 p.m.
,, 270.	,,	29,	,,	69° 51′ S., 166° 17′ W., 0–600 metres, 8 p.m.
,, 272.	Jan.	1,	1913.	71° 35′ S., 166° 01′ W., 80 metres, 4 p.m.
,, 275.	,,	3,	,,	71° 29′ S., 166° 0′ W., 160 metres, 1–5 p.m.
,, 276.	,,	5,	,,	71° 41′ S., 166° 47′ W., 0–1750 metres, 10.30–11.30 p.m.
,, 282.	,,	6/7,	,,	,, ,, ,, 0–1000 metres, 8 p.m.–8 a.m.
,, 285.	,,	8,	,,	71° 49′ S., 167° 32′ W., 0–600 metres, 8–10 p.m.
,, 288.	,,	10/11,	,,	71° 59′ S., 168° 43′ W., 60 metres, 8 p.m.–9 a.m.
,, 302.	Feb.	3,	,,	58° 21′ S., 158° 5′ E., 20 metres, 8.30 p.m.

South America (off south end of).

Station 308.	Apr.	9,	1913,	55° 29′ S., 78° 54′ W., 4 metres, 9.30–11 a.m.

Antarctic (McMurdo Sound, Ross Sea).

Station 317.	June 7–Oct.	14,	1911,	Hole in ice between Cape Evans and Inaccessible Island, 175 metres.
,, 323.	Oct. 16–Dec.	23,	,,	Do., 168 metres.
,, 342.	Jan.	31,	1912,	Off Cape Royds, 0–350 metres, 4 p.m.
,, 343.	Feb.	1,	,,	,, 0–600 metres, noon.
,, 344.	,,	1,	,,	,, 0–400 metres, 3 p.m.
,, 345.	,,	2,	,,	McMurdo Sound, 0–500 metres, 8.30–9.30 a.m.
,, 346.	,,	3,	,,	,, 0–450 metres, 9 a.m.–5 p.m.
,, 350.	Mar.	4,	,,	Off Glacier Tongue, McMurdo Sound, 250 metres, 2–4 p.m.
,, 351.	Apr. 26–June	7,	1912,	Hole in ice between Cape Evans and Inaccessible Island, 205 metres.
,, 352.	Aug. 29–Sept.	26,	,,	Do., 112 metres

V.—SYSTEMATIC ACCOUNT.

SUB-ORDER MYODOCOPA.

FAMILY 1.—CYPRIDINIDAE.

SUB-FAMILY 1.—CYPRIDININAE.

GENUS CODONOCERA, Brady.

1. *Codonocera cruenta*, Brady. (Text-fig. 1.)

Codonocera cruenta, Brady, 1902,* p. 188, pl. XXII, figs. 1–10; Müller, 1906*b*, p. 25, pl. VIII, figs. 1–6, 10, pl. IX, figs. 7, 8; *id.* 1912, p. 22.

Stations 110, 111 (N. of New Zealand). Surface. Four specimens.

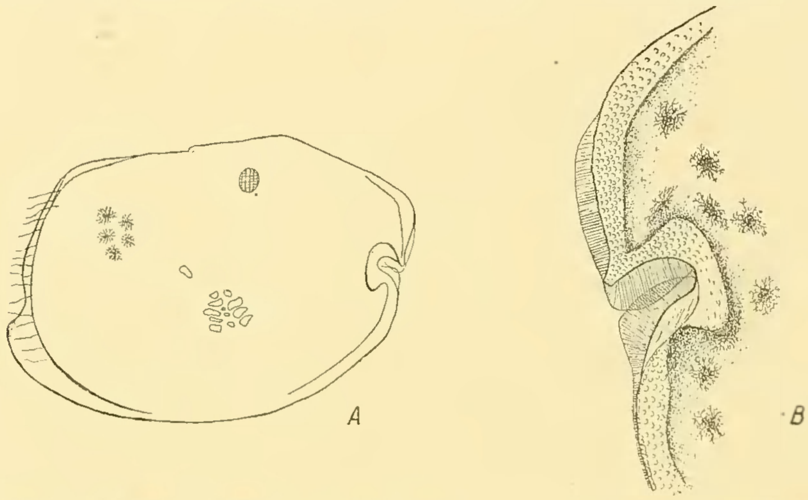

FIG. 1.—*Codonocera cruenta*. Male. *A*, Right valve, × 19; *B*, Anterior part of shell, × 48.

Two males and two females were obtained. The males, although undoubtedly to be referred to this species, present some peculiarities. The rostrum bends steeply downwards from the dorsal margin, but ends in a point turned slightly forwards. The posterior process is wider than in Müller's figure, and terminates posteriorly in a blunt angle. The right and left processes when apposed form a tube or siphon. The appendages agree exactly with Müller's description.

SUB-FAMILY 2.—PHILOMEDINAE.

GENUS PHILOMEDES, Lilljeborg.

2. *Philomedes assimilis*, Brady.

Philomedes assimilis, Brady, 1907, p. 5, pl. I, figs. 16–21, pl. II, figs. 1–6; Müller, 1908, p. 87, pl. VI, figs. 9–17, pl. VII, figs. 14–16; *id.* 1912, p. 31.
P. antarctica, Brady, 1907, p. 5, pl. III, figs. 1–6.

Stations 317, 351 (Hole in ice, McMurdo Sound). 10 to 175 metres. About ten specimens.

* Names of authors, followed by a date, refer to the "List of References" on p. 188.

Sub-Family 3.—ASTEROPINAE.

Genus CYCLASTEROPE, Brady.

3. *Cyclasterope lobiancoi* (Müller). (Text-fig. 2.)

Cylindroleberis Lobiancoi, Müller, 1894, p. 220, pl. IV, figs. 40, 42, pl. V, figs. 2, 3, 26, 32, 34, 40.
Cyclasterope Lobiancoi, *id.* 1912, p. 48.

Stations 133 and 135 (North of New Zealand). 3 to 20 metres. Twenty-four specimens.

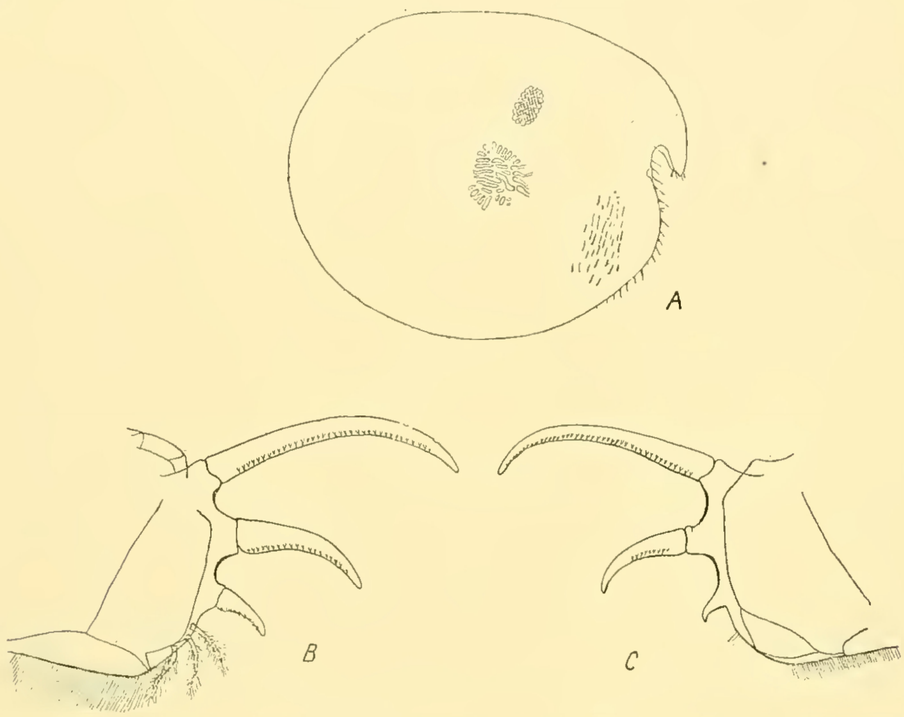

Fig. 2.—*Cyclasterope lobiancoi.* *A*, Female. Right valve, × 6; *B*, Female, Stage II. Furca, × 65; *C*, Female, Stage III. Furca, × 65.

The specimens are all females, and only one is mature. This is an immense specimen from Station 133, the right valve measuring 8·45 mm. by 7·7 mm.

The surface of the valves is marked with short wavy lines, giving it a scaly appearance. The furcal spines are relatively shorter and stouter than in Müller's figure, but in other respects this adult agrees well with his description.

None of the young females has the cleaning foot developed, and the number of bristle-like post-furcal appendages is in all cases much less than nine. That they are developmental forms of *C. lobiancoi* is fairly certain: for besides the fact that they were obtained in the same haul at Station 135, and were the only species taken there, they show a gradual advance towards the adult characters which can best be understood by considering two stages. These I call Stages II and III, using the terms with the same significance as Dr. Fowler has done (1909, p. 227), Stage II being the older. The characteristics of the adult are given for comparison.

ADULT. ♀ 8·45 mm. by 7·7 mm. (Fig. 2A.)

First Antennae.—The second and third segments bear over twenty bristles on the dorsal surface.

Second Antennae.—The basal joint of the secondary branch bears eight or ten hairs, second joint five hairs.

Mandibles.—First sensory joint bears numerous hairs on ventral edge. Second joint about ten. Third joint very many.

Cleaning foot.—Well developed.

Furca.—Three pairs of stout, finely serrated spines, followed by about nine pairs of plumose bristles.

STAGE II. ♀ 2·5 mm. by 2·1 mm. (Fig. 2B.)

First Antennae.—Second, third and fourth segments each bear one large plumose hair or bristle on the dorsal surface.

Second Antennae.—The basal joint of the secondary branch bears one or two hairs, second joint hairless.

Mandibles.—First sensory joint bears about sixteen hairs, second joint two, third joint many.

Cleaning foot.—Undeveloped.

Furca.—Three pairs of more slender, finely serrated spines, followed by three or four pairs of plumose bristles.

STAGE III. ♀ 1·9 mm. by 1·65 mm. (Fig. 2C.)

First Antennae.—Third segment alone bears a single hair.

Second Antennae.—Secondary branch hairless.

Mandibles.—First sensory joint bears five hairs, second joint two, third joint about twelve hairs.

Cleaning foot.—Undeveloped.

Furca.—Three pairs of spines, the third not serrate, imperfectly separated from furcal plate, and followed by a few simple hairs.

There may be an older stage between Stage II and the adult, which is not represented by the specimens obtained.

MEASUREMENT OF SPECIMENS (♀♀), in mm.

ADULT.	8·45 × 7·7	STAGE III.	1·89 × 1·66
			1·89 × 1·64
STAGE II.	2·97 × 2·65 (right valve 2·60)		1·89 × 1·63
	2·75 × 2·55 (right valve 2·45)		1·84 × 1·62
	2·50 × 2·09		1·84 × 1·62
	2·35 × 2·04		1·84 × 1·61
	2·30 × 2·04		1·84 × 1·61
	2·30 × 2·01		1·84 × 1·61
	2·30 × 2·09		1·79 × 1·60
	2·30 × 2·09		1·79 × 1·60
	2·24 × 1·99		1·79 × 1·60

FAMILY HALOCYPRIDAE.

SUB-FAMILY CONCHOECIINAE.

GENUS HALOCYPRIS, Dana.

4. *Halocypris globosa* (Claus).

Halocypria globosa, Claus, 1874, p. 7, pl. III, figs. 36–39; *id.* 1890, p. 25; Müller, 1890, p. 270, pl. XXVIII, fig. 20; Claus, 1891, p. 79, pl. XXII, figs. 13–18.

Halocypris globosa, Müller, 1906*a*, p. 47, pl. VIII, figs. 13–16, 18, 19, pl. XXXV, fig. 1; Fowler, 1909, p. 255 , pls. XXV, XXVI, figs. 263–278; Müller, 1912, p. 57.

Stations 65, 67, 68 (Atlantic); 235, 238 (S. of New Zealand). Surface to thirty metres. Numerous specimens.

5. *Halocypris inflata* (Dana).

Conchoecia inflata, Dana, 1849, p. 52.

Halocypris inflata, Müller, 1906*a*, p. 50, pl. VII, figs. 19–28; *id.* 1912, p. 58.

Stations 50, 64–68 (Atlantic); 85, 92, 103, 106, 107 (N. of New Zealand); 235, 238, 240 (S. of New Zealand). Surface to thirty metres. Numerous specimens.

GENUS CONCHOECIA, Dana.

6. *Conchoecia acuticosta*, Müller.

Conchoecia acuticosta, Müller, 1906*a*, p. 87, pl. XXX, figs. 18–21; *id.* 1912, p. 78.

Stations 50, 64, 65, 67, 68 (Atlantic). Surface. Stations 85 and 87 (North of New Zealand). Two to thirty metres.

The Terra Nova records extend our knowledge of the distribution of this species northwards to 29° N. in the Atlantic, and eastwards to the Pacific Ocean, from which ocean it has not been previously reported. Dr. G. W. Müller has recorded it from the Indian Ocean (91° E.) and from the Atlantic (4° N. to 35° S.).

The sculpture is very variable, even in specimens from the same haul, and it is sometimes almost invisible.

7. *Conchoecia alata*, Müller. (Text-fig. 3.)

Conchoecia alata, Müller, 1906*a*, p. 121, pl. XXIX, figs. 1–10; *id.* 1912, p. 92.

Station 67 (Atlantic). Surface.

FIG. 3.—*Conchoecia alata*. Immature male, × 29; *A*, Right valve from inside; *B*, Shell from above. The wing-like expansion of the left valve is injured.

A single young male measuring 1·08 mm. The wing-like expansions are rounded off posteriorly. First antennae of female type. Penis large and conspicuous.

8. *Conchoecia antipoda*, Müller.

Conchoecia antipoda, Müller, 1906*a*, p. 110, pl. XXVI, figs. 5–16; *id.* 1912, p. 87.

Stations 178, 270, 276, 282, 285, 346 (Antarctic). Surface to one thousand seven hundred and fifty metres.

9. *Conchoecia belgicae*, Müller. (Text-fig. 4.)

Conchoecia belgicae, Müller, 1906*c*, p. 4, figs. 1–11; *id.* 1912, p. 92.
Conchoecia innominata, Brady, 1907, p. 1, pl. II, figs. 7–14.

Stations 112, 136 (North of New Zealand). Surface to ten metres. Stations 172, 178, 235, 270, 317, 323, 343–6, 350–352 (Antarctic). Surface to six hundred metres.

Certainly the most numerous species in the nettings of the Expedition, occurring in more gatherings than any other Ostracod, and in many cases forming the bulk of the plankton and giving it a characteristic appearance. The percentage of young in these swarms is low. Thus in No. 317 fourteen per cent. were larvae, in No. 112 only twelve per cent.

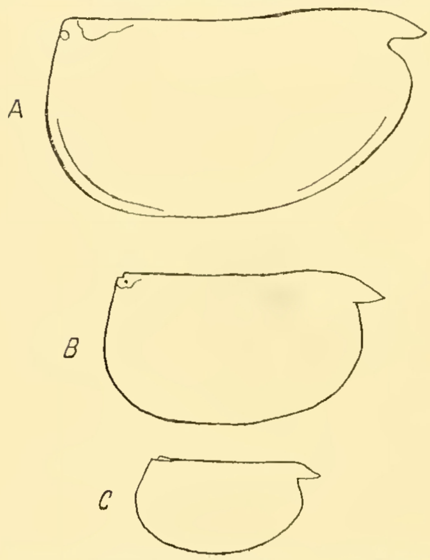

FIG. 4.—*Conchoecia belgicae*. *A*, Male; *B*, Male, Stage II; *C*, Male, Stage III; Right valves, × 25.

Two larval stages may be distinguished.

STAGE II. ♂ mean length, 2·08 mm. (Fig. 4B.)

Rostrum relatively slightly larger and shoulder-ridge less prominent than in adult. Anterior and posterior margins more evenly curved. First antennae of ♀ type, principal bristle slightly hairy in its middle one-third.

Frontal organ, head not clearly marked off from stem, slightly hairy below, club-shaped with acute point bent slightly downwards.

STAGE III. ♂ mean length, 1·36 mm. (Fig. 4C.)

Shell very similar to that of Stage II. Left asymmetrical gland with prominent mouth. First antennae, sense-tubes about half as long as principal bristle.

10. *Conchoecia bispinosa*, Claus.

Conchoecia bispinosa, Claus, 1890, p. 10; *id.* 1891, p. 59, pl. V, figs. 1–10, pl. VI, fig. 1, pl. VIII, figs. 7, 8; Müller, 1906*a*, p. 90, pl. XVIII, figs. 12–19; *id.* 1912, p. 79.
Conchoecia secernenda, Vávra, 1906, p. 59, pl. VI, figs. 121–127.
Conchoecia mülleri, Juday,* 1906, p. 24, pl. V, figs. 5–7, pl. VI, figs. 1–5.

Stations 92, 107 (North of New Zealand). Surface. Stations 235, 238 (South of New Zealand). Ten to thirty metres.

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* In a copy of this paper received from the author by Dr. W. T. Calman the name, *C. mülleri*, has been altered in manuscript to *C. striola*, Müller.

11. *Conchoecia chuni*, Müller.

Conchoecia chuni, Müller, 1906*a*, p. 124, pl. XXXI, figs. 16–28; *id.* 1912, p. 93, fig. 25.

Station 106 (North of New Zealand). Surface. One specimen.

Müller has recorded *C. chuni* from deep gatherings only, seven hundred metres being the shallowest.

12. *Conchoecia daphnoides daphnoides* (Claus).

Conchoecilla daphnoides, Claus, 1890, p. 18; *id.* 1891, p. 68, pl. XV, figs. 1–12; Brady and Norman, 1896, p. 697, p. LXIV, fig. 22.
Conchoecilla lacerta, Brady and Norman, 1896, p. 697, pl. LXII, figs. 1–4, pl. LXV, figs. 1–10.
Conchoecia daphnoides, Müller, 1901, p. 6, figs. 11–14; Fowler, 1909, p. 233, pl. XVII, figs. 55–57.
Conchoecia daphnoides, var. *typica*, Müller, 1906*a*, p. 126, pl. XXXI, figs. 4–8, 10–14.
Conchoecia daphnoides daphnoides, Müller, 1912, p. 94.

Station 87 (North of New Zealand). Thirty metres.

A single young male measuring ·88 mm. to the end of the posterior spine.

The shell closely resembles Dr. Fowler's figure of Stage III (*l.c.*, pl. XVII, fig. 56). The mouth of the right asymmetrical gland is slightly prominent, and the other three pairs of glands conspicuous. First antennae of female type.

13. *Conchoecia discophora*, Müller.

Conchoecia discophora, Müller, 1906*a*, p. 67, pl. XIII, figs. 1–9, 12–18; *id.* 1912, p. 71, figs. 16, 17.

Station 87 (North of New Zealand). Thirty metres. Four specimens.

14. *Conchoecia edentata*, Müller. (Text-fig. 5.)

Conchoecia edentata, Müller, 1906*a*, p. 76, pl. XV, figs. 24–29; *id.* 1912, p. 74.

Station 282 (Antarctic). 0–1,000 metres. Two males (one young), two females (one young).

Shell of female. Height rather more than half the length. The greatest height a little behind the middle. Ventral margin scarcely arcuate, passing in a broad even curve to the posterior margin, which is broadly arched, and meets the straight dorsal margin in a rounded obtuse angle. The antero-ventral curve viewed from the inside has an imbricate appearance. Glands: Right asymmetrical gland opens at about half the height of the shell. Left asymmetrical gland at the postero-dorsal angle. The posterior margin of the left valve bears a row of glandular cells. The remarkable group of gland-cells in the centre of the ventral margin of each valve, though present, is less noticeable than in the male.

First antenna bears four sense-tubes of unusual length.

Frontal organ slender, unjointed. Head almost straight, hairy except at the tip, which is rounded, scarcely wider than the stem.

Second antenna. One bristle of the secondary branch is longer than the other four, sword-shaped, broadening towards the tip, acutely pointed.

First leg (sixth appendage) unusually long, the last joint bearing a long curved claw and two bristles.

Length, 1·62 mm.

The only specimens of this species previously recorded are a somewhat imperfect male and a young female, described by Müller, from the "Valdivia" Expedition, from one thousand metres and two thousand metres respectively.

Fig. 5.—*Conchoecia edentata*. Female. *A*, Right valve, × 29; *B*, Part of margin of left valve from inside, × 87; *C*, First Antenna, × 87; *D*, Part of same, × 345; *E*, Second Antenna, secondary branch, × 87; *F*, First leg, × 87.

15. *Conchoecia hettacra*, Müller.

Conchoecia hettacra, Müller, 1906*a*, p. 121, pl. XXIX, figs. 11–19; *id.* 1912, p. 92; Brady, 1918, p. 7, pl. XVII, figs. 1–5.

Stations 178, 180, 267, 270, 272, 275, 276, 282, 285, 288 (Antarctic). Surface to one thousand seven hundred and fifty metres.

16. *Conchoecia imbricata* (Brady).

Halocypris imbricata (part.), Brady, 1880, p. 167, pl. XLI, figs. 1, 3–9, pl. XLII, figs. 1–8.
Conchoecissa armata, Claus, 1890, p. 19; *id.* 1891, p. 70, pl. XVI, figs. 1–5, pl. XVII, figs. 1–4, pl. XVIII, figs. 1–11.
Conchoecissa imbricata, Brady, 1897, p. 96.
Conchoecia imbricata, Müller, 1890, p. 277; *id.* 1906*a*, p. 118, pl. XXVIII, figs. 1–6; Fowler, 1909, p. 238, pl. XX, figs. 110–121; Müller, 1912, p. 91.

Station 285 (Antarctic). Surface to six hundred metres.

Only two specimens were obtained. This locality is the most southerly from which the species has been recorded.

17. *Conchoecia oblonga* (Claus). (Text-fig. 6.)

Paraconchoecia oblonga, Claus, 1890, p. 13; *id.* 1891, p. 63, pl. VIII, figs. 10, 11, pl. IX, figs. 1–14.
Conchoecia variabilis, Müller, 1890, p. 273, pl. XXVIII, figs. 27, 38.
Conchoecia oblonga, Müller, 1906*a*, p. 58, pl. IX, figs. 11–13, 16–25; *id.* 1912, p. 69.
(*non Conchoecia oblonga*, Müller, 1890, p. 272, pl. XXVIII, figs. 26, 31, 32, 36, 37.)

Stations 50, 64, 65, 68 (Atlantic). Surface.

A small number of specimens were taken in four nettings. One or more small globular glands with granular contents were visible along the anterior curve of the shell as described by Claus. The shell bears a few long stiff hairs almost equal in length to the height of the valve. These hairs are symmetrically arranged and may be tactile.

Length of ♂ 1·53 mm. Length of ♀ 1·42 mm.

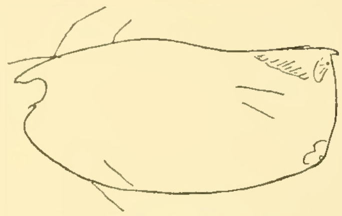

FIG. 6. — *Conchoecia oblonga*. Left valve, × 29.

18. *Conchoecia serrulata serrulata*, Claus.

Conchoecia serrulata, Claus, 1874, p. 6, pl. I, figs. 2–7, 9, 10, pl. II, figs. 12, 13, 17, 19; Müller, 1906*a*, p. 97, pl. XXII, fig. 24, pl. XXIII, figs. 20–30; Brady, 1918, p. 6, pl. XVII, figs. 10–16.
Conchoecia serrulata serrulata, Müller, 1912, p. 81.
Halocypris atlantica, Lubbock, Brady, 1880, p. 164, pl. XL, figs. 1–15, pl. XLI, figs. 11–12.
Pseudoconchoecia serrulata, Claus, 1890, p. 20; *id.* 1891, p. 72, pl. XIX, figs. 1–14, pl. XXIII, figs. 1–13; Brady, 1897, p. 96, pl. XVII, figs. 22–24.

Station 107 (North of New Zealand). Surface. Station 235 (South of New Zealand). Ten metres.

19. *Conchoecia serrulata laevis*, Brady.

Conchoecia serrulata, var. *laevis*, Brady, 1907, p. 2.
Conchoecia serrulata laevis, Müller, 1912, p. 82.

Stations 235, 238, 240, 248, 259, 302, 308 (South Pacific). Surface to thirty metres.

By far the greater number of *serrulata* taken belong to this variety.

20. *Conchoecia spinirostris*, Claus.

Conchoecia spinirostris, Claus, 1874, p. 6, pl. I, figs. 1, 6'*a*, 8, pl. II, figs. 11, 14, 15; *id.* 1890, p. 7; *id.* 1891, p. 56, pl. I, figs. 1–12; Müller, 1894, p. 227, pl. VI, figs. 1–9, 13; Brady and Norman, 1896, p. 689, pl. LX, fig. 22; Müller, 1906*a*, p. 104, pl. 22, figs. 21–23, 25–28; Fowler, 1909, p. 252, pls. XXIV, XXV, figs. 236–246; Müller, 1912, p. 84.
Conchoecia pellucida, Sars, 1887, p. 252, pl. XI, figs. 1–4, pl. XII, pl. III, figs. 1–4.
Conchoecia porrecta, Claus, 1890, p. 12; *id.* 1891, p. 61, pl. VII, figs. 1–13.

Stations 49, 50, 64, 65, 67, 68 (Atlantic). Surface. Stations 87, 106 (North of New Zealand). Surface to thirty metres.

21. *Conchoecia stigmatica*, Müller.

Conchoecia stigmatica, Müller, 1906*a*, p. 88, pl. XXX, figs. 22–28 ; *id.* 1912, p. 78.
Conchoecia curta (Lubbock) (part.), Fowler, 1909, p. 231, pl. XVII, figs. 30–34, 43–47.

Stations 50, 64, 65, 67, 68 (Atlantic). Surface. Stations 87, 106 (North of New Zealand). Surface to thirty metres.

This species is now recorded from the Pacific for the first time.

22. *Conchoecia subarcuata*, Claus.

Conchoecia subarcuata, Claus, 1890, p. 9 ; *id.* 1891, p. 58, pl. III, figs. 3–9, pl. IV, figs. 1–8 ; Müller, 1906*a*, p. 102, pl. XXI, figs. 10–16, 19 ; *id.* 1912, p. 83.
Conchoecia striata (part.), Claus, 1890, p. 12 ; *id.* 1891, p. 62, pl. VIII, figs. 1–6.

Station 87 (North of New Zealand). Thirty metres.

A small number of specimens in different stages of development seem to be referable to this species. Only one adult, a female (1·96 mm.), agreeing exactly with Claus's figures and description, was seen. The remainder represent three larval stages.

23. *Euconchoecia chierchiae*, Müller.

Euconchoecia chierchiae, Müller, 1890, p. 277, pl. XXVIII, figs. 1–10 ; *id.* 1906*a*, p. 128, pl. XXXII, figs. 8–17 ; *id.* 1912, p. 96.

Stations 39, 40 (Atlantic). Two metres.

Swarms of this species occurred in these two hauls. Many of the females were carrying developing ova between the valves of their shells. The body of the female is relatively small compared to the size of the shell, which can therefore accommodate a number of eggs. In one case as many as twelve large eggs were counted.

VI.—DISTRIBUTION.

The methods adopted in collecting the material were not such as to furnish precise data of the bathymetrical distribution of the several species. It may be of value, however, to record that, of the species discussed in this report, the great majority were taken in nets that had not descended to a depth greater than thirty metres. *Philomedes assimilis*, *Conchoecia antipoda*, *C. edentata*, and *C. imbricata* were only captured by nets that fished from a greater depth. It may also be of significance that *C. antipoda* was not found in any haul from less than four hundred and fifty metres, and *C. edentata* only in a net hauled from one thousand metres to the surface.

Ostracoda were collected in three areas :—

1. Atlantic Ocean, collected on Outward and Homeward Voyages.
2. South Pacific Ocean (New Zealand).
3. Antarctic Ocean.

The greatest number of species is from the Pacific Ocean.

There are only six species from the Antarctic, but one of these (*Conchoecia belgicae*) far outnumbers any other species, both in individuals and in the number of hauls in which it was captured.

Atlantic.	South Pacific.	Antarctic.
Halocypris globosa.	*Codonocera cruenta.*	*Conchoecia antipoda.*
,, *inflata.*	*Philomedes assimilis.*	,, *belgicae.*
Conchoecia acuticosta.	*Cyclasterope lobiancoi.*	,, *edentata.*
,, *alata.*	*Halocypris globosa.*	,, *hettacra.*
,, *oblonga.*	,, *inflata.*	,, *imbricata.*
,, *spinirostris.*	*Conchoecia acuticosta.**	
,, *stigmatica.*	,, *belgicae.*	
Euconchoecia chierchiae.	,, *bispinosa.*	
	,, *chuni.*	
	,, *daphnoides.*	
	,, *discophora.**	
	,, *serrulata.*	
	,, *spinirostris.*	
	,, *stigmatica.**	
	,, *subarcuata.*	

* Not previously recorded from Pacific Ocean.

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CRUSTACEA.

PART VI. TANAIDACEA AND ISOPODA.

BY

W. M. TATTERSALL, D.Sc.

(Keeper of the Manchester Museum)

WITH TWO FIGURES IN THE TEXT AND ELEVEN PLATES.

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CRUSTACEA.

PART VI.—TANAIDACEA AND ISOPODA.*

BY W. M. TATTERSALL, D.Sc.

(*Keeper of the Manchester Museum*).

WITH TWO FIGURES IN THE TEXT AND ELEVEN PLATES.

I.—INTRODUCTION.

THE collection of Isopoda (including Tanaidacea) obtained by the "Terra Nova" Expedition comprises forty-seven species, of which twenty-six were captured in the Antarctic seas, seventeen off the coasts of New Zealand, two at a station near the Falkland Islands, and two in the Atlantic Ocean.

Taking account only of the species captured in Antarctic waters, the numbers recorded by other South Polar Expeditions, the reports of which have been published, are :—" Southern Cross," nine ; " Français," seventeen ; " Pourquoi Pas ? " twenty-four ; " Discovery," twenty-six ; " Gauss," fifty-eight. The great deficiency in the present collection is in small species of the Asellota, of which the " Gauss " in particular captured a large number.

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* Manuscript received January 10, 1920 (S. F. H.).

For the purposes of this report I have been allowed to include an account of a small collection of Isopoda made in S. Georgia in November and December, 1913, by the late Major G. E. H. Barrett-Hamilton and his assistant, Mr. P. Stammwitz, and kindly entrusted to me for examination by the authorities of the British Museum. This collection comprised thirteen species, of which four were also found in the Antarctic collections of the "Terra Nova," and it has been of the greatest service to me in the elucidation of some of the species.

In view of the activity in South Polar Exploration during the last twenty years, it was not to be expected that the "Terra Nova" collection would yield many novelties, especially when its deficiency in small forms is taken into account. Only four species new to science were found among the Antarctic material, but five other species have only recently been described in the report of the "Gauss" collections.

Of the twenty-six truly Antarctic Isopods in the "Terra Nova" collection, five were also taken by the "Southern Cross," thirteen by the "Discovery," ten by the "Gauss," and eight by the French Expeditions. The four new species are *Aega glacialis, Serolis glacialis, Antarcturus lilliei*, and *Antarcturus horridus*. In addition to these new forms, seven species are recorded from the Ross Sea area for the first time. Four of them were previously known only from the collections made by the "Gauss," viz. :— *Eisothistos antarcticus*, Vanhöffen, *Gnathia calva*, Vanhöffen, *Cirolana intermedia*, Vanhöffen, and *Cirolana obtusata*, Vanhöffen ; one was described from the collections made by the French Expeditions, *Ectias turqueti*, Richardson ; and two, *Nototanais dimorphus* (Bedd.) and *Antarcturus furcatus* (Studer), were known from the sub-antarctic regions from earlier expeditions.

The collection from S. Georgia contained thirteen species, of which eight were recorded from the same locality by Pfeffer in 1887, and no fewer than ten are also known from Kerguelen.

Perhaps the most interesting part of the "Terra Nova" collection is that made in New Zealand waters. Seventeen species were collected, of which I have described six as new, viz.:—*Cirolana pellucida, C. canaliculata, Eurydice subtruncata, Exosphaeroma falcatum, Cymodoce hodgsoni*, and *Pseudarcturella chiltoni*. Two further species are new to the New Zealand Fauna, *Cirolana japonica*, Hansen, and *Neastacilla falclandica*, Ohlin.

The reports dealing with Antarctic Isopoda, which have so far been published, refer to only about one-half of the Antarctic Ocean, from 100° E. long. to 60° W. long. The report on the "Scotia" collection is not yet published, and, as this expedition collected mainly in the otherwise unknown half of the Antarctic Ocean, the Weddell Sea, it is manifestly premature to consider the geographical distribution of the Antarctic Isopoda as a whole, especially in view of Hodgson's statement (1910, p. 3) that the "Scotia" collection does not contain a single species collected by the "Discovery." It may, however, be remarked that, of the total of forty species known from the Ross Sea, eleven were collected at the winter quarters of the "Gauss" and fifteen by the French

Antarctic Expeditions, but only two species, *Gnathia antarctica* (Studer) and *Glyptonotus antarcticus*, Eights, var. *acutus*, Richardson, are common to the three lists.

The most interesting morphological point revealed by the examination of this collection is the modification of the exopodites of the first pleopod in the males of certain species of the family Arcturidae, as accessory sexual organs. It may be recalled that Ohlin described such a modification in *Pseudidothea bonnieri* from the Magellan region, and was so impressed with the importance of this feature that he created a new family for the reception of that species entirely on the characters of the first pleopod of the male. I have found two distinct types of modified first pleopods in the males of certain Arcturidae.

The first type is characteristic of the genus *Antarcturus*, and is illustrated diagrammatically in text-fig. 1, A, which shows the relations of the various parts of the

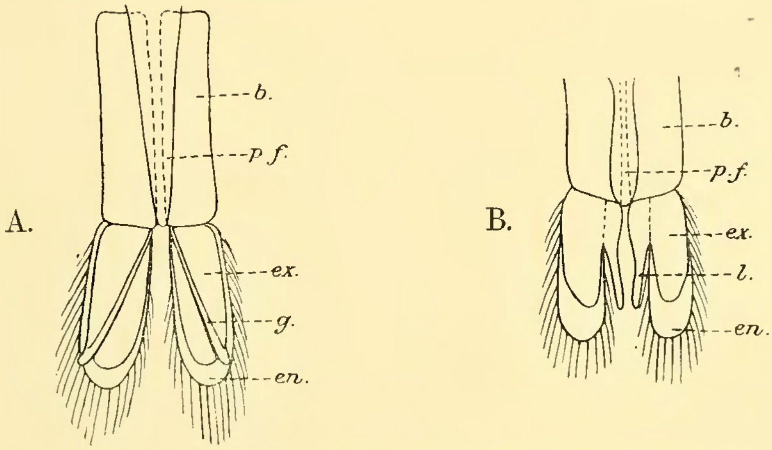

FIG. 1.—First pair of pleopods of male. A, *Antarcturus*. B, *Pseudarcturella*.
b. basipodite; *en.* endopodite; *ex.* exopodite; *g.* groove; *l.* lobe on inner margin of exopodite; *p.f.* penial filament.

first pair of pleopods in the males of that genus as they appear when the animal is laid on its dorsal surface and the doors of the operculum opened. In the median line lies the penial filament (formed by fusion of the two filaments present in most Isopods), which is about as long as the basipodite of the pleopods. The exopodite of each pair of pleopods lies on top of the endopodite, and on its under surface there is a rather deep oblique groove which commences at the inner proximal corner, immediately at the posterior end of the penial filament, and traverses the exopod to the outer distal corner. It becomes more or less completely roofed over distally, and at the distal end there is a protuberance on the margin of the exopod roofing over the distal opening of the groove. This type of first male pleopod I have found in all the Antarctic species of *Antarcturus* and the allied genus *Dolichiscus*. It has been noticed, but not sufficiently emphasised, by Barnard in *Antarcturus kladophorus*, Stebbing, and

Neoarcturus oudops, Barnard, from the Cape. A study of Barnard's figures will make it clear that he has really seen a similar modification to that which I have just described. Moreover, the same modification was found by Ohlin in his species, *Pseudidothea bonnieri*.

The second type of first male pleopod I found in a single species, *Pseudarcturella chiltoni*, from New Zealand, and it is represented diagrammatically in text-fig. 1, B. Here, instead of a groove on the underside of the exopodite, the latter bears an additional lobe on the inside. This lobe is swollen at the base, narrow and pointed at the tip, and looks like the appendix masculina of the second pair of pleopods. At the tip are several transverse thickenings of the chitin. The specialisation of the first pair of pleopods of the males as accessory copulatory organs is not known, as far as I am aware, in Marine Isopoda, otherwise than in the tribe Valvifera, and its widespread occurrence in that tribe seems worthy of special emphasis.

My thanks are due to the authorities of the British Museum for entrusting this collection to me for examination and report, and especially to Dr. Calman for the valuable help, always willingly given, which he has rendered me with literature, and the facilities he has given me for the examination of specimens in the National Collection.

I am especially indebted to my wife for the beautiful drawings which illustrate this report.

II.—LIST OF SPECIES.*

Order TANAIDACEA.

Family TANAIDAE.

Nototanais dimorphus (Beddard).
Tanais gracilis, Heller (?).
Tanais novae-zealandiae, G. M. Thomson (?).

Order ISOPODA.

Sub-order ASELLOTA.

Family PARASELLIDAE.

Group JANIRINI.

Janira longicauda, Chilton.
Ianthopsis sp. (?).
Notasellus sarsi, Pfeffer.
Ectias turqueti, Richardson.

Group MUNNINI.

Coulmannia frigida, Hodgson.
Munna maculata, Beddard (?).
Haliacris antarctica, Pfeffer.

Sub-order FLABELLIFERA.

Family CYMOTHOIDAE.

Cirolana intermedia, Vanhöffen.
,, *obtusata*, Vanhöffen.
,, *pellucida*, n. sp.
,, *canaliculata*, n. sp.
,, *japonica*, Hansen.
Eurydice subtruncata, n. sp.
Aega antarctica, Richardson.
,, *glacialis*, n. sp.
,, *novi-zealandiae*, Dana.

* The classification and arrangement of species followed in this report is that of Hansen, in his account of the Tanaidacea and Isopoda of the "Ingolf" Expedition (Hansen, 1913 and 1916).

Ceratothoa impressa (Say).
Cymothoid, gen. et. sp. (?).

Family SPHAEROMIDAE.

Limnoria antarctica, Pfeffer.
Plakarthrium typicum, Chilton.
Exosphaeroma gigas (Leach).
,, *falcatum*, n. sp.
Isocladus armatus (M.-Ed.).
Cymodoce hodgsoni, n. sp.
,, *bituberculata*, Filhol (?).
Cymodocella tubicauda, Pfeffer.
Dynamenella eatoni (Miers).
Cassidinopsis emarginata (Guér).
Euwallentinia darwinii (Cunningham).
Cassidina typa (M.-Ed.).

Family SEROLIDAE.

Serolis schythei, Lütken.
,, *septemcarinata*, Miers.
,, *pagenstecheri*, Pfeffer.
,, *polita*, Pfeffer.
,, *glacialis*, n. sp.

Family ANTHURIDAE.

Leptanthura glacialis, Hodgson.
Eisothistos antarcticus, Vanhöffen.

Sub-order VALVIFERA.

Family IDOTHEIDAE.

Glyptonotus antarcticus, Eights.
Ditto, var. *acutus*, Richardson.

Family ARCTURIDAE.

Antarcturus polaris (Hodgson).
,, *furcatus* (Studer).
,, *franklini* (Hodgson).
,, *hiemalis*, Hodgson.
,, *lilliei*, n. sp.
,, *horridus*, n. sp.
Dolichiscus meridionalis (Hodgson).
Neastacilla (gen. nov.) *falclandica* (Ohlin).
Pseudarcturella chiltoni, gen. et sp. nov.

Sub-order GNATHIIDEA.

Euneognathia gigas (Beddard).
Gnathia antarctica (Studer).
,, *hodgsoni*, Vanhöffen.
,, *calva*, Vanhöffen.

INCERTAE SEDIS.

Rhabdocheirus incertus, Bonnier.

III.—LIST OF STATIONS AT WHICH SPECIMENS WERE OBTAINED.

Atlantic Ocean.

Station 51. May 12, 1913. 5° S., 27° 15′ W., surface.
,, 66. ,, 27, ,, 25° 35′ N., 34° 10′ W., surface.

Sub-Antarctic Zone.

Station 38. April 13, 1913, 52° 23′ S., 63° 50′ W., 125 fathoms (229 m.).

South Georgia.

Cumberland Bay
Leith Harbour
Stromness Harbour
King Edward Cove

Collections made in November, 1913–January, 1914, by P. Stammwitz.

New Zealand Area.

Station 77.	July	18, 1911,	34° 5′ S., 171° 48′ E., surface.
,, 84.	,,	23, ,,	From C. Maria van Dieman Light, S.W. by W., 15 miles, 2 metres. Plankton.
,, 85.	,,	24, ,,	From C. Maria van Dieman Light, W.N.W., 24 miles, 2 metres. Plankton.
,, 86.	,,	25, ,,	Off Three Kings Islands, 3 metres. Plankton.
,, 89.	,,	25, ,,	Off Three Kings Islands, surface.
,, 92.	,,	27, ,,	From Summit, Great King, S. by W., 24 miles, surface.
,, 93.	,,	28, ,,	From Summit, Great King, S.E. by S., 13 miles, surface.
,, 96.	Aug.	3, ,,	Seven miles East of North Cape, New Zealand, 70 fathoms (128 metres). Agassiz trawl.
,, 106.	,,	4, ,,	From West Island, Three Kings Islands, S.W., 5 miles, surface.
,, 107.	,,	4, ,,	From West Island, Three Kings Islands, 5 miles, surface.
,, 109.	,,	5, ,,	34° 15′ S., 172° 0′ E., 3 metres. Plankton.
,, 110.	,,	6, ,,	34° 4′ S., 171° 55′ E., surface.
,, 111.	,,	7, ,,	Off Three Kings Islands, surface.
,, 118.	,,	17, ,,	34° 32′ S., 172° 20′ E., surface.
,, 120.	,,	18, ,,	34° 26′ S., 172° 14′ E., surface.
,, 122.	,,	19, ,,	From C. Maria van Dieman, S., 80° W., 21 miles, surface.
,, 126.	,,	24, ,,	34° 13′ S., 172° 15′ E., surface.
,, 127.	,,	25, ,,	Off Three Kings Islands, surface.
,, 128.	,,	26, ,,	Off Three Kings Islands, surface.
,, 129.	,,	26, ,,	Off Three Kings Islands, surface.
,, 130.	,,	27, ,,	Off Three Kings Islands, surface.
,, 133.	,,	30, ,,	Spirits Bay, near North Cape, 20 metres. Plankton.
,, 134.	,,	31, ,,	Spirits Bay, near North Cape, 11–20 fathoms (20–37 metres). Dredge.
,, 135.	Sept.	1, ,,	Spirits Bay, near North Cape, 3 metres. Plankton.
,, 136.	,,	2, ,,	Spirits Bay, near North Cape, surface.
,, 139.	,,	6, ,,	34° 30′ S., 171° 53′ E., surface.
,, 141.	,,	7, ,,	34° 37′ S., 171° 19′ E., surface.
,, 142.	,,	8, ,,	34° 45′ S., 170° 45′ E., 2 metres. Plankton.
			Sandy pool between tide marks at Motorua, Bay of Islands, New Zealand.

Antarctic Zone.

Station 194.	Feb.	22, 1911,	Off Oates Land, 69° 43′ S., 163° 24′ E., 180–200 fathoms (329–366 metres). Agassiz trawl.
,, 220.	Jan.	3, 1912,	Off Cape Adare, mouth of Robertson's Bay, 45–50 fathoms (82–92 metres). Agassiz trawl.
,, 294.	,,	15, 1913,	Ross Sea, 74° 25′ S., 179° 3′ E., 158 fathoms (299 metres). Agassiz trawl.
,, 314.	,,	23, 1911,	5 miles North of Inaccessible Island, 222–241 fathoms (406–441 metres). Agassiz trawl.
,, 316.	Feb.	9, ,,	Off Glacier Tongue, about 8 miles North of Hut Point, McMurdo Sound, 190–250 fathoms (348–457 metres). Agassiz trawl.
,, 317.	June Oct.	7– 14 ,,	Hole in ice between Cape Evans and Inaccessible Island, 175 metres. Plankton.
318.	June Sept.	13– 16 ,,	Hole in ice between Cape Evans and Inaccessible Island, 175 metres. Traps and tangles on bottom.
,, 331.	Jan.	14, 1912,	Off Cape Bird Peninsula, entrance to McMurdo Sound, 250 fathoms (457 metres). Dredge.
,, 338.	,,	23, ,,	77° 13′ S., 164° 18′ E., 207 fathoms. Agassiz trawl.
,, 339.	,,	24, ,,	77° 4′ S., 164 17′ E., 140 fathoms (256 metres). Agassiz trawl.

Station 348.	Feb.	13,	„	Off Barne Glacier, McMurdo Sound, 200 fathoms (366 metres), Agassiz trawl.
„ 349.	„	15,	„	Off Butter Point, Western shore of McMurdo Sound, 80 fathoms (146 metres). Agassiz trawl.
„ 355.	Jan.	20,	1913,	77° 46′ S., 166° 8′ E., 300 fathoms (547 metres). Agassiz trawl.
„ 356.	„	22,	„	Off Granite Harbour, entrance to McMurdo Sound, 50 fathoms (92 metres). Agassiz trawl.
				North Bay, N. of Cape Evans, McMurdo Sound.

IV.—DESCRIPTIONS OF SPECIES.

Order TANAIDACEA.

Family TANAIDAE.

Genus NOTOTANAIS, Richardson.

1. *Nototanais dimorphus* (Beddard).

Paratanais dimorphus, Beddard, 1886 (1), p. 119; Beddard, 1886 (2), p. 130, pl. XVII, figs. 1–8; *Nototanais dimorphus*, Richardson, 1906 (2), p. 3; Nierstrasz, 1913, p. 39; Vanhöffen, 1914, p. 470; *N. australis*, Richardson, 1908, p. 1, text-fig. 1.

Occurrence.—Station 356, off Granite Harbour, entrance to McMurdo Sound, 50 fathoms, bottom fauna, one male, 4 mm.

Remarks.—I am in complete agreement with Vanhöffen's opinion that Richardson's species, *N. australis*, is the same as that described earlier as *N. dimorphus*, by Beddard. Beddard's type was not available for examination, but the specimen now recorded is in the closest agreement with his description and figures, and I am quite unable to see any important points of difference between *N. dimorphus* and *N. australis*.

Genus TANAIS, Audouin and Milne-Edwards.

2. *Tanais gracilis*, Heller (?).

T. gracilis, Heller, 1865, p. 133, pl. XII, fig. 3; Stebbing, 1905, p. 3, pl. I (D); Nierstrasz, 1913, p. 23; Vanhöffen, 1914, p. 468, text-figs. 6*a*–*g*.

Occurrence.—Cumberland Bay, South Georgia, December, 1913, collected by P. Stammwitz, one ovigerous female, 6·5 mm.

Remarks.—There is no male specimen in the collection, and in consequence my identification must be accompanied by an expression of doubt.

The question is further complicated by the asymmetry of the pleon. On the left side the abdomen is distinctly composed of six somites, while on the right side only five somites are visible, the articulation separating the fifth and sixth somites being incomplete and finishing in the mid-dorsal line. On the left side, therefore, this specimen is a *Tanais sensu lato*, and on the right side a *Tanais sensu stricto*. It agrees very closely with the description given by Vanhöffen of specimens from Kerguelen which he refers to *T. gracilis.* The uropods are six-jointed, the terminal joint very small. The body is furnished with a few scattered setae on the anterior margins of its somites, and a tuft of strong plumose setae on the lateral parts of the first and second somites of the abdomen. The egg-pouch is single, and in this respect agrees with Vanhöffen's observations on this species, in contrast with the double egg-pouch found in *T. litoralis.* I can find no valid character to separate this specimen from *T. gracilis,* but in the absence of a male specimen I cannot be sure of the identity. *T. ohlinii,* Stebbing, from the Falkland Islands, seems to be very closely related to *T. gracilis,* and the only really important point of difference lies in the uropods, which are, like those of *T. gracilis,* six-jointed ; but the terminal joint is nearly as large as the penultimate, and not minute as in *T. gracilis.* If the present specimen really belongs to *T. gracilis,* the distribution of the latter is considerably extended, as it has previously only been found at the Cape, St. Paul, Ceylon, Kerguelen and New Amsterdam, localities all to the South of the Indian Ocean.

3. *Tanais novae-zealandiae,* G. M. Thomson (?). Pl. I, figs. 1–5.

T. novae-zealandiae, G. M. Thomson, 1879, p. 417, pl. XIX, figs. 5, 6 ; 1881, p. 207, pl. VII, fig. 3 ; Thomson and Chilton, 1886, p. 151 ; Hutton, 1904, p. 262 ; Chilton, 1909, p. 669 ; Thomson, 1913, p. 245 ; Vanhöffen, 1914, p. 465.

Occurrence.—Station 96, 7 miles E. of North Cape, New Zealand, 70 fathoms, bottom fauna, one male, 5·5 mm.

Remarks.—The only serious difference I can find between this specimen and Thomson's description is in the uropods. In my specimen the uropods (fig. 5) consist of a moderately large basal joint and a seven-jointed terminal portion, the first joint of which shows traces of being a double joint laterally, but I could not trace the line of separation across the joint, and the terminal joint is very small.

Thomson describes the uropods in his species as five-jointed, but from his figure it is obvious that this number does not include the basal joint, and it seems possible that he also overlooked the minute terminal joint. This would make the difference between Thomson's species and my specimen one or at most two joints extra in the uropods. Thomson's specimen measured 4·5 mm., mine measures 5·5 mm. Vanhöffen has shown that in *T. gracilis* the number of joints in the uropods increases with age, and it is possible that the differences in the present instance may be explained on similar grounds. I do not feel justified in instituting a new species on this difference, because otherwise there is the closest agreement between the two forms. I give, herewith, figures of some of the appendages of my specimen for comparison with future specimens. The species has six segments in the urosome, and thus belongs to the genus *Tanais* in the wider sense, and not in the restricted sense as used by Sars. The specimen still retains traces of an extensive development of pigment, giving a mottled or marmorate appearance to the animal.

ORDER ISOPODA.

SUB-ORDER ASELLOTA.

FAMILY PARASELLIDAE.

GROUP JANIRINI.

Hansen, 1916, in his account of the Isopoda of the Ingolf Expedition, has expressed the opinion that several genera closely allied to *Janira* have been founded on insufficient grounds. Among these genera, *Iolella*, Richardson (= *Ianthe*, Bovallius, and *Tole*, Ortmann), is definitely relegated by Hansen to the synonymy of *Janira*, and he at least implies that *Ianthopsis* and *Iolanthe* should share a similar fate.

Vanhöffen, on the other hand, places *Iolella*, *Ianthopsis* and *Iolanthe*, with four other genera, in a separate family, the *Iolellidae*, which he briefly diagnoses as "*Janira*-like forms with a more or less distinctly prominent rostrum, with notched lappets drawn out at the sides of the somites, and with two or more side thorns on the abdomen." He suggests briefly a revision of the genera of this family. The name *Iolella* is applied to those species in which the abdomen is produced into two long and pointed lateral extremities with no clearly marked central portion, and *Ianthopsis* is retained for those species in which the lateral processes of the abdomen are pointed and separated from the distinct but broadly rounded median process by deep notches. These distinctions are very slight, and the case for the inclusion of both genera in the older genus *Janira* is strengthened by the fact that one species, *Ianthopsis libbeyi* (Ortmann), which Vanhöffen includes in the genus *Ianthopsis*, has been shown by Hansen to be a synonym of *Janira tricornis*, Kröyer. But Hansen has himself suggested a division of the genus *Janira* which is based on much more definite characters. He notes that the species of *Janira* taken by the "Ingolf" Expedition fall into three groups, as follows :—

"A. Epimeral plates developed at all thoracic segments. The plates are small, never produced into long acute processes, but bifid at two or three of the segments.

"B. Epimeral plates completely wanting.

"C. Epimeral plates developed at the three posterior segments but wanting at least at second and third segments."

These three divisions or groups of the genus *Janira* correspond to the genera *Janira* (A), *Ianthopsis* (B) and *Iolella* (C) of Vanhöffen. There can be no question that all the genera belong to the same family or group, and Hansen's classification is the most natural one yet proposed and the one I follow here. But I think there are sufficient grounds for the retention of the three divisions of the genus *Janira*, indicated by Hansen, as generic groups under the names *Janira*, *Ianthopsis* and *Iolella*.

Genus JANIRA, Leach.

4. *Janira longicauda*, Chilton. Pl. I, fig. 6.

J. longicauda, Chilton, 1884, p. 250, pl. XVIII, figs. 2*a*–6; Thomson and Chilton, 1886, p. 157; *Iathrippa longicauda*, Bovallius, 1886, p. 31–33; Hutton, 1904, p. 264.

Occurrence.—Station 96, 7 miles E. of North Cape, New Zealand, 70 fathoms, bottom fauna, one ovigerous female, 4·5 mm.

Remarks.—The uropods and second antennae are broken off in this specimen, but I have little doubt that it should be referred to Chilton's species. It is readily recognised by the well-marked rostrum, by the non-serrated margins of the terminal somite of the pleon, and by the clothing of scattered hairs on the dorsal surface of the body, especially laterally. Chilton does not mention this character in his description. In 1886, Bovallius instituted the genus *Iathrippa* for this species, separating it from *Janira* on the grounds that the uropods are laminar whereas in *Janira* they are styliform. I cannot judge of the validity of this distinction, because in my specimen the uropods are missing. But the specimen otherwise seems to be a typical *Janira* in the restricted sense, and I here refer it to that genus.

Genus IANTHOPSIS, Beddard.

5. *Ianthopsis* sp. Pl. I, figs. 7–10.

Occurrence.—Station 331, off Cape Bird Peninsula, entrance to McMurdo Sound, 250 fathoms, bottom fauna, one male, 5·5 mm.

Remarks.—In the absence of the uropods and second antennae it is not possible to identify this species with certainty. It is, however, a true *Ianthopsis* as defined by Beddard, and is very closely allied to, if not identical with, *I. bovallii*, Studer, the type species of the genus. Studer, however, only figures a median series of tubercles on the body, but Beddard says there is a double row in specimens which he referred to this species. In my specimen there are three rows of tubercles, rather obscure and difficult to make out, and there is, in addition, an obscure tubercle on the lateral parts of the second to the seventh thoracic somites. Studer, moreover, figures a sharply pointed process on the front margin of the head, between the rostrum and the lateral process. This is not present in my specimen, though the anterior margin of the head is slightly produced at the place where this process is present in Studer's specimen. The latter, too, is almost twice as large as the present one. I give figures of the second thoracic limb and the male operculum of my specimen. The median lamella of the abdominal operculum of the male agrees closely with Beddard's figure of the same appendage in *I. bovallii.* The thoracic limbs are all bi-unguiculate and slender, and the flagellum of the first antennae is quite short and consists of only five joints.

Of the five species of this genus recorded by Vanhöffen from the Antarctic, the present specimen approaches most nearly to the small unnamed specimen figured by him (*loc. cit.*, p. 544, text-fig. 70). It differs from this form, and indeed from all Vanhöffen's species, in having distinct eyes, though they are almost colourless. Like Vanhöffen's specimen, the present one has the lateral parts of the head, thoracic somites and abdomen microscopically serrulated. The serrulations are not so coarse as Vanhöffen shows, but I think this is due to the difficulty of indicating such minute serrulations accurately rather than to any actual difference in the specimens. The lateral margins of the abdomen in both species are armed with five small spines. Vanhöffen's specimen measured only 2·5 mm. in length and was immature. I think it is quite possible that in so small a specimen the eyes have been overlooked, having regard to their almost colourless appearance. If this is so, I should have no hesitation in identifying my specimen with Vanhöffen's species.

Genus NOTASELLUS, Pfeffer.

6. *Notasellus sarsi*, Pfeffer.

N. sarsi, Pfeffer, 1887, p. 125, pl. VII, figs. 5-28; *N. australis*, Hodgson, 1902, p. 251, pl. XXXVI; Richardson, 1906 (2), p. 13; Richardson, 1908, p. 5; Hodgson, 1910, p. 49; Richardson, 1913, p. 17; *N. sarsi*, Vanhöffen, 1914, p. 532.

Occurrence.—Station 220, off Cape Adare, mouth of Robertson's Bay, 45–50 fathoms, bottom fauna, three females, 4·5 mm. Cumberland Bay, South Georgia, December, 1913, collected by P. Stammwitz, fifteen specimens.

Remarks.—In separating *N. australis* from *N. sarsi* Hodgson relied mainly on the length of the uropods in his specimens compared with that shown in Pfeffer's figure. Hodgson's specific diagnosis reads: "Uropoda biramous, longer than the urosome, which is approximately as long as broad and terminates in a small rounded lobe between them." Pfeffer's figure shows the uropods to be considerably shorter than the urosome, but the examination of the above specimens from the type locality reveals the fact that the uropods are much longer than shown by Pfeffer, are actually longer than the urosome, and are in fact very much as figured by Hodgson for *N. australis*. Pfeffer's figure undoubtedly conveys a wrong impression of the size of the uropods in this species; and Vanhöffen, who examined specimens from Kerguelen, suggests that the specimen from which the figure was taken had regenerated uropods, which would be shorter than the original ones. This suggestion is probably correct, and my observations on specimens from the type locality lend support to Vanhöffen's suspicions that the two suggested species are really one, since the size of the uropods was one of the main characters used for their separation. The second main point of difference, noted by Miss Richardson, relates to the length of the rostrum. In *N. sarsi*, according to Pfeffer, the rostral process is as long as the head, whereas in *N. australis* Richardson says it is only about half as long as the head. This difference disappears in the light of Vanhöffen's observations on specimens from Kerguelen, in which he found that small specimens agree with *N. australis* and large ones with

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N. sarsi. There seems, therefore, to be no valid character separating the two forms, and I have here regarded them as one species with a wide circumpolar Antarctic and sub-Antarctic distribution.

As to the genus *Notasellus*, Hodgson has already remarked that it is extremely near to *Janira*. Vanhöffen, however, points out that it differs from all the other genera of the Janirini except *Antias* in the form of the eyes, which are borne on lateral processes of the head instead of being situated on the dorsal surface of the head. For this reason he would retain the genus as distinct from *Janira*, and for the present I would follow that conclusion. Hansen is of opinion that several supposedly distinct genera allied to *Janira* should be suppressed as synonymous, but pending a complete revision of the genus and its allies it is more convenient to retain *Notasellus*, particularly as there is a species *Iolella* (*Ianthopsis*) *sarsi* which in Hansen's view should be called *Janira sarsi*, and confusion could only result if *Notasellus sarsi* were referred to the same genus.

Genus ECTIAS, Richardson.

7. *Ectias turqueti*, Richardson.

E. turqueti, Richardson, 1906 (2), p. 14, pl. I, fig. 5, text-figs. 14–19; Richardson, 1913, p. 18.

Occurrence.—Station 220, off Cape Adare, mouth of Robertson's Bay, 40–50 fathoms, bottom fauna, seven females, up to 7 mm. long.

Group MUNNINI.

Genus COULMANNIA, Hodgson.

8. *Coulmannia frigida*, Hodgson.

C. frigida, Hodgson, 1910, p. 54; Vanhöffen, 1914, p. 580, text-fig. 111.

Occurrence.—Station 356, off Granite Harbour, entrance to McMurdo Sound, 50 fathoms, bottom fauna, two specimens.

Genus MUNNA, Boeck.

9. *Munna maculata*, Beddard (?). Pl. I, figs. 11–14.

Munna maculata, Beddard, 1886 (1), p. 98; Beddard, 1886 (2), p. 25, pl. XI, fig. 14; Vanhöffen, 1914, p. 563, text-figs. 92*a*, 92*b*.

Occurrence.—King Edward Cove and Cumberland Bay, S. Georgia, December, 1913, collected by P. Stammwitz, three males and six females, 3 mm.

Remarks.—I am doubtful of the identity of these small Munnids. They have not the prominent pigment-spots as figured by Beddard from which the species derives its name, but they have a distribution of subdued pigment-spots more or less as figured by Vanhöffen. They were captured with *Haliacris antarctica*, Pfeffer, and at first I thought they represented immature specimens of the latter, but closer examination revealed a few small but constant differences. The body is more compac than in *H. antarctica,* and rather broader proportionally than in the latter. It is covered by a not very close pile of short hairs, whereas the body of *H. antarctica* is practically smooth. The pigment, as I have already remarked, is not so intensely developed or so well marked as in *H. antarctica,* but is much more subdued and diffuse, as Vanhöffen shows. The coxal plates of the first four free thoracic somites are rounded, those of the last three somites bluntly pointed. In this character they are sharply distinct from *H. antarctica,* in which all the coxae are acute. The antennae are long, and have a flagellum composed of fifty-six to sixty joints. The second thoracic limb of the female (pl. I, fig. 11) closely resembles that of *H. antarctica,* but that of the male (pl. I, fig. 14) is quite distinct, and there is not nearly so striking a sexual dimorphism as I have described for *H. antarctica,* unless, indeed, I have only seen immature males. Compared with the same limb in immature males of *H. antarctica* the second thoracic limb of *M. maculata* has the carpus shorter and broader, and the palmar edge evenly curved without any trace of the palmar tooth of the former species. The uropods (pl. I, fig. 12) are quite distinct, those of *H. antarctica* being short straight one-jointed appendages, whereas in *M. maculata* these appendages are strongly curved and hook-like with two or three subsidiary spinules. The median lamellae of the operculum of the males of both species are closely similar, as my drawings show (pl. I, fig. 13, pl. II, fig. 3). Finally, on the lateral margin of the abdomen of *H. antarctica,* about half-way down, there is a short transverse row of stout sensory hairs, forming quite a conspicuous lateral tuft. These hairs are absent in *M. maculata.*

From *M. maculata* as described by Vanhöffen, my specimens differ in the absence of dorso-lateral spinules on the abdomen, and in some minor details in the form of the second thoracic limb of the female. Vanhöffen says nothing about the uropods of his specimens.

Genus HALIACRIS, Pfeffer.

10. *Haliacris antarctica*, Pfeffer. Pl. I, figs. 15, 16; Pl. II, figs. 1–3.

H. antarctica, Pfeffer, 1887, p. 137.
(?) *H. australis,* Hodgson, 1902, p. 253, pl. XXXIV, fig. 1, and pl. XXXVII; Richardson, 1906, p. 16; 1908, p. 5.
(?) *H. antarctica,* Hodgson, 1910, p. 58; Richardson, 1913, p. 19.
Munna antarctica, Vanhöffen, 1914, p. 562, text-fig. 90*a* and *b*.

Occurrence.—Cumberland Bay and King Edward Cove, S. Georgia, December, 1913, collected by P. Stammwitz, one adult male, three sub-adult males, two adult females, and three juvenile specimens, 2–4 mm.

Station 220, off Cape Adare, mouth of Robertson's Bay, 45–50 fathoms, bottom fauna, two immature males, 2–5 mm.

Remarks.—I have no doubt whatever that the specimens from S. Georgia, which is the type locality, are referable to Pfeffer's species. Their examination has yielded very interesting results, for it is quite evident that fully adult male specimens have not before been met with. There is a very marked sexual dimorphism in the form of the second thoracic limb in this species. Pl. II, fig. 1, illustrates the second thoracic limb of an adult male, 4 mm. in length, from S. Georgia. The appendages are about twice as long as the body of the animal, and lie folded between the remaining thoracic appendages, against the ventral surface of the body, the "elbow" between the ischium and the merus reaching the posterior end of the body. They are altogether out of proportion to the rest of the animal, and give it a weird and grotesque appearance. In sub-adult males these appendages are not so long. Pl. I, fig. 16, represents those of a male 3·5 mm. long, but while these are of the same general form as in the fully grown male, the ischium and merus are very much shorter and the elbow does not extend much more than half-way along the body. I have no specimens of the first stage in the development of these appendages, from S. Georgia, but two specimens from "Terra Nova" Station 220, which I refer to this species, are immature males in this stage. Pl. I, fig. 15, illustrates the distal part of their second thoracic limbs. They agree, in general form, with those of the sub-adult male, even to the tooth on the palmar edge of the carpus, but are smaller, the ischium and carpus are not elongated but of normal size, and the whole limb is not any larger than that of the female. Chilton (1909) has described a very similarly marked sexual dimorphism in *Munna neo-zelanica*, Chilton, which he, therefore, refers to the genus *Haliacris*, in the light of Miss Richardson's observations (1906) on *H. antarctica*, in which she was the first to discover evidences of the marked sexual dimorphism of this species. Miss Richardson's figure of the second thoracic limb of the male of this species, judging from my own observations, is taken from a sub-adult male. It differs from my figure of the same stage in having the merus longer than the ischium, whereas in my specimens of all stages the ischium is longer than the merus. It is possible, therefore, that Miss Richardson had under observation a closely allied Antarctic species, and this has led me to doubt whether all the recent records of *H. antarctica* from Antarctic waters really refer to this species, or whether, after all, *H. australis*, Hodgson, is a distinct species, more markedly polar in its range, to which the records of recent writers under the names *H. antarctica* and *H. australis* really refer. The matter cannot be cleared up until fully adult males from Antarctic waters are available.

The discovery of so marked a form of sexual dimorphism in this species naturally raises the question how far such a dimorphism is in reality developed in the genus *Munna* and its allies, and how many new species of the latter genus have been established on immature specimens. The genera *Munna* and *Haliacris* are undoubtedly very closely related. Pfeffer, who had no adult males at his disposal, gave no satisfactory characters for the separation of the genus from *Munna*; Hodgson, in describing *Haliacris australis*, suggested that the genus was synonymous with *Munna*; and Chilton, in spite of the marked sexual dimorphism of his species *Munna neo-*

zelanica, which he reluctantly refers to *Haliacris*, is inclined to share Hodgson's opinion. Miss Richardson (1913), however, suggests that the genera *Munna* and *Haliacris* should be kept separate, on the ground of the sexual differences in the second thoracic limbs. The genus *Munna* is well known from Northern waters, but no such form of sexual dimorphism is known in Northern species. Much, however, still remains to be done among the Southern species. Most of them have been described from one or two specimens, and the occurrence of marked sexual dimorphism may in reality be much more widely spread than appears at present. The facts emphasise the importance of having a full range of specimens before describing new forms. For the present I accept Miss Richardson's suggestion to keep *Munna* and *Haliacris* distinct, the latter, so far as present knowledge goes, including only two species, *H. antarctica*, Pfeffer, and *H. neo-zelanica*, Chilton, with possibly a third in *H. australis*, Hodgson.

Sub-order FLABELLIFERA.

Family CYMOTHOIDAE.

Sub-family CIROLANINAE.

Genus CIROLANA, Leach.

11. *Cirolana intermedia*, Vanhöffen.

C. intermedia, Vanhöffen, 1914, p. 500, text-fig. 37.

Occurrence.—Station 316, off Glacier Tongue, about 8 miles N. of Hut Point, McMurdo Sound, 190–250 fathoms, bottom fauna, one male, 25 mm.

Remarks.—In his report on the Isopoda of the German South Polar Expedition, Vanhöffen (1914) described four species of giant *Cirolana* which had been found in great abundance at the winter quarters of the "Gauss." Two of these species are represented in the "Terra Nova" collection by one and two specimens respectively. Fortunately all three specimens are males, and by the aid of Vanhöffen's figures can be referred easily and without doubt to their correct species. *C. intermedia* may be distinguished from the following species, *C. obtusata*, by its smaller eye with pale pigment, its relatively longer antenna (which in the single specimen measured 11 mm.), by the long penial filaments on the sternum of the last thoracic somite in the male, and by the strongly curved appendix masculina on the second pleopod of the male. Both species belong to Hansen's "Sectio prima" of the genus *Cirolana*, and have the epistome (labrum and frontal lamina and clypeus) of the same form as *C. borealis* and *C. hirtipes*.

12. *Cirolana obtusata*, Vanhöffen.

C. obtusata, Vanhöffen, 1914, p. 496, text-fig. 34.

Occurrence.—Station 194, off Oates Land, 69° 43′ S., 163° 24′ E., 180–200 fathoms, bottom fauna, two males, 25 and 28 mm.

Remarks.—Compared with *C. intermedia* this species has larger eyes with black pigment, relatively shorter antennae, measuring in these specimens 8 mm. as compared with 11 mm. in *C. intermedia* of the same size, very short and blunt penial filaments, and an appendix masculina on the second pleopods of the male, which is not very much curved and has an obtuse or club-shaped apex.

13. *Cirolana pellucida,* n. sp. Pl. II, figs. 4–10.

Occurrence.—Stations 86, 129 and 130 (types), off Three Kings Islands, plankton, from the surface and 3 metres, about two hundred specimens.

Station 133, Spirits Bay, near North Cape, New Zealand, plankton, at 20 metres, one specimen.

Description.—Body robust in general form and considerably vaulted ; integument soft and only very slightly calcareous, semi-transparent and without pigment or chromatophores.

Eyes a beautiful golden brown colour in specimens preserved in formaline ; in spirit the colour disappears and the eyes appear colourless ; seen from the side, slightly longer than deep, with the upper margin practically straight.

Frontal plate about four times as long as broad, its front end not visible from above ; clypeus without anterior process ; the whole form and structure of the frontal plate, clypeus and labrum is very similar to that of *C. borealis* and the other species belonging to Hansen's "Sectio prima" of the genus.

Antennules (pl. II, fig. 5) shorter than the peduncle of the antennae, robust; flagellum composed of ten to twelve short joints furnished with numerous sensory hairs.

Antennae (pl. II, fig. 6) reaching just beyond the posterior margin of the second free thoracic somite ; second joint of the peduncle very short, third joint longer than fourth, fifth one and three-quarters the length of the fourth ; flagellum composed of 22–24 joints.

Coxal plates of the thoracic somites shaped and furrowed almost exactly as in *C. neglecta,* Hansen ; seventh coxal plate shorter than the sixth, with its oblique furrow extending to the posterior margin.

Last thoracic legs (pl. II, fig. 8) with the second joint flattened and expanded, about twice as long as broad, with a conspicuous ridge on its lower side ; the outer lateral margin and the distal portion of the inner margin closely set with long plumose setae ; the proximal portion of the inner margin with a few short simple setae ; the longitudinal ridge on the lower side furnished with setae, which are shorter than on the outer margin and not so closely set nor so numerous as in *C. neglecta,* to which this species is most closely allied ; fourth joint shorter than the fifth and much shorter than the sixth.

Last abdominal somite (pl. II, fig. 9) triangular, wider than long, its apex very obtuse and evenly rounded, not angular ; armed with six pairs of spinules on the distal third of its margins.

Uropods (pl. II, fig. 9) reaching to about the level of the apex of the last abdominal somite; inner ramus not twice as long as broad, with about nine spinules on its margins; outer ramus nearly three times as long as broad, with three spinules on its inner margin and five or six on its outer margin.

Appendix masculina on the second pleopods of the male (pl. II, fig. 10) equal in length to the rami, slightly curved and pointed in shape.

Length of an adult female, 10 mm.; of an adult male, slightly smaller. There are no conspicuous sexual differences.

Remarks.—Of the described species of the genus *Cirolana*, this species is most closely allied to *C. neglecta*, Hansen. It agrees with this species in most of its characters, and especially in the colour of the eyes, the form of the epimera and the shape of the frontal plate and clypeus. The two species may be separated by the difference in the shape of the eyes and of the last abdominal segment, and by the difference in the second joint of the last four thoracic legs. In *C. neglecta* the eyes are shorter than deep, viewed laterally, and have the upper margin strongly convex. In *C. pellucida* the eyes, viewed laterally, are somewhat longer than deep, with the upper margin straight. In *C. pellucida* the setae on the longitudinal ridge of the lower side of the second joint of the last four thoracic legs are shorter and not so numerous nor so closely set as in *C. neglecta*. I have not seen the latter species, but nothing is mentioned in existing descriptions about the soft, semi-transparent character of the integument, which is such a feature of *C. pellucida*. It gives the animal the appearance of a deep-sea species. Both *C. neglecta* and *C. pellucida* are pelagic species, and are undoubtedly very closely related.

14. *Cirolana canaliculata*, n. sp. Pl. III, figs. 1–8.

Occurrence.—Station 134, Spirits Bay, near North Cape, New Zealand, 11–20 fathoms, bottom fauna, twenty specimens (types).

Station 135, same place, plankton, from 3 metres, three specimens.

Description.—This species belongs to Hansen's "Sectio secunda" of the genus, and is most closely allied to *C. sulcata*, Hansen.

Body about three times as long as broad, microscopically scaled, without tubercles or spines. Head without rostrum, but with a distinct rim marked off by a sub-marginal furrow round the anterior end. Eyes rather small, pigment black, seen from the side longer than deep, with the upper margin convex, the whole eye partly covered by the coxae of the first free thoracic somite.

First free thoracic somite larger than any of the others; the second the shortest; third, fourth and fifth successively longer; sixth longer than seventh. The first five free thoracic somites with a single distinctly impressed line or furrow running right across the segment, rather nearer to the posterior margin than to the anterior; the sixth and seventh free thoracic somites with two such impressed lines. The coxae of the thoracic somites increase gradually in size backwards; each has a deep oblique furrow besides the sub-marginal one.

Telson (pl. III, fig. 8) broadly triangular, wider than long, with bluntly rounded apex armed with six spines and numerous short plumose setae. The dorsal surface has a median, shallow, longitudinal groove or sulcus, narrowing anteriorly.

Frontal plate (pl. III, fig. 7) small, pentagonal, about one and a half times as long as broad, its front end acute and not visible from above. Clypeus without anterior process, its surface slightly convex, with a furrow along each lateral margin.

Antennules (pl. III, fig. 2) about as long as the head; flagellum with about six joints.

Antennae (pl. III, fig. 3) reaching almost to the posterior margin of the third free thoracic somite; flagellum with about fourteen joints.

Second thoracic legs (pl. III, fig. 4) with the third and fourth joints produced; third joint with one, and fourth joint with five blunt spines on the inner margin. Third and fourth thoracic limbs with the third and fourth joints produced at their outer distal corners.

The remaining thoracic limbs slender, without natatory setae; last pair (pl. III, fig. 5) with the second joint not expanded, nearly three times as long as broad; fourth joint a little shorter than the fifth, which is somewhat shorter than the sixth.

Male stylet on the second pleopod (pl. III, fig. 6) longer than the rami, slightly curved, but not nearly so acutely pointed as in some other species belonging to this section of the genus.

Uropods (pl. III, fig. 8) with the endopods nearly twice as long as broad, extending some way beyond the apex of the telson, inner margin with three spines, outer margin with four spines, apex sub-bifid with a tuft of long setae, longer than the other setae fringing the margins; exopods shorter than the endopods, three times as long as broad, inner margin with two spines, outer with four, apex bifid with a tuft of long setae.

Length of the largest female, 9 mm.; of the largest male, 5·5 mm.

Of all the species of *Cirolana* belonging to the second section of the genus, this species approaches most closely to *C. sulcata*, Hansen. It differs, however, in the absence of tubercles on the somites of the abdomen, and in the shorter and broader form of the telson. The impressed lines on the somites of the thorax are also distinguishing characters, and I cannot find a similar arrangement figured in any other species. Hansen shows a single line across the dorsal surface of the last four thoracic somites of *C. sulcata*, and that is the nearest approach I can find to the condition I have represented in the present species.

15. *Cirolana japonica*, Hansen. Pl. II, figs. 11–16.

C. japonica, Hansen, 1890, p. 349, pl. IV, figs. 2–21.

Occurrence.—Stations 77, 89, 92, 107, 109, 110, 111, 122, 128, 129, 130, 139, 141 and 142, in the neighbourhood of Three Kings Island, between 34° 4′–34° 58′ S., 170° 45′ E.–172° 18′ E., plankton at the surface and down to 3 metres, about four hundred specimens.

Remarks.—I am unable to find any differences of specific importance between these specimens and the description of *Cirolana japonica* by Hansen. The legs appear to be somewhat stouter in general build, but the antennae, antennules, clypeus, coxae and last abdominal somite agree very closely with Hansen's figures. The body and appendages appear to be microscopically scaled, and under a moderately high power of the microscope a regular arrangement of hexagonal markings can be detected. The species does not appear to have been met with since Hansen described his single specimen. Hansen regarded it as a pelagic species, and the present specimens have the same habit. It is not unlike the species described and figured by Filhol under the name of *C. cooki*, but Filhol speaks of special hairs on the internal face of the basal joint of the last four pairs of thoracic legs. There are no such hairs on *C. japonica*, but they are characteristic of the group of species of the genus to which *C. borealis* belongs, and to which, I presume, Filhol's species must be referred.

16. *Eurydice subtruncata*, n. sp. Pl. III, figs. 9–17.

Occurrence.—Stations 84, 85, 86, 89 (types), 92, 93, 106, 107, 109, 110, 111, 118, 120, 122, 126, 127, 128, 129, 130, 139 and 141, in the neighbourhood of Three Kings Islands, between 35° 4′–34° 38′ S., 171° 19′–172° 20′ E., plankton at the surface and down to 3 metres, about nine hundred specimens.

Stations 133, 135 and 136, Spirits Bay, near North Cape, New Zealand, plankton at the surface, about fifty specimens.

Description.—General form in the female robust and dorsally much vaulted, body about two and a half times as long as broad; in the male, general form much more slender and less vaulted, and the body about three and a half times as long as broad. Whole surface of the body and appendages microscopically scaled.

Eyes large, with pigment intense black; there seems to be considerable variation in the size of the eyes, which variation is not sexual; I have found specimens which otherwise do not differ from one another, in some of which the eyes are much larger than in the others, and consequently appear closer together.

Clypeus (pl. III, fig. 16) and labrum of the type found in *E. truncata* (Norman), the process of the clypeus, seen from below, covering only a small portion of the space between the mandibular palps.

Antennulae (pl. III, figs. 9, 10) exhibiting no marked differences between the sexes, reaching the antero-lateral angle of the first free thoracic somite; peduncle with the third joint sub-equal to the second; flagellum slender, with the first joint considerably longer than the remaining four and furnished with long sensory hairs, second joint longer than the third or fourth, terminal joint minute and furnished with a few setæ, one of which is moderately robust and as long as the whole flagellum.

Antennae in the male about three-fourths of the total length of the body, reaching the second abdominal somite; in the female slightly shorter, only three-fifths of the total length, and extending barely beyond the penultimate thoracic somite; third joint of the peduncle (pl. III, fig. 11) approximately half as long as the fourth; flagellum of 22–24 joints terminated by a long robust seta.

Coxal plates of the second, third and fourth free thoracic somites not produced at all; those of the fifth, sixth and seventh produced into distinct processes; those of the sixth segment much longer than those of the fifth or seventh somites. The coxal plates are almost exactly similar to those of *E. truncata*, Norman.

Eighth thoracic legs (pl. III, fig. 13) moderately robust; fourth joint only very slightly longer than broad, shorter than the fifth joint; fourth, fifth and sixth joints with two or three groups of spines on both the upper and lower margins, mingled with long setae.

Last abdominal somite (pl. III, fig. 17) with the posterior margin about one-third as long as the breadth of the somite, almost straight and finely serrate, without movable spines, at each end furnished with a prominent tooth, outside which is a smaller tooth; some of the serrations between the external prominent teeth larger than the rest, the margin furnished with small setae between the serrations.

Rami of the uropods (pl. III, fig. 15) each furnished at their outer distal angles with two or three conspicuous spines among the long plumose setae fringing their margins.

Appendix masculina on the second pleopod of the male (pl. III, fig. 14) longer than the rami; its apex abruptly narrowed and almost spiniform.

The colour of preserved specimens indicates that in life the species is mottled or marbled brown, with a profuse system of black chromatophores.

Length of an adult male, 5 mm.; of an adult female, 7 mm.

Remarks.—This new species is very closely allied to *Eurydice truncata*, Norman, a pelagic species of similar habits known from the Atlantic Ocean and the Mediterranean. The main differences are to be found in the length of the antennules and antennae, in the absence of marked sexual differences in the antennules, in the robuster and rather more spiny nature of the posterior thoracic legs, and in the shape of the appendix masculina of the second pleopods of the male. In such fundamental structures as the clypeus, the form and shape of the coxae of the thoracic segments, and the shape and armature of the last abdominal segment, the species are hardly distinguishable. It should be remarked that Stebbing (1910) has recorded *E. truncata* from the Indian Ocean, near the Seychelles, thus indicating a much extended geographical distribution. The present form is so close to *E. truncata* that it may perhaps be more properly regarded as a local race.

Sub-family AEGINAE.

Genus AEGA, Leach.

17. *Aega antarctica*, Hodgson.

Aega australis, Richardson, 1906 (2), p. 4, text-figs. 8–11.
A. antarctica, Hodgson, 1910, p. 17, pl. II; Richardson, 1913, p. 4.
Non *A. australis*, Whitelegge.

Occurrence.—Station 294, Ross Sea, 74° 25′ S., 179° 3′ E., 158 fathoms, bottom fauna, two specimens, 10 and 24 mm.

Station 331, off Cape Bird Peninsula, entrance to McMurdo Sound, 250 fathoms, bottom fauna, five specimens, 9–19 mm.

Station 338, 77° 13′ S., 164° 18′ E., 207 fathoms, bottom fauna, one ovigerous female, 18 mm.

Station 339, 77° 5′ S., 164° 17′ E., 140 fathoms, bottom fauna, eleven specimens, 15–24 mm.

Station 349, off Butter Point, western shore of McMurdo Sound, 80 fathoms, bottom fauna, one female, 22 mm.

Station 356, off Granite Harbour, entrance to McMurdo Sound, 50 fathoms, bottom fauna, seven specimens, 18–27 mm.

2.3.1911, washed up on the beach at North Bay, one specimen, 23 mm.

Remarks.—This species is closely allied to the new species described below, but is distinguished by its smaller eyes, and by the armature of the anterior thoracic limbs, as well as by its relatively smaller size. I have examined the "Discovery" specimens named by Hodgson and find that they all belong to the small-eyed form. Richardson's species is, I think, the same as Hodgson's. It agrees with the latter in the armature of the thoracic limbs, and the eyes are certainly smaller than in the new species I describe below.

18. *Aega glacialis*, sp. nov. Pl. IV, figs. 1–10.

Occurrence.—Station 194, off Oates Land, 69° 43′ S., 163° 24′ E., 180–200 fathoms, bottom fauna, one male, 27 mm., and one female, 34 mm.

Station 314, 5 miles north of Inaccessible Island, McMurdo Sound, 222–241 fathoms, bottom fauna, three specimens, 16–25 mm.

Station 316, off Glacier Tongue, about 8 miles north of Hut Point, McMurdo Sound, 190–250 fathoms, three ovigerous females, 34–37 mm.; nine other specimens, 14–25 mm. (types).

Station 339, 77° 5′ S., 164° 17′ E., 140 fathoms, bottom fauna, one female, 30 mm.

Station 355, 77° 46′ S., 166° 8′ E., 300 fathoms, bottom fauna, three specimens, 17–29 mm.

Description.—This new species is so closely related to *A. antarctica*, Hodgson, that it is perhaps most easily described by pointing out the differences between the two.

A. glacialis differs from *A. antarctica*:—

(1) In the size of the eyes. Pl. IV, figs. 1, 2, 3.

In the type specimen, measuring 37 mm. in length, the head measures 7 mm. in a straight line across its widest part. The eyes measure 2·5 mm. along their longer axes, and the distance between the eyes is less than the length of the longest axis of each eye. The eyes are of elongate pyriform shape, the longer axis running transversely across the head towards the centre with the narrower end of the eye nearer the centre. The pigment is somewhat paler than in *A. antarctica.*

In a specimen of *A. antarctica*, 25 mm. in length, the head measures 6 mm. in greatest width, the longest axis of the eye measures 1·25 mm., and the distance between the eyes is 3·5 mm., or more than double the length of the longest axis of the eye. The eye is of a much shorter pyriform shape than in *A. glacialis*, as if the elongate narrower end of the eye in the latter had become obsolete, while the pigment is much blacker.

(2) In the armature of the anterior thoracic limbs.

In *A. antarctica*, according to Hodgson, and the specimens in the present collection bear out his description, the propodus of the second to fourth thoracic limbs is armed with three blunt spines on the inner margin, one at either end and one intermediate, while the carpus has three such blunt spines.

In *A. glacialis* both propodus and carpus of the second to fourth thoracic limbs have only one spine each, at the distal end of the inner margin (pl. IV, fig. 8).

(3) In size.

The largest *A. antarctica* recorded hitherto measures 28 mm. *A. glacialis* reaches 38 mm. in length.

For the rest, the body in *A. glacialis* is rather more than twice as long as broad, perfectly smooth and without hairs. The telson is rather less in length than one-quarter of the entire animal, and one and a quarter times as broad, at its widest part, as long. There is a well-developed keel in the mid-dorsal line, and the margins are produced into a short acute apex, minutely crenulated distally, with short setae between the crenulations. The uropods are slightly longer than the telson, both with rather acute apices, their margins crenulate and armed with short setae.

The peduncle of the antennule (pl. IV, fig. 5) is as long as the head, and has the third joint considerably longer than the first two combined. The flagellum has about twenty joints.

The antenna (pl. IV, fig. 6) reaches the posterior end of the third free thoracic somite. The fourth joint of the peduncle is level with the end of the peduncle of the first antenna. The fourth and fifth joints are sub-equal in length and longer than any of the first three. The flagellum has about twenty-five joints, the distal joints about double the length of the proximal ones.

The appendix masculina on the second pleopods of the male (pl. IV, fig. 10) is longer than the rami of the pleopods, its distal half very acutely pointed in the form of a stylet.

19. *Aega novi-zealandiae*, Dana. Pl. IV, figs. 11–14.

A. novi-zealandiae, Dana, 1852, p. 767, pl. LI, figs. 2*a–c*; Miers, 1876, p. 108; Thomson and Chilton, 1886, p. 153; Hutton, 1904, p. 262; Thomson, 1913, p. 246.

Occurrence.—Station 96, 7 miles E. of North Cape, New Zealand, 70 fathoms, bottom fauna, one ovigerous female, 13·5 mm.

Remarks.—Dana's original description is short and inadequate, and though the species has since been recorded by Thomson and Chilton, no more complete description has been published. It is therefore with considerable doubt that I refer the present single specimen to Dana's species. There is nothing in Dana's description and figures to suggest the possibility of my specimen belonging to another species. In the hope that the species may be recognised and more fully described in the future, I add a few notes. The body is absolutely smooth, without carinae, ridges or tubercles of any kind, and is covered on the dorsal surface by a regular series of minute red flecks or chromatophores. These microscopical dots of pigment have persisted extraordinarily well in the spirit specimen.

The specimen is to be placed in Section 2A of Schioedte and Meinert's Synopsis of the Species of *Aega* (1879, p. 339), and, having the eyes distant, it comes nearest to the two Northern species, *A. arctica*, Lütken, and *A. ventrosa*, M. Sars.

The head is furnished with a small rostrum, which curves over ventrally to meet the frontal lamina, and thus separates the bases of the antennules.

The eyes are of moderate size, black in colour, separated from each other by a distance almost equal to the length of each eye.

The frontal lamina and clypeus are almost identical with those figured by Schioedte and Meinert for *A. ventrosa* (1879, tab. IX, fig. 8), and it is sufficient to refer to this figure for their general structure.

The antennules reach the posterior margin of the first free thoracic somite. The peduncle is slightly shorter than the head, and equal to the first four joints of the peduncle of the second antenna. The third joint of the peduncle is about equal to or slightly longer than the first two combined, and the flagellum is composed of thirteen joints.

The antennae reach the posterior margin of the third free thoracic somite, and the flagellum is composed of eighteen joints.

The second thoracic limbs (pl. IV, fig. 12) have one spine on the fourth joint, one on the fifth, and two on the sixth.

The telson (pl. IV, fig. 14) is broadly triangular, with the apex rounded. The distal half of the margins is serrate, the serrations at first regular but becoming uneven towards the apex, and there is a fringe of small plumose setae between the serrations. The uropods are about as long as the telson. Both rami have margins coarsely serrate or toothed, and in my figure I have indicated the spinules which still remain in my specimen.

In comparing my specimen with Dana's description and figures the following differences may be noted :—

(1) The first free thoracic somite in my specimen, while longer than the succeeding ones, is not so disproportionately long as Dana shows.

(2) The eyes are larger in my specimen, and the distance between them correspondingly smaller than Dana's figure illustrates.

(3) The flagellum of the antennules is nine-jointed according to Dana, and thirteen-jointed in my specimen.

(4) The antennae in my specimen have the last joint of the peduncle rather longer and narrower than Dana figures it, while the flagellum has sixteen to eighteen joints as against twenty-two given by Dana.

(5) Dana's description and figures of the telson in his species suggest that it is longer and more truncate than in my specimen. He gives no detail of the armature of either telson or uropods.

The general resemblance between my specimen and Dana's description is sufficiently close to warrant its being referred to Dana's species, at any rate until more material is forthcoming.

Sub-family CYMOTHOINAE.

Genus CERATOTHOA, Dana.

20. *Ceratothoa impressa* (Say).

Glossobius linearis, Schioedte and Meinert, 1881–83, p. 301, tab. XII, figs. 1,2.
Ceratothoa impressa, Richardson, 1905, p. 234, text-figs. 236–240 (with full synonymy).

Occurrence.—12.5.1913, from the branchial chamber of a flying fish, *Exocoetus*, which flew on board the "Terra Nova"; one female, 38 mm., one male, 11 mm. From the list of stations, it would appear that on this date the "Terra Nova" was in about 5° S., 27° 15′ W., in the Tropical Atlantic.

21. *Larval Cymothoid*, gen. et sp. (?).

Occurrence.—Station 133, Spirits Bay, near North Cape, New Zealand, plankton, one specimen.

Remarks.—It is not possible to name this larva, but it seems to belong to this sub-family, and indeed probably to the genus *Ceratothoa* or its relative, *Meinertia*. It is in the second stage of larval development, and the dactylus of the three anterior pairs of limbs is armed with five teeth. Four species of the genus *Meinertia* are known from New Zealand waters, and it is probably to one of these that this larva should be referred.

Family SPHAEROMIDAE.

Sub-family LIMNORIINAE.

Genus LIMNORIA, Leach.

22. *Limnoria antarctica*, Pfeffer.

L. antarctica, Pfeffer, 1887, p. 96, pl. II, figs. 12, 13, pl. V, figs. 2–22; Stebbing, 1904, p. 714; Calman, 1910, p. 185; Richardson, 1913, p. 8; Chilton, 1914, p. 382, pl. XVII, fig. 8; Chilton, 1914, p. 448.

Occurrence.—Cumberland Bay, S. Georgia, December, 1913, collected by P. Stammwitz, one.

Sub-family PLAKARTHRIINAE.

Genus PLAKARTHRIUM, Chilton.

23. *Plakarthrium typicum*, Chilton.

P. typicum, Chilton, 1883, p. 74, pl. I, figs. 5–5*k*; Thomson and Chilton, 1886, p. 159; Hutton, 1904, p. 263; Hansen, 1905 (1), p. 115.

Occurrence.—Station 135, Spirits Bay, near North Cape, New Zealand, plankton, one male.

Remarks.—The specimen measures 4 mm. in length, and agrees very closely with Chilton's description. As Hansen notes, the species is very closely allied to *P. punctatissimum*, Pfeffer; but I have been able to examine a specimen of the latter species in the collections at the British Museum identified by Prof. Chilton from collections made by Dr. W. S. Bruce at the South Orkneys, and I am convinced that the two species, though very closely related, are distinct, and readily separable by one important character. This is the form of the thoracic legs, and a comparison of the original descriptions of both species brings out the fact that both Pfeffer and Chilton have accurately described the thoracic legs in their respective species. Pfeffer states that in *P. punctatissimum* "Die Beine sind nach zwei ganz verschiedenen Typen gebildet. Das 1, 2 und 7 Paar sind schlank, haben lange Femora und 2 Endklauen; die übrigen sind kürzere und feste Klammerfüsse mit ganz kurzen Femur und einfacher, grosser Endklaue." Chilton's original description of *P. typicum* reads: "First two pairs of legs slender, three following pairs short and stout, last two pairs slender, similar to the first two, all ending in strong curved claws." That is to say, using the terminology now in vogue for the appendages of Crustacea, that in *P. typicum* the second, third, seventh and eighth thoracic limbs are similar in general form, and form a sharp contrast with the fourth, fifth and sixth, while in *P. punctatissimum* the second, third and eighth are similar, and in contrast with the fourth, fifth, sixth and seventh. The specimens of both species which I have examined bear out these descriptions, and the form of the seventh pair of thoracic limbs forms a valid and sharp specific character.

P. typicum, Chilton, has so far only been recorded from Lyttelton Harbour, and that only once, when discovered by Chilton in 1883.

Sub-family SPHAEROMINAE.

A. SPHAEROMINAE HEMIBRANCHIATAE.

Genus EXOSPHAEROMA, Stebbing, 1900.

24. *Exosphaeroma gigas* (Leach).

E. gigas, Stebbing, 1900, p. 553, pl. XXXIX; Hansen, 1905 (1), p. 118.

Occurrence.—Stations 133, 135 and 136, Spirits Bay, near North Cape, New Zealand, four, quite juvenile.

Remarks.—These specimens are quite small and immature, and are, with doubt, referred to this common New Zealand species.

25. *Exosphaeroma falcatum*, sp. nov. Pl. V, figs. 1–8.

Occurrence.—Station 133, Spirits Bay, near North Cape, New Zealand, plankton, two males and one female (types).

Description.—A hemi-branchiate Sphaeromid, with the body smooth, without granules or tubercles, but presenting a minutely honeycombed appearance dorsally under the microscope. Head with a distinct though small rostral projection, with a distinct excavation at each side of its base, into which the antennules fit and are just visible from dorsal view. Below the rostral process and in front of it projects the large epistome, very prominent in dorsal view. The epistome is figured in pl. V, fig. 8, and in side view is distinctly dorsally recurved, giving a very pug-nosed appearance to the animal. Coxal plates almost hidden in dorsal view, and strongly curved on to the ventral surface. Telson broadly triangular in shape and strongly convex, without tubercles or granules, apex bluntly and rather broadly rounded. Uropods in the male (pl. V, fig. 1) almost reaching the apex of the telson, inner ramus narrowly ovate and bluntly pointed, outer ramus very narrow, curved slightly outwards and sharply pointed; uropods in the female (pl. V, fig. 2) exactly as in the male except for the outer ramus, which is strongly hooked at the outer distal extremity.

Antennule (pl. V, fig. 3) very slightly longer than the head; first joint of the peduncle stouter and longer than the other joints, about twice as long as wide; second joint shorter than the third, latter not much more than half as long as the first; flagellum shorter than the peduncle, seven-jointed.

Antenna (pl. V, fig. 4) longer than the antennule, but not quite reaching the posterior end of the first somite of the thorax; flagellum a little longer than the peduncle, thirteen-jointed.

Second to the eighth thoracic limbs (pl. V, figs. 5–6) long and slender, progressively increasing in length from the second to the seventh pair, mainly by the increase in length of the meral and especially of the carpal joints; in the second limbs, the carpus is quite small and the merus hardly longer than wide, while in the eighth pair the carpus is not much shorter than the propodus and equal to the merus; the limbs have a varying armature of long setae, especially from the outer distal corner of the meral joints, and the inner margin of the merus and carpus of the posterior limbs has a dense fringe of short setae.

Male stylet on the second pleopod of the male (pl. V, fig. 7) rather more than twice as long as the rami, rather sharply curved towards the finely pointed apex.

Length of male and female types, 2·5 mm. Across the head and first somite of the thorax, and also across the last somite of the thorax and anterior somite of the abdomen, are two bands of dark purple pigment.

This small species may be distinguished by the smooth body, the shape of the outer ramus of the uropods in both sexes, and the long dorsally recurved epistome, giving a snub-nosed effect in lateral view.

Genus ISOCLADUS, Miers, 1876.

26. *Isocladus armatus* (Milne-Edw.). Pl. V, figs. 9–17.

Sphaeroma armata, M.-Edw., 1840, p. 210; Dana, 1852, p. 780, pl. LII, fig. 7.
Isocladus armatus, Miers, 1876 (1), p. 229; Miers, 1876 (2), p. 112; Thomson and Chilton, 1886, p. 155; Hansen, 1905 (1), p. 118; Thomson, 1913, p. 246.
Sphaeroma spinigera, Dana, 1852, p. 780, pl. LII, fig. 8.
Isocladus spiniger, Miers, 1876 (1), p. 229; Miers, 1876 (2), p. 113, pl. III, fig. 4; Thomson and Chilton, 1886, p. 155; Hansen, 1905 (1), p. 118; Thomson, 1913, p. 246.

Occurrence.—Sandy pool between tide marks at Motorua, Bay of Islands, New Zealand, sixteen males and nine females.

Remarks.—I have figured (pl. V, figs. 9–11) the adult male, adult female and young male of this species, to show the sexual differences and the changes in the growth of the young male to fully adult size, and to support my contention that *I. armatus* and *I. spiniger* are really different sexes and growth-stages of the one species, which I regard as the *Sphaeroma armata* of Milne-Edwards.

Milne-Edwards' original description says nothing about the length of the process from the seventh thoracic somite. He merely stated, " Septième segment du thorax surmonté d'une dent conique médiane dirigée en arrière."

Dana, in 1853, described two species from the Bay of Islands, one of which he referred to *S. armata*, M.–Ed., with "seventh thoracic segment having a tooth behind, the tooth sometimes obsolescent" ; and the other, which he describes as a new species, *S. spinigera*, having the " tooth of the seventh thoracic segment elongate, spiniform, longer than half the abdomen." Dana also states that in his *S. armata* the caudal lamellae do not quite reach the apex of the telson, whereas in *S. spinigera* they extend beyond it. I am of the opinion that Dana's *S. armata*, with the seventh thoracic somite having a tooth behind, is the young male, and those specimens with the tooth obsolescent adult females ; and his *S. spinigera*, with the elongate spiniform tooth on the seventh thoracic somite, the fully adult male of the same species, which I regard as the same as Milne-Edwards' species.

Miers founded the genus *Isocladus* on a number of specimens which included both females and adult males, and which he referred to Dana's *S. spinigera* (?). He had not seen any specimens which he could refer to *S. armata*, M.-Ed., and if any young males occurred among the specimens which he examined he probably regarded them as merely growth stages of *I. spinigera*, without considering whether they agreed with Milne-Edwards' description of *S. armata*.

There seems to be some confusion as to the identity of this species in the minds of the New Zealand zoologists who have collected specimens. Thomson and Chilton (1883) record *I. armatus* from the Bay of Islands on the authority of Thomson, and *I. spiniger* from Lyttelton on the authority of Chilton ; Thomson adding a note to the latter record, " I do not think I know this form."

Thomson (1913) records both species from Otago Harbour, but seems doubtful of his record of *I. spiniger*, since he adds, " Several specimens collected near Dunedin appear to belong to this species."

The figures here given will show the general form of the body in the adult and young male and in the adult female. The body is strongly convex, and capable of being rolled up into a ball. It is smooth and without tubercles of any kind. The last segment of the abdomen is strongly convex in the centre, with a flatter marginal portion. There is a median shallow groove or depression in the central convex portion, which gives the impression that the latter is made up of two obscure bosses. The spiniform process from the seventh thoracic somite of the male reaches backward nearly to the apex of the telson. In the young male it appears as a short tooth, and is absent in the female.

The uropods in the adult male extend slightly beyond the apex of the telson ; inner ramus broad and ovate, with a truncate tip ; outer ramus scythe-like, curving slightly outwards ; apex pointed. In the female the uropods are smaller than in the male, and do not reach the apex of the telson, but are otherwise of the same general type. In the young male the uropods just reach the apex of the telson. The scythe-like curved outer uropods are characteristic of all stages of growth of this species, and essentially of the same type throughout, though larger and more emphasised in the adult male.

The figures (pl. V, figs. 12–15) of the antennules and antennae, the second and eighth thoracic limbs and epistome will convey a sufficient idea of the character of these appendages in this species. The stylet in the second pleopods of the male (pl. V, fig. 16) is long and sharply pointed, nearly twice as long as the inner ramus. The epistome (pl. V, fig. 17) is constricted somewhat at the centre, and has the anterior margin convex. It projects slightly beyond the head, and is visible in dorsal view. The upper lip is triangular, with the distal margin convex. Length of an adult male, 8 mm.; of an adult female, 7 mm.; and of a young male, 6·5 mm.

Three species of *Isocladus* are known: *I. tristensis*, Leach, *I. integer*, Heller, and the present species. *I. armatus* may be distinguished from the other two by the shape of the outer ramus of the uropods, and by the form of the upper lip and epistome.

Genus CYMODOCE, Leach.

27. *Cymodoce hodgsoni*, n. sp. Pl. VI, figs. 1–8.

Occurrence.—Station 96, 7 miles East of North Cape, New Zealand, 70 fathoms, bottom fauna, one male, 9 mm.

Description.—Body (pl. VI, fig. 1) about twice as long as broad and capable of being partially rolled up into a ball, more or less covered, but not closely, with short fine setae. On the thoracic segments these setae occupy a band running across the posterior half of each segment, and though nearly all worn off, the pits from which they arise are clearly to be seen. The hairs are much more numerous on the abdomen, and more evenly and regularly distributed. They are rubbed off dorsally but still remain laterally.

Head somewhat highly vaulted, anterior margin produced between the bases of the first antennae into a short spatulate rostral process, in front of which projects the blunt epistome. The latter is a conspicuous object in dorsal view even when the animal is not fully straightened out, as in the figure here given (pl. VI, fig. 1). On each side of the head, slightly in front of and below the eye, there is a broad groove, the margins of which are strengthened by a ridge, into which the anterior forwardly directed part of the coxal plate of the first free thoracic somite slides when the creature rolls itself up into a ball.

Thorax with the first free somite much the largest, and the remainder more or less sub-equal. The form of the coxal plates is shown in pl. VI, fig. 2. The last four somites of the thorax have four obscure tubercles each, those nearest the median line being more clearly defined.

Abdomen (pl. VI, fig. 1) with a proximal segmented portion and a terminal unsegmented portion. The proximal segmented portion would appear to be formed of four somites. The suture marking off the first segment is visible in the middle line, and on each side just behind the junction of the seventh thoracic tergum with its coxa but not in between, nor does it extend to the lateral margins. The two succeeding sutures are incomplete in the mid-dorsal line, but extend to the lateral margins. The suture marking the fourth somite is complete. The posterior margin of the fourth segment is produced backwards into a broad stout process the apex of which is truncate or even slightly emarginate in dorsal view. On each side there are two small processes or tubercles, the outer of which is the larger. The unsegmented terminal portion of the abdomen has a single prominent lateral tubercle on each side above the base of the uropods. The apex is trilobed, the median tongue-like process only slightly shorter than the lateral ones. On the dorsal surface of the median lobe, at its base, is a short, blunt, forwardly directed tubercle, which in dorsal view shows two quite small tubercles, one on each side of its base, giving the whole a trident-like form.

Uropods (pl. VI, fig. 7) with the endopod fused to the sympod, the whole forming a stout rigid bar the inner edge of which is grooved and fitting over and under the lateral margins of the abdomen in the familiar groove and tongue fashion known to the carpenter. The outer uropod is much smaller than the inner, with its apex acute.

Epistome of the form shown in pl. VI, fig. 3, very prominent both laterally and dorsally.

Antennules (pl. VI, fig. 4) reaching the posterior margin of the second free thoracic somite; basal joint of the peduncle rather broad, second joint small, third joint as long as the first but much narrower; flagellum composed of about eleven or twelve joints.

Antennae (pl. VI, fig. 5) a little longer than the antennules; joints of the peduncle all narrow except the first small joint, fifth joint the longest; flagellum of about sixteen to eighteen joints.

Second thoracic limbs (pl. VI, fig. 6) much shorter and stouter than any of the others, the merus, carpus and propodus all armed with stout spines, the dactylus bi-unguiculate.

In the succeeding thoracic limbs the merus is not so stout and is without strong spines, the carpus and propodus successively becoming longer and the dactylus bi-unguiculate.

The processes on the sternum of the seventh thoracic somite of the male are rather long and lie close to one another.

The pleopods are of the usual hemi-branchiate type. The stylet on the second pair is longer than the rami, strongly curved, and acute at the tip (pl. VI, fig. 8).

Of all the species of *Cymodoce* hitherto described, this species approximates most closely to *C. australis*, Hodgson, described from specimens taken on the "Southern Cross" Expedition in 8 fathoms, off Cape Adare. It is indeed very closely allied to the latter, and I hesitated for a long time whether to describe it as a new species.

After an examination of Hodgson's type in the British Museum, I have come to the conclusion that the two forms are distinct and that *C. hodgsoni* may be distinguished from *C. australis* by the following characters :—

(1) It is not so hairy.

(2) The big process on the anterior part of the abdomen is broader, and the apex truncate instead of pointed.

(3) The small recurved spine-like tubercle at the base of the median tongue of the apex of the telson is shorter, less acute, and broader at the base. In *C. australis* the tubercle is longer and more pointed, and has not the trilobed appearance in dorsal view that it has in *C. hodgsoni.*

(4) In *C. australis* the median lobe at the apex of the abdomen is much shorter than the lateral lobes. In *C. hodgsoni* they are more nearly of the same size.

(5) *C. hodgsoni* has the outer uropod of proportionately smaller size and more acute at the apex.

Hansen, 1905 (1), does not mention *C. australis,* Hodgson, or express any opinion as to its exact place in the family. From my examination of the type and the above specimen of a closely allied species, I believe it has been correctly referred to the genus *Cymodoce,* where I would, at least provisionally, retain both species. In his key to the genera of the Cymodocini (Hansen, 1905 (1), p. 104) the author defines the genus *Cymodoce* as "in the male the anterior part of the abdomen is without mesial process, and the endopod of the uropod is generally moderately well developed." *C. australis* and *C. hodgsoni,* which both have mesial processes on the anterior part of the abdomen, can hardly be said to come within the above definition. On the other hand, they can just as little be placed in the genera *Cilicaea* or *Cilicaeopsis,* which are both described as having the endopod of the uropod very short or quite rudimentary. Hansen has already commented on the very slight value of the latter two genera, and the species now under discussion lend support to his opinion.

28. *Cymodoce bituberculata,* Filhol (?). Pl. VI, figs. 9–15.

Cymodoce bituberculata, Filhol, 1885, p. 457, pl. LV, fig. 2 ; Hutton, 1904, p. 263.

Occurrence.—Stations 133, 135 and 136, Spirits Bay, near North Cape, New Zealand, plankton, nine specimens.

Remarks.—The specimens are all quite small, measuring from 1 to 4 mm., and none of them are sexually mature. My identification of them is therefore accompanied by a strong element of doubt. I have figured the whole animal from the side, the epistome, and more important appendages, in the hope that the adult animal may some day be found and satisfactorily identified.

The body is granular and glabrous, without any distinctive armature except on the last abdominal somite (telson), which has two well-marked bosses separated in the median line by a groove. The relative height and contour of these bosses may be judged from the figure of the animal in side view (pl. VI, fig. 9). The apex of the telson has a semi-circular notch, not very visible in dorsal view but somewhat deep viewed from behind. In one of the specimens, which I suspect to be a male, though it had no stylet on the second pleopods or any appendages on the sternum of the last thoracic somite, the notch in the apex of the telson is completely hidden in dorsal view by a short obtuse blunt process on the dorsal surface of the telson (pl. VI, fig. 10). This is the only difference I could find between the sexes, supposing my presumption that the latter specimen represents the male sex be true. The uropods are sub-equal in length, with truncate apices. The anterior margin of the head is produced between the bases of the first antennae into a short but well-marked rostral process, which meets the anterior end of the epistome. The latter is figured on pl. VI, fig. 11, and is of quite characteristic shape, with a distinct tubercle on the central portion. The first and second antennae (pl. VI, figs. 12, 13) have flagella of eight and twelve joints respectively. The second to eighth thoracic limbs (pl. VI, figs. 14, 15) are all bi-unguiculate, the second pair with three larger spines on the inner margin of the merus, two on the carpus, and three on the propodus, with smaller spinules in between. The thoracic limbs become successively longer, but the general form and the armature remain of the same type throughout. The pleopods are of the usual hemi-branchiate type, with the exopod of the third pair two-jointed.

Filhol's specimens were taken in Cook Strait and on the shores of Stewart Island. His original description, which I quote in full, is very short and unsatisfactory : "Cette espèce, que j'ai recueillé dans le détroit de Cook et sur la côte est de l'Ile Stewart, se différencie du *Cymodocea granulata* par le lobe postero-latéral du dernier segment thoracique qui ne se contourne pas en arrière pour se terminer par une courte épine dirigée en haut, par la présence de deux tuberosités sur la portion médiane du dernier anneau abdominal, par la disposition des appendices caudaux qui ont la même grandeur." The present specimens agree with that description as far as it goes, and, as the specific name indicates, the chief character of the species is the presence of two prominent bosses on the telson. This character alone has led me to regard my specimens as belonging to Filhol's species.

B. SPHAEROMINAE EUBRANCHIATAE.

Genus CYMODOCELLA, Pfeffer.

29. *Cymodocella tubicauda*, Pfeffer.

C. tubicauda, Pfeffer, 1887, p. 110, pl. II, fig. 8, pl. VI, figs. 11, 12 ; Richardson, 1908, p. 4 ; Hodgson, 1910, p. 31 ; Chilton, 1909, p. 657 ; Richardson, 1913, p. 6.
Sphaeroma (?) *egregia*, Chilton, 1892, p. 269.
C. egregia, Hansen, 1905 (1), p. 126 ; Richardson, 1906, p. 6.
Cymodocea antarctica, Hodgson, 1902, p. 243, pl. XXXII, fig. 2.

Occurrence.—Station 220, off Cape Adare, 45–50 fathoms, bottom fauna, three specimens, 7–8 mm.

Station 331, off Cape Bird Peninsula, 250 fathoms, bottom fauna, one specimen, 7·5 mm.

Cumberland Bay, South Georgia, collected by P. Stammwitz, December, 1913, eight specimens, 2–10 mm.

Genus DYNAMENELLA, Hansen, 1905.

30. *Dynamenella eatoni* (Miers).

Dynamene eatoni, Miers, 1875, p. 73; Miers, 1879, p. 203, pl. XI, fig. 2.
Dynamenella eatoni, Hansen, 1905 (1), p. 125; Vanhöffen, 1914, p. 515.

Occurrence.—Cumberland Bay, South Georgia, December, 1918, collected by P. Stammwitz, two males.

Remarks.—The specimens are both apparently immature, and measure 11 mm. and 13·5 mm. Though the male appendages on the seventh thoracic somite are present and well developed, the stylet on the second pleopods is not yet visible externally. Chilton (1909) has already called attention to the close similarity between this species and *D. huttoni* (G. M. Thomson).

Genus CASSIDINOPSIS, Hansen, 1905.

31. *Cassidinopsis emarginata* (Guér.).

Cassidina emarginata, Guérin, 1843, p. 31; Cunningham, 1871, p. 499, pl. LIX, fig. 4; Miers, 1879, p. 204; Studer, 1884, p. 19; Pfeffer, 1887, p. 103, pl. II, figs. 9, 10, pl. V, figs. 23–30, pl. VI, figs. 1–10; Stebbing, 1900, p. 562.
Cassidinopsis emarginata, Hansen, 1905 (1), p. 128; Stebbing, 1914, p. 351; Vanhöffen, 1914, p. 514.
Cassidina latistylis, Dana, 1852, p. 784, pl. LII, figs 12*a–e*.

Occurrence.—King Edward Cove, S. Georgia, November, 1913, collected by P. Stammwitz, fifteen specimens.

Remarks.—The largest male specimen measured 32 mm. in length and 21 mm. in breadth; the largest female, 22 mm. long, 11 mm. broad. This difference in the relative proportions of the sexes has already been commented on by Studer, Miers, and Vanhöffen. The stylet on the second pleopod of the male is a little longer than the rami.

Genus EUVALLENTINIA, Stebbing, 1914.

Vallentinia, Stebbing, 1914, p. 351.
nec *Vallentinia*, E. T. Browne, 1902 (Medusa).
„ *Vallentinia*, Norm. and Scott 1906 (Copepoda).

Stebbing instituted this genus in 1914, on the recommendation of Hansen, for the species previously known as *Dynamene darwinii*, Cunningham, or *Cymodocea darwinii*, Cunningham. Finding that the name he originally proposed, *Vallentinia*, had been used twice previously, he changed the name to *Euvallentinia.* His diagnosis is quoted here in full :—

"A member of the Sphaerominae eubranchiatae, near to *Paracerceis*, Hansen, 1905, but distinguished by not having the basal joint of the first antennae produced into an acute process, the mandibles of the female not coalesced with the head, the exopod of the uropods much shorter and narrower than the endopod, first gnathopod prehensile in the male."

In 1906 (1) Miss Richardson instituted a new genus, *Cassidias*, the type species of which is *C. argentinea*, Richardson. To this genus Miss Richardson says that *Cymodoce darwinii*, Cunningham, should be referred, and she proceeds to point out the differences between the two species. It seemed at first, therefore, as if the genera *Cassidias* and *Euvallentinia* were synonymous, but, on going into the matter further, certain difficulties appeared in the way of my accepting Miss Richardson's interpretation of the generic position of *C. darwinii*, and as a result of my observations I have been led to uphold the validity of Stebbing's genus. If the diagnoses of Richardson and Stebbing for their two genera are compared, two points require further elucidation. Richardson says of *Cassidias*, "mouth parts of the female metamorphosed," and her figures of the first maxilla and maxilliped of the female of *C. argentinea* support her statement. Stebbing in defining *Euvallentinia* says, "the mandibles of the female not coalesced with the head." This statement is not inconsistent with a metamorphosis of the mouth-parts in egg-bearing females, for it is only in some few genera that the metamorphosis is so complete as to lead to a complete fusion of the mandibles with the head, such as Hansen describes in the genera *Cerceis* and *Dynamene.* Stebbing's statement is included, I take it, in his diagnosis to indicate a point of difference between *Euvallentinia* and *Paracerceis*, the genus to which Hansen had suggested that *C. darwinii* was most closely related. In the latter genus, the metamorphosis of the mouth-parts in the egg-bearing female is very complete, and includes a fusion of the mandible with the head. Stebbing had only one specimen at his command, and that appears from his remarks to have been a female. He gives no information on the state of its maturity, and no further information on the mouth-parts except to state that they are "much as in *Cymodoce*."

In the material I have examined there are two adult males, one immature male and three adult females, which I refer with some confidence to the *Cymodoce darwinii* of Cunningham. The three females have three pairs of well-developed marsupial lamellae, which overlap in the median line, but none of them has eggs in the marsupium. Two of the females, however, are carrying eggs in internal pouches, though I have not been able to make out the number of these pouches or the position of their external openings. I have carefully compared the mouth-parts of one of these egg-bearing females with those of an adult male and can discern no difference whatsoever.

In *C. darwinii*, therefore, the mouth-parts of the egg-bearing female are not metamorphosed, and this character is of sufficient importance to constitute, in my opinion, a generic difference between *C. darwinii* and *C. argentinea.*

The second point in the diagnosis of Richardson and Stebbing which requires notice is the structure of the fourth pleopod. Richardson says "both branches of the fourth pair of pleopods are similar—fleshy, with transverse folds and without marginal setae"; and from the figure of the fourth pleopods of *C. argentinea* we gather that the exopod is without a terminal joint. Stebbing, in his remarks on *Euvallentinia darwinii*, though not actually in his diagnosis of the genus, states that "the exopod of the fourth pair is clearly two-jointed." I can confirm Stebbing's statement, and venture to think that this character can be regarded as of generic value.

I am therefore led to remove *C. darwinii* from the genus *Cassidias* to which Miss Richardson would refer it, and to uphold the validity of the genus *Euvallentinia*, Stebbing, a genus of Sphaerominae Eubranchiatae, having both sexes very similar in external aspect, without processes on the thorax; basal joint of the first antennae not expanded into a free plate nor produced into an acute process; mouth-parts similar in both sexes, not metamorphosed in the egg-bearing females; uropods similar in both sexes, with an exopod which is much shorter than the endopod; exopods of pleopods three and four two-jointed; female with marsupial lamellae which overlap in the median line, young developed in internal pouches; male with an appendix masculina on the second pleopod.

To this diagnosis may perhaps be added, as Stebbing has done, second thoracic limb of the male prehensile. Whether this character is of generic or specific significance is a matter of opinion, but it is at least interesting in view of Hansen's statement that "in no case has any sexual difference been observed" in the anterior two pairs of thoracic legs among the genera of the Eubranchiate Sphaeromids.

In only one other genus of Eubranchiate Sphaeromidae, *Scutuloidea*, Chilton, is the exopod of the fourth pleopods two-jointed, but this genus differs from *Euvallentinia* in having the exopod of the third pleopod unjointed, and in having the uropods without exopods.

32. *Euvallentinia darwinii* (Cunningham).

Cymodocea darwinii, Cunningham, 1871, p. 499, pl. LIX, figs. 1–1*b*; Studer, 1884, p. 18, pl. II, figs. 6–6*b*; Beddard, 1886 (2), p. 150; Dollfus, 1891, p. 65, pl. VIII, figs. 8–8*b*; Ortmann, 1911, p. 649.
Dynamene darwinii, Miers, 1881, p. 79; Hansen, 1905 (1), p. 135.
Cassidias darwinii, Richardson, 1906 (1), p. 22, fig. 27.
Vallentinia darwinii, Stebbing, 1914, p. 351.
Euvallentinia darwinii, Stebbing, 1914, p. 944.

Occurrence.—Station 38, 52° 23′ S., 63° 50′ W., 125 fathoms, bottom fauna, three males and three females.

Remarks.—Two of the males were adult, and measured 13 mm. The third, measuring only 10 mm., was immature. The females, all adult and two carrying eggs, measure only 9 mm. There is thus a considerable difference in size between adults of both sexes. There are other interesting sexual differences in this species. In the adult male the base of the propodus of the second thoracic limb bears a rather long and stout blunt process, which makes this appendage in the male a prehensile limb. The process is quite absent in the female and only slightly developed in the immature male specimen. This character is interesting, as no other genus of Eubranchiate Sphaeromids exhibits such a sexual difference.

Further, on the third to the eighth pairs of thoracic limbs of the male the carpus and merus bear on their inner margins a dense pad of short stout setae just like a brush. These are not present in the female and only slightly developed in the immature male.

The stylet on the second pleopod of the male is about half as long again as the inner ramus.

C. SPHAEROMINAE PLATYBRANCHIATAE.

Genus CASSIDINA, Milne-Edw., 1840.

33. *Cassidina typa*, M.-Edw.

C. typa, M.-Edw., 1840, p. 224, pl. XXXII, figs. 10–16; Hansen, 1905 (1), p. 129.
C. neo-zealanica, G. M. Thomson, 1888, p. 264, pl. XIV, figs. 1–4; Stebbing, 1900, p. 562; Hutton, 1904, p. 263; Thomson, 1913, p. 247.

Occurrence.—Station 134, Spirits Bay, near North Cape, New Zealand, 11–20 fathoms, bottom fauna, one female.

Remarks.—The single specimen measures 6 mm. in length and about 4 mm. in breadth. Hansen has identified *C. neo-zealanica*, Thomson, with Milne-Edwards' species, and with this opinion I am in agreement. My specimen agrees more closely with Milne-Edwards' figures than with Thomson's. For instance, the latter author figures the abdomen as consisting of two somites only, whereas in my specimen four somites are indicated, the suture marking off the first somite not visible in the centre and not reaching the lateral margins, while that marking off the second segment is not complete in the median dorsal line but does extend to the lateral margins. This condition agrees absolutely with Milne-Edwards' figure. The body generally is clothed dorsally with short hairs, which are more numerous laterally than in the centre of the body. Between the bases of the hairs the surface of the body is microscopically honey-combed. The proportions of the first and second antennae and the form of the epistome agree very well with Milne-Edwards' figures, and differ somewhat from those of Thomson. The first antenna is slightly longer than the head, and quite reaches the end of the peduncle of the second antenna. The flagellum has eight joints. The second antenna reaches a little beyond the posterior border of the first free thoracic somite, and its peduncle is as long as the head. The flagellum has twelve joints. These differences are small, and considering the many points of close resemblance between Milne-Edwards' and Thomson's accounts, and the fact that both species are found in New

Zealand waters, I think that there can be little doubt that the species are synonymous. Hansen's re-description of the genus and species is sufficient for easy recognition. The type of *C. typa* came from New Zealand, Thomson's specimens from the Bay of Islands, and Hansen has recorded the species from Akaroa Harbour.

Family SEROLIDAE.

Genus SEROLIS, Leach.

34. *Serolis schythei*, Lütken.

S. schythei, Lütken, 1858, p. 98, pl. I, figs. 12, 13; Grube, 1875, p. 220, pl. V, fig. 1, pl. VI, fig. 1; Beddard, 1884, p. 40, pl. II, figs. 5–13.

Occurrence.—Station 38, 52° 23′ S., 63° 50′ W., near the Falkland Islands, 125 fathoms, Agassiz trawl, bottom fauna, two males, four females and eighteen juveniles.

Remarks.—Both male specimens measure 22 mm. in length and 25 mm. in greatest breadth, while the females, with eggs, measure 21 mm. long and the same in greatest breadth. Adult males are therefore proportionately broader as compared with females. The first four free thoracic somites (3–6 thoracic somites) have their coxae marked off from the terga by a distinct suture. Lütken, Grube and Beddard have all noted the differences between the sexes in this species. In the male the coxae of the seventh thoracic somite reach backward some considerable way beyond the apex of the last abdominal somite, while the coxae of the sixth thoracic somite and the pleura of the second abdominal somite extend backward equally to the apex of the last abdominal somite. In the female, the coxae of the seventh thoracic somite reach, and those of the sixth thoracic somite and the pleura of the second abdominal somite fall some considerable way short of the apex of the last abdominal somite. The dactylus of the second thoracic limb in the female has a comb of short spines on the distal half of the inner edge.

Richardson (1911, p. 396, fig. 1) has recently described a species of *Serolis*, *S. polaris*, which is very closely related to *S. schythei*, but apparently differs in that the pleura of the second abdominal somite are longer than the coxae of the seventh thoracic somite, whereas in *S. schythei* the reverse obtains, and the transverse carina on the last abdominal somite is of different form in the two species. *S. polaris* is recorded from the South Sandwich Islands. *S. schythei* is confined to the waters off Patagonia and the Falkland Islands.

35. *Serolis septemcarinata*, Miers.

S. quadricarinata, White, 1847, p. 106.
S. septemcarinata, Miers, 1875, p. 116; Miers, 1879, p. 206, pl. XI, fig. 3; Studer, 1884, p. 8; Beddard, 1884, p. 47, pl. II, fig. 14, pl. VIII, figs. 3–5; Pfeffer, 1887, p. 63, pl. II, figs. 5, 6, pl. III, figs. 1–26, pl. IV, fig. 6; Collinge, 1918, p. 74, pls. III, IV, figs. 1–13.
S. ovalis, Studer, 1879, p. 24, pl. III, figs. 8–10.

Occurrence.—Cumberland Bay, S. Georgia, December, 1913, collected by P. Stammwitz, two females.

Remarks.—The two specimens respectively measure 12 mm. long by 9·5 mm. broad, and 11 mm. long by 8·5 mm. broad. There is nothing to add to Pfeffer's detailed and careful description, or to the more recent account of this species given by Collinge. One point only requires remark. Collinge describes and figures only one kind of sensory spine on the inner margin of the propodus of the second thoracic limb. Pfeffer, however (*loc. cit.*, pl. III, figs. 13–15), gives detailed figures showing both kinds of sensory spines. My own observations agree absolutely with those of Pfeffer, whose account of this species has evidently been overlooked by Collinge.

36. *Serolis glacialis*, n. sp. Pl. VII, figs. 1–5.

Occurrence.—Station 194, off Oates Land, 69° 43′ S., 163° 24′ E., 180–200 fathoms, bottom fauna, one male, 17 mm. long, 14·5 mm. broad.

Description.—Body (pl. VII, fig. 1) broadly oval, slightly longer than broad, the breadth being about $\frac{5}{7}$ of the length, rather flattened and semi-translucent, especially laterally.

Head (pl. VII, fig. 1) very nearly twice as wide as long, shield-shape in outline, convex, with a small but well-marked pointed rostral process between the bases of the antennules; behind the rostrum there is a well-marked transverse keel or ridge, which runs laterally to the sides of the cephalosome; behind this again, between and in a line with the anterior end of the eyes, there is a short transverse well-marked ridge, immediately posterior to which is a deep groove; the portion of the head between the eyes is very convex, and divided into three more or less equal oval prominences, the posterior margins of which are much more sharply defined than the anterior, where the prominences merge in the general surface of the body; this portion of the cephalosome is roughened by irregular anastomosing ridges.

Eyes large, about half as long as the head, reniform, pigment black.

As in all Serolidae, the second thoracic somite united with the head, the lateral portion with two transverse ridges on each side, the anterior one commencing at the point at which the anterior ridge of the head meets the lateral margin of the head, the second one commencing some little way behind this point, and both running at first transversely and finally outward and backward, fading away into the lateral margins; third to seventh somites with well-developed coxal plates, those of the third to fifth somites marked off by distinct sutures; in the median dorsal line each of the third to the seventh thoracic somites is produced into a short but distinct median dorsal spiniform process; the coxal plates of the seventh thoracic somite are much more produced than those of any of the other thoracic somites, and extend about to the level of the basal joint of the uropods.

Abdomen (pl. VII, fig. 1) with three free somites and a large terminal one, each of the free somites with a short median dorsal spiniform process in continuation of those of the thorax; pleural plates of the second somite well produced backwards and extending posteriorly beyond the coxal plates of the seventh thoracic somite; pleural plates of the third somite *shorter* than those of the second, and reaching the same level as the coxal plates of the seventh thoracic somite; terminal segment with a well-developed spine in the anterior median line, followed by a median dorsal keel which extends to the extremity; on each side of the median keel there are two lateral oblique keels, terminating in small spines some way from the lateral margins, which are slightly turned down and infolded.

First and second antennae (pl. VII, fig. 1) rather long, reaching backwards almost to the posterior margin of the third free segment of the mesosome; peduncle of the first antenna four-jointed, first two joints small, third joint the longest, three times as long as the fourth, flagellum of thirty-five joints; peduncle of the second antenna longer than that of the first by the entire length of the fifth joint, fourth and fifth joints long and narrow and equal to each other, flagellum of about seventeen joints, shorter than the last peduncular joint.

The second, third and fourth thoracic appendages are shown in the figures (pl. VII, figs. 2–5). The second is stoutly built, with the propodus greatly expanded, having its outer distal corner somewhat pointed, and its inner margin armed with a row of about forty-five broad triangular tooth-like processes alternating with peculiar stout spines. The distal edge of the carpus is crenulate and bears two stout spines. The third thoracic appendage is much smaller than the second, with the propodus modified and bearing on its inner border several short stout spines and larger and more slender setae. Each of the sternal plates of the first three abdominal segments has the median posterior border produced into a spine, increasing in length from the first to the third.

The appendix masculina on the second pleopod of the male reaches about two-thirds of the way towards the apex of the metasome.

Uropods not extending beyond the metasome; endopod and exopod narrowly oval in shape, the exopod scarcely more than half the length of the endopod, margins of both finely serrated and sparsely setose.

This species appears to be most nearly related to *S. septemcarinata*, Miers, which has been recently redescribed and figured by Collinge (1918). I have compared the single type specimen with examples of Miers' species in the present collection and have noted the following points of difference.

(1) *S. glacialis* is more flattened, less compact and more transparent than *S. septemcarinata*. It should be remarked, however, that the "Terra Nova" specimen has every appearance of having been frozen before preservation, and this may account for its translucent appearance.

(2) The eyes are larger in *S. glacialis* than in *S. septemcarinata*.

(3) The first and second antennae in *S. glacialis* are longer than in *S. septemcarinata*. In *S. glacialis* the peduncle of the first antenna is equal to the first four joints of the peduncle of the second antenna, and the whole first antenna is if anything slightly longer than the second. In *S. septemcarinata* the peduncle of the first antenna reaches only about half-way along the fourth joint of the peduncle of the second, and the whole first antenna is considerably shorter than the second antenna.

(4) In *S. glacialis* each of the thoracic and first three somites of the abdomen has the median dorsal posterior border produced into a spine-like process, which is absent in *S. septemcarinata*.

(5) In *S. glacialis* the coxal plates of the seventh thoracic segment extend backwards as far as the pleural plates of the third abdominal somite, and not quite so far as those of the second abdominal somite. In *S. septemcarinata* the coxal plates of the seventh thoracic segment are much shorter than the pleural plates of the third abdominal segment, which in turn are equal to those of the second.

(6) In *S. glacialis* the last somite of the abdomen bears anteriorly a prominent median dorsal spine, which is not present in *S. septemcarinata*. The latter has seven carinae on the last segment of the abdomen, while *S. glacialis* has but five. Moreover, the shape of the abdomen differs considerably in the two forms.

(7) In *S. glacialis* the outer branch of the uropods is much shorter than the inner. In *S. septemcarinata* the two branches are much more equal in size and broader than in *S. glacialis*.

S. glacialis, like the majority of species of the genus, has the terga of the first three free thoracic somites separated by a suture from their coxal plates. This character serves to separate it from *S. schythei*, Lütken, *S. paradoxa*, Fabr., and *S. polaris*, Rich., which have the first four free thoracic coxal plates separated by a suture, and from *S. gracilis*, Bedd., and *S. latifrons*, White, in which the number is five and six respectively.*

S. glacialis is also separated readily from the Australian group of species, *S. tuberculata*, Grube, *S. pallida*, Bedd., *S. australiensis*, Bedd., *S. elongata*, Bedd., *S. longicaudata*, Bedd., *S. minuta*, Bedd., and *S. bakeri*, Chilton, in that the tergum of the fourth free thoracic somite is not unduly narrow, and that of the fifth free thoracic somite is not obsolete in the middle dorsal region. From the remaining species of the genus the characters of the last abdominal segment and of the uropods will serve as distinguishing marks.*

The armature of the inner palmar margin of the propodus of the second thoracic appendages in this genus seems to be a matter that is not quite clear. Beddard, speaking generally, states that there are two kinds of peculiarly formed spines regularly

* *See* Calman (1920) for a suggested re-grouping of the species of this genus based on the structure of the uropods and the segmentation of the thorax. *S. glacialis* belongs to Calman's group of *S. paradoxa*. The Australian species form a distinct group, and the third group comprises *S. latifrons* and Calman's new species *S. beddardi*.

alternating with one another, and for the species *S. neaera*, *S. convexa*, *S. minuta*, and *S. pallida* he figures such an arrangement. Hodgson, in describing *S. trilobitoides*, Eights, gives as one of the specific characters "special spines on the propodus of the second thoracic appendage consisting of sensory teeth alternating with broad leaf-like sensory structures, of which the blade is unequally developed on the two sides of the shaft." Hodgson gives figures of each of these spines, showing each to possess a mid-rib terminating in a peculiar sensory structure. Collinge, on the other hand, speaking of *S. septemcarinata*, states that he was unable to find more than one kind of spine, which he describes as terminating in three or four finger-like processes. My own observations agree with those of Beddard and Hodgson. I have examined the five species in this collection from this point of view, and in all five I have found the propodus of the second thoracic limb to be armed with two kinds of sensory spines regularly alternating with one another and having essentially the general structure indicated by Hodgson. The shape of the spines varies somewhat in each species, particularly those which Hodgson calls "leaf-like organs," which are sometimes leaf-shaped and sometimes longer and narrower as figured by Beddard for some of his species. I found both kinds present in *S. septemcarinata* (pl. VII, fig. 3), though Collinge was only able to find one kind, the rod-like, more obviously spine-like type.

S. glacialis is here recorded from a locality which is further South than that at which any species of the genus has been taken before. It is thus a true Antarctic species.

37. *Serolis pagenstecheri*, Pfeffer.

S. pagenstecheri, Pfeffer, 1887, p. 73, pl. II, figs. 1, 2, pl. IV, figs. 1–3.

Occurrence.—Leith Harbour and Cumberland Bay, South Georgia, December, 1913, collected by P. Stammwitz, two females.

Remarks.—The specimens respectively measure 45 mm. long by 37 mm. broad, and 37 mm. long by 33 mm. broad. I have nothing to add to Pfeffer's description and figures of this species, which are sufficient for its ready identification. The species belongs to that group of the genus having the coxae of the first three free thoracic segments separated by a distinct suture from their terga. The species has not been recorded since Pfeffer described it, and the present specimens are from the type locality.

38. *Serolis polita*, Pfeffer. Pl. VII, fig. 6.

S. polita, Pfeffer, 1887, p. 81, pl. II, figs. 3, 4, pl. IV, fig. 4; Richardson, 1906 (2), p. 7; Richardson, 1911, p. 396.

Occurrence.—King Edward Cove and Cumberland Bay, South Georgia, November and December, 1913, collected by P. Stammwitz, five males and one female.

Remarks.—The male specimens measure 15–17 mm. in length by 14–16 mm. in breadth; and the female, 12 mm. by 10·5 mm. The first three free thoracic somites have their coxae separated by a distinct suture from the terga; but in the fourth and fifth free thoracic somites the coxae and terga are completely fused. Pfeffer's figure is therefore inaccurate in this respect, as he shows all five free thoracic somites with a coxal suture. I may add to Pfeffer's otherwise accurate description a note on an interesting difference in the sexes. The inner margins of the merus and carpus of the third thoracic limb of the male are fringed with dense tufts of long plumose setae (pl. VII, fig. 6). In none of the other species in this collection have I observed a similar sexual difference, but Beddard has figured a similar difference in the male of *S. neaera*. Pfeffer's specimens came from South Georgia, as did the present ones. Richardson has recorded it from Booth-Wandel Island and from the South Sandwich group.

Family ANTHURIDAE.

Genus LEPTANTHURA, G. O. Sars.

39. *Leptanthura glacialis*, Hodgson.

L. glacialis, Hodgson, 1910, p. 9, pl I, figs. 11*g*.

Occurrence.—Station 331, off Cape Bird Peninsula, entrance to McMurdo Sound, 250 fathoms, January, 1912, bottom fauna, one female with eggs in the marsupium, 10 mm.

Remarks.—The single specimen agrees very closely with Hodgson's description and figures, as far as it is possible to see without actual dissection, but is only about half the size of his specimens, though apparently adult, since it carried eggs in the marsupium. None of the other Antarctic expeditions have met with this species.

Genus EISOTHISTOS, Haswell.

40. *Eisothistos antarcticus*, Vanhöffen.

E. antarcticus, Vanhöffen, 1914, p. 494, text-fig. 33.

Occurrence.—Station 339, 77° 5′ S., 164° 17′ E., 140 fathoms, January 24, 1912, bottom fauna, one male, 3·5 mm.

Remarks.—This specimen agrees very closely with Vanhöffen's description and figures. Having only one specimen, I have not thought it advisable to dissect it and examine the mouth-organs in more detail, though it is very desirable that this should be done when more material is available.

Sub-order VALVIFERA.

Family IDOTHEIDAE.

Genus GLYPTONOTUS, Eights.

41. *Glyptonotus antarcticus*, Eights. Pl. IX, figs. 5, 6.

G. antarcticus, Eights, 1853, p. 331, 2 pls.; Miers, 1881, p. 11; Pfeffer, 1887, p. 115, pl. II, fig. 7, pl. VI, figs. 13–27; Tait, 1917, p. 246, 22 text-figs.; Collinge, 1918, p. 65, pls. I, II, figs. 1–12.

Occurrence.—Cumberland Bay, South Georgia, December, 1913, 0–15 fathoms, collected by P. Stammwitz, two males, 57 and 62 mm., one female, 59 mm., and twenty-one juvenile, 12–35 mm.

Stromness Harbour, South Georgia, January, 1914, collected by P. Stammwitz, one male, 52 mm.

41A. *Glyptonotus antarcticus*, Eights, *var.* acutus, Richardson. Pl. IX, figs. 3, 4.

G. acutus, Richardson, 1906 (2), p. 10, pl. I, figs. 2–4; Hodgson, 1910, p. 45, pl. VII; Richardson, 1913, p. 17; Vanhöffen, 1914, p. 527.

Occurrence.—Station 220, off Cape Adare, mouth of Robertson's Bay, 45–50 fathoms, bottom fauna, one female, 86 mm., one male, immature, 62 mm., one cast shell and three juvenile, 8 mm.

Station. 316, off Glacier Tongue, about 8 miles N. of Hut Point, McMurdo Sound, 190–250 fathoms, bottom fauna, one immature, 26 mm.

Station 355, 77° 46′ S., 166° 8′ E., 300 fathoms, bottom fauna, three immature, 18, 39 and 53 mm.

Station 356, off Granite Harbour, entrance to McMurdo Sound, 50 fathoms, bottom fauna, six immature, 20–56 mm.

March 1, 1911, washed up on North Bay, one male, 99 mm.

,, 29, 1912, trawl in North Bay, one male, 92 mm.

Remarks.—The differences between these two supposed species are difficult to translate into words. They are differences of degree rather than differences of structure. Richardson (1906) says that in *G. antarcticus* the body is less than twice as long as broad, the metasome shorter than broad and its extremity obtusely pointed; while in *G. acutus* the body is two and a half times as long as broad, the metasome longer than broad and its extremity prolonged into a very acute point. Collinge says that *G. antarcticus* differs from *G. acutus* in its more ovoid form and shorter metasome, which terminates much less acutely. These differences in the proportions of the body and of the metasome simply hinge on the degree of prolongation of the extremity of the metasome. It should be remarked at the outset that Miss Richardson's statements of the dimensions of the two species are somewhat erroneous. From measurements of her own figure of *G. acutus*, I make the length only 2·2 times the breadth; and according to Pfeffer's figure of *G. antarcticus*, which is one of the authorities for Miss Richardson's remarks on that species, the metasome is 1·16 times as long as broad.

The collections I have examined contain both species at all sizes from about 20 mm. upwards, and from a series of measurements I have made, it is clear that the proportions of the length to the breadth vary with age in both species. The young specimens are proportionately longer than broad, and in both species the metasome is more pointed and produced in young specimens than in old.

In a series of *G. antarcticus*, twenty-two in number and varying in size from

20 mm. to 59 mm., I find that the length varies from 2·2 times the breadth in the smallest specimens to 1·9 times the breadth in adult specimens, and that, allowing for individual variation, there is a progressive change between these proportions as the animal grows to the adult condition. In the same way, the length of the metasome in these specimens varies between 1·5 times the breadth in the smaller specimens to 1·2 in the largest.

Similarly in *G. acutus*, the length of the body varies between 2·45 times the breadth in young specimens measuring about 20 mm. to 2·2 times the breadth in fully grown specimens of 99 mm. In the same specimens the metasome is twice as long as broad in small specimens, and only 1·55 times as long as broad in the largest specimens.

It will be seen from these measurements that the proportions of the body and of the metasome in *young G. antarcticus* are almost exactly the same as those of *old G. acutus*, and the degree of "pointedness" of the metasome is very nearly the same. So that if we only had young of *G. antarcticus* and fully grown specimens of *G. acutus* before us, it would be almost natural to assume that the one would grow into the other. On the other hand, young *G. acutus* and fully grown *G. antarcticus* are very easily distinguishable. In the one, the prolongation of the point of the metasome is at its maximum, and in the other it is almost obsolete.

Size for size, therefore, the two forms are distinct, and may be identified from the measurements I have given. *G. acutus* is a stretched or drawn-out form of *G. antarcticus*.

A more constant distinction is to be found in the proportions of the joints of the posterior thoracic legs. Hodgson gives as one of the specific characters of *G. acutus*, "legs very long and slender," and a study of the figures given by him and Richardson for *G. acutus* and the comparison of those figures with the ones given by Pfeffer and Collinge to illustrate *G. antarcticus* will bring out the differences in the proportions of the joints of both forms. The difference is even more obvious in the actual specimens. The legs in *G. antarcticus* are certainly shorter and stouter than in *G. acutus*. But, again, the differences are those of degree and not of structure. I give the actual measurements of the last three joints of the last thoracic limbs of *G. antarcticus* and *G. acutus*, taken from specimens of comparable size, 58 mm. and 55 mm. respectively. I had no specimens of *G. antarcticus* larger than 59 mm. in the collections I examined.

G. antarcticus.—Carpus, 9 mm. long, 4 mm. broad at its widest point; propodus, 9 mm. long; dactylus, 4·5 mm. long.

G. acutus.—Carpus, 10·5 mm. long, 2 mm. broad at its widest point; propodus, 10·5 mm. long; dactylus, 6 mm. long.

These measurements give, in effect, the chief difference between the two forms. In *G. acutus*, while the joints are actually longer than in *G. antarcticus*, their very much narrower width emphasises the difference in length and makes the joints appear much longer and more slender in comparison than they actually are.

Other differences between the two forms have been pointed out by Collinge, in the degree of insertion of the cephalon into the first segment of the mesosome and in the maxillae and maxillipeds. As to the first of these, Collinge's statement is based on Hodgson's figure, and I find the difference in this respect not so great in actuality and negligible from a specific point of view.

With regard to the maxillae, Collinge states that there are eleven spines on the outer lobe of the first pair in *G. antarcticus*, and only eight (or nine) in *G. acutus* according to Hodgson. It has not been possible for me to examine all my specimens with regard to this character, but in one specimen of *G. acutus* I found eight spines on the outer lobe of the first maxilla, and in another specimen ten spines, so that the number would appear to be subject to some variation.

One other difference may be mentioned for what it is worth. Pfeffer figures the appendix masculina on the second pleopod of the male of *G. antarcticus* as extending backwards to the level of the end of the rami of the third pleopods. The only adult male of this species available in the material at my command agrees with Pfeffer's figure in this respect. In the two adult males of *G. acutus* in this collection the appendix masculina on the second pleopod is relatively much longer, and extends as far backwards as the tip of the outer branch of the uropods.

It may here be noticed that *G. acutus* appears to mature later than *G. antarcticus*, and eventually to reach a larger size. In a male *G. antarcticus* of 52 mm. the penial appendages on the sternum of the first abdominal somite are present, but there is no appendix masculina on the pleopods. A male measuring 58 mm. is fully adult in both respects. A male specimen of *G. acutus*, 62 mm., is still without the appendix masculina on the second pleopods. Unfortunately, I have no males between this size and 92 mm., so that I am unable to say at what size it really becomes fully mature.

My largest specimen of *G. antarcticus* is an adult female measuring 59 mm. Pfeffer's longest specimen was 62 mm., but Collinge gives the length of his largest specimens as 88 mm. On the other hand, the largest specimen of *G. acutus* in this collection is 99 mm. Hodgson gives the maximum length of his specimens as 119 mm., 30 mm. larger than the biggest *G. antarcticus* yet recorded.

As Tait (1917) has already noted, *G. antarcticus* is a shallow water form. The "Scotia" specimens were invariably taken in water of less than 12 fathoms, while the specimens in the present collection are from depths of less than 15 fathoms. On the other hand, Richardson records *G. acutus* from the shore to 38 fathoms; the "Scotia" collected it in 161 fathoms; Hodgson gives the depth as 20–125 fathoms; Vanhöffen examined a single specimen from 208 fathoms; while the specimens I have examined were obtained in depths varying from 45–300 fathoms.

As a result of these considerations I think that we can best express the relationships of these two forms by regarding *G. acutus* as a variety of *G. antarcticus*, inhabiting colder and deeper water, growing to a somewhat larger size and maturing later, and distinguished in general form by its less robust proportions, slenderer legs and more pointed apex to the metasome. It is in that light that I have regarded it here.

Family ARCTURIDAE.

Genus ANTARCTURUS, zur Strassen.

This genus seems to be separated from the genus *Arcturus* by the following characters:—(1) The coxal plates of the first free thoracic segment are not produced downwards and forwards to cover the mouth-parts and the bases of the first two thoracic limbs; and (2) the dactylus of the second to the fifth thoracic limb is long and well developed, whereas in *Arcturus* it is quite small.

In the light of Hansen's recent work on the Northern forms belonging to this family, I may state that I have found four pairs of incubatory lamellae in *A. polaris*, Hodgson, *A. franklini*, Hodgson, *A. hiemalis*, Hodgson, and *A. furcatus*, Studer.

Of the other species present in the collection there was not sufficient material to make an investigation on this point. It may be noted, however, that Miss Richardson found four pairs in the genus *Dolichiscus*. Hansen's surmise, that four pairs of incubatory lamellae will be found to be a very general character of the group, therefore receives considerable support from the Antarctic species. I have also found the sexual differences, noted by Hansen in the maxillipedes of *Astacilla*, occurring in each of the four species I have mentioned above.

The curious structure of the exopods of the first pleopods of the male in this genus does not appear to have been adequately noticed. In all the species I have examined the exopod of the first pleopod in the male (pl. VIII, figs. 1, 2) has, on its inner or posterior surface, an oblique groove or channel, running from the inner proximal corner to the outer distal corner; the channel tends to become closed in distally to form a distinct tube, and the aperture or outlet is roofed over by a peculiar process on the outer distal corner of the outer or anterior surface. The pair of penial filaments usually found on the sternum of the last thoracic somite of the male in Isopods are in this family fused into a single tapering process showing faint traces of its two component parts distally and situated on the first abdominal somite*. In this genus the process extends to the distal end of the basal joint of the first pleopods. The oblique groove on the inner face of the exopods is, I take it, merely a channel for the passage of spermatozoa from the penial filament; and the appendage is comparable in this respect to the first pleopod of the male in crayfishes, which is an appendage modified into tubular form to act as a passage for the male sexual elements. In the crayfishes, however, the first pleopod of the male is a simple styliform process consisting of the fused protopodite and endopodite. Here it is the exopod which is modified in connection with the sexual apparatus. In *Dolichiscus* the exopod of the first pleopod of the male is rather more specialised. The inner face is very concave and the distal portion bent inwards, so that the whole exopod looks like a spatula or

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* Barnard (1920) has recently pointed out that in the Valvifera the penial processes are situated on the first abdominal somite and not on the last thoracic somite as in all other Isopoda.

elongate spoon. The oblique groove is very well marked. This interesting structure has not been noted previously in this family of Isopods, but Barnard's figure of the first pleopod of the male in *Antarcturus kladophoros* (1914, pl. XVIII *B, plp. I*) makes it fairly obvious that a similar modification is present in that species, and his figure of the same appendage in *Neoarcturus oudops* (1914, pl. XIX *B, plp. I*) suggests a similar structure. I have found it in all the species of *Antarcturus* and *Dolichiscus* in the present material.

Ohlin (1901) has instituted the family Pseudidotheidae* for the species *Pseudidothea bonnieri*, Ohlin, entirely on the grounds of the modification of the first pleopods of the male as accessory sexual organs. An examination of his figure shows a structure which is in every way similar to that described above for the genus *Antarcturus*, the groove on the lower surface of the exopod being well shown. It is a fact of considerable interest that the same modification of the first pleopods of the male should be developed in two distinct families.

42. *Antarcturus polaris* (Hodgson). Pl. VIII, figs. 3, 4.

Arcturus polaris, Hodgson, 1902, p. 247, pl. XXXIV, fig. 2, pl. XXXV.
Antarcturus polaris, Richardson, 1913, p. 9.

Occurrence.—Station 220, off Cape Adare, mouth of Robertson's Bay, 45–50 fathoms, bottom fauna, over seventy specimens, the largest male 43 mm., the largest female 38 mm.

Station 294, Ross Sea, 74° 25′ S., 179° 3′ E., 158 fathoms, bottom fauna, one adult female, 33 mm.

Station 314, 5 miles N. of Inaccessible Island, McMurdo Sound, 222–241 fathoms, bottom fauna, two males, 40 and 42 mm.

Station 355, 77° 46′ S., 166° 8′ E., 300 fathoms, bottom fauna, one male, 36 mm., sixteen immature.

Station 356, off Granite Harbour, McMurdo Sound, 50 fathoms, bottom fauna, one male, 28 mm.

Remarks.—The essential spiny armature of this species can be seen in pl. VIII, figs. 3 and 4, representing a young male, 20 mm. The fully grown specimens differ from this figure only in the greater development of small spines or spiny tubercles on different parts of the body, especially between and around the lateral and coxal spines of the first four free thoracic somites and on the dorsal and lateral surfaces of the abdomen. These differences can be seen on a comparison of my figure with that given by Hodgson. The large spines arming the body remain more or less constant in position and number throughout life, but with the more robust form of the adult they

* Collinge has doubted the validity of this family, and I was inclined to agree with him, but Barnard (1920) has recently given further reasons for its maintenance. He has described a second genus and species belonging to the family, *Holidotea unicornis*, which has the first pleopod of the male modified in a similar manner to that here described.

appear smaller than in the young. Miss Richardson has noted similar differences in the specimens she examined, and has rightly interpreted them as due to age. The specimen I have figured agrees very well with the small specimen mentioned by Hodgson from 60 fathoms, off Duke of York Island. There does not appear to be any well-marked difference in the armature of the male and female.

The terminal spines of the abdomen in this species are about one-tenth of the length of the body. There is a well-marked pre-ocular spine on the lateral corners of the head.

The second antennae in fully grown specimens are about equal to the length of the body. The second joint of the peduncle is short, and bears a spine on the dorsal surface of the anterior margin, a stronger and longer spine on the outer distal corner and a smaller spine behind the latter. The third joint is less than half as long as the fourth joint, and bears three small spines on the inner margin and three larger spines on the outer margin, including the spine on the outer distal corner, which is the strongest and largest of the series. The fourth joint has the outer distal corner produced into a prominent spine. The fifth joint is one and a quarter times as long as the fourth joint, and equal in length to the flagellum, which is composed of thirteen joints.

The third thoracic limb has the outer corners of the fourth and fifth joints produced into a spine. The fourth and fifth thoracic limbs have similar spines on the third, fourth and fifth joints. The second joint of these limbs has at least one prominent spine and generally two or three small spines on its outer surface.

The sixth, seventh and eighth thoracic limbs have a few stout spines on the outer face of the second joint, a strong spine on the hinder distal corner of the third joint, a similar spine on the outer distal corner of the third joint, a double row of small spinules on the front edges of the third, fourth and fifth joints, and a single row of about eight small spines on the front edge of the sixth joint.

The largest specimens reach a length of 43 mm., which is 6 mm. larger than the specimens recorded by Hodgson. It is the most abundant species in the present collection, and appears to have the centre of its distribution in comparatively shallow water, about 50 fathoms, at which depth it was most abundant. It is a matter of some surprise that no specimens were collected by the "Discovery"; and, indeed, only one other expedition, the "Pourquoi Pas?" has met with this species.

43. *Antarcturus furcatus* (Studer). Pl. VIII, figs. 1, 2.

Arcturus furcatus, Studer, 1882, p. 57; Studer, 1884, p. 12, pl. I, figs. 3*a*–*c*; Beddard, 1886 (2), p. 85.

Antarcturus furcatus, zur Strassen, 1902, p. 686.

Occurrence.—Station 220, off Cape Adare, mouth of Robertson's Bay, 45–50 fathoms, bottom fauna, one male, 29 mm., one juvenile, 24 mm.

Station 314, 5 miles N. of Inaccessible Island, McMurdo Sound, 222–241 fathoms, bottom fauna, twenty specimens, largest female 40 mm., largest male 32 mm.

Station 348, off Barne Glacier, McMurdo Sound, 200 fathoms, bottom fauna, two females and one male, 26–33 mm.

Station 355, 77° 46′ S., 166° 8′ E., 300 fathoms, bottom fauna, fifteen females and ten males, 24–38 mm.

Remarks.—This species is very closely related to *A. polaris*, Hodgson, but may be distinguished from that species by the different armature of the body, the longer second antennae, and the longer terminal spines on the abdomen.

In *A. furcatus* the longest and most conspicuous spines on the body are those on the head, on the coxal plates and on the basal joint of the thoracic limbs. There are no specially large spines on the thorax, as in *A. polaris*, but the thorax and abdomen are much more densely covered by small, sharp, backwardly directed spines than in Hodgson's species. Studer's figure gives a very good general idea of the arrangement of these small spines. On the head there is a pair of long flattened and outwardly directed spines, behind which is a row of small spinules. There is a prominent pre-ocular spine on the antero-lateral corner of the head.

The terminal spines of the abdomen are about one-sixth of the total length of the body and equal to the terminal unsegmented portion of the abdomen. They are therefore considerably longer, and in consequence more slender, than in *A. polaris*, and rather longer than Studer's figure shows them.

The second antennae are longer than the body, about one-sixth to one-fifth longer. In a female measuring 38 mm. without the terminal spines of the metasome, the second antennae measure 45 mm., the third joint measuring 5·5 mm., the fourth 12 mm., and the fifth 14·5 mm.

These measurements give a very fair idea of the general proportions of the second antenna in this species, from which it will be seen that it is proportionately longer than the same appendage in *A. polaris*. The second joint has a spine on the dorsal face of the anterior margin and the outer distal corner produced into a strong spine. There are three smaller spines about half-way along the joint on the dorsal and outer face. The third joint has five small spines on the inner margin and five stronger spines on the outer margin, in addition to the very strong spine on the outer distal corner. The fourth joint has the outer distal corner produced into a strong spine. The flagellum is composed of about fifteen joints. The third thoracic limbs have one large and two smaller spines on the front margin of the second joint, the front distal corner of the third, fourth and fifth joints produced into a strong spine, that of the fourth the largest, the fifth joint with a smaller spine about half-way down. In the fourth thoracic limb there are three spines on the second joint, and in the fifth five. In the sixth to the eighth thoracic limbs, the second joint has about seven spines on the inner posterior margin, and six on the outer posterior margin. The third joint has two rows of small spines on the inner front margin, about eight in number. The inner lower distal posterior corner is produced into a long spine, and there are three smaller spines on the outer posterior margin. The fourth and fifth joints have two rows of eight small spines on the first margin and the inner hinder distal corner produced into a strong spine. The sixth joint has a single row of eight spines on the front margin, and two prominent spines on the outer hinder margin. On the seventh joint there is a small secondary spine near the tip of the dactylus.

. There are four pairs of incubatory lamellae in the female, and the exopod of the first pleopod of the male is modified as I have described it under the genus *Antarcturus* (pl. VIII, figs. 1, 2).

This species comes very near to *A. glacialis*, Bedd., but the latter has no pre-ocular spines on the antero-lateral corner of the head, and the spines arming the body are smaller, finer and much more numerous.

I have compared my specimens with those identified as *A. furcatus* by Beddard from the "Challenger" collections, and find the following differences. In the "Challenger" specimens the spines of the body are more erect, especially the two prominent ones on the cephalon, and on the abdomen there is a specially prominent spine about half-way down on each side which is conspicuously larger than the rest. In my specimens there is no outstanding spine of this kind on the abdomen, and Studer shows none in his figure. Moreover, both Studer's figure and the present specimens agree in the flattened outwardly spreading form of the cephalic horns. On the other hand, the "Challenger" specimens agree with mine and with Studer's figures in the general details of the armature of the body, the position of the spines and their general arrangement. The present specimens are in closer agreement with Studer's figures than the "Challenger" specimens, and the only really vital difference is in the length of the terminal spines of the metasome, which are longer than Studer shows and more nearly resemble those figured by Beddard in *A. glacialis*.

A. furcatus is nearly as common in this collection as *A. polaris*, but in Antarctic waters at any rate appears to be a deeper water form with the maximum of distribution at about 200 fathoms. Studer's specimens were from Kerguelen, and the "Challenger" records it from two or three localities near there, and from one place in the Southern Ocean at a depth of 1,675 fathoms.

44. *Antarcturus franklini*, Hodgson.

Arcturus franklini, Hodgson, 1902, p. 250.
Antarcturus franklini, Hodgson, 1910, p. 38, pl. V, figs. 2, 3; Richardson, 1913, p. 10.

Occurrence.—Station 314, 5 miles N. of Inaccessible Island, McMurdo Sound, 222–241 fathoms, bottom fauna, three males and three females, 18–25 mm.

Station 318, hole in the ice between Cape Evans and Inaccessible Island, 95 fathoms, bottom fauna, one male, 16 mm.

Station 355, 77° 46′ S., 166° 8′ E., 300 fathoms, bottom fauna, two females, 20 mm.

Remarks.—A smaller species than the last, and having the centre of its distribution in deeper water. Unlike *A. polaris*, the two sexes are quite different in external aspect, so much so that Hodgson at first described each sex as a separate species.

45. *Antarcturus hiemalis*, Hodgson.

A. hiemalis, Hodgson, 1910, p. 41, pl. VI, figs. 1–1*e*.

Occurrence.—Station 314, 5 miles N. of Inaccessible Island, McMurdo Sound, 222–241 fathoms, bottom fauna, sixteen specimens, largest male 35 mm., largest female 40 mm.

Station 355, 77° 46′ S., 166° 8′ E., 300 fathoms, bottom fauna, one male, 34 mm., one female, 32 mm.

Remarks.—This is a very distinct and easily recognisable species. There are no well-marked sexual differences. Hodgson has already noted the growth of Hydroids, Polyzoa, worm-tubes, etc., on the bodies of this species. The present specimens show similar growths, and indicate a species of almost sedentary habits. With such animal-growths all over the body and with its decoration of long fine hairs the animal must be very well concealed in its environment.

46. *Antarcturus lilliei*, n. sp. Pl. IX, fig. 1.

Occurrence.—Station 220, off Cape Adare, mouth of Robertson's Bay, 45–50 fathoms, bottom fauna, one female, 15 mm.

Station 355, 77° 46′ S., 166° 8′ E., 300 fathoms, bottom fauna, one male, 14 mm. (type).

Description.—The general form and sculpture of the body will be seen from the figure of the male (pl. IX, fig. 1). The female is slightly more vaulted and swollen in the thoracic region, owing to the development of the marsupial pouch. The body is widest at the fifth free thoracic somite, which is markedly swollen at each side above the insertion of the legs of that somite. The body is covered by minute granules, which extend to the antennules and antennae. On the lateral parts of the last two thoracic somites, and on the abdomen, there are also coarser tubercles as shown in the figure. The head is excavated in front and bears two cephalic horns, short, conical in lateral view, more or less quadrangular in outline in dorsal view, and situated between the eyes. There is no spine on the antero-lateral corners of the head in front of the eyes. The terminal spines of the abdomen are quite short, stout and blunt, and do not project beyond the tip of the abdomen.

The second antennae are not quite as long as the body, the proportion being as 9 is to 10. The second joint bears a prominent spine dorsally and at the antero-lateral distal corner. The third joint has four tooth-like spines on its outer margin. The fourth joint is nearly twice as long as the third, and the fifth joint one and one-third times as long as the fourth. Both joints are without prominent spines. The flagellum is about one-half times the length of the fifth joint, and composed of seven joints.

The third, fourth and fifth thoracic limbs have the outer distal corners of their second, third and fourth joints spiniform, and their front margins clothed with long setae. The sixth, seventh and eighth thoracic limbs are shorter and stout in build, with one or two blunt spines on the hind margin of the second joint, the outer and hinder corner of the fourth joint spiniform, a row of small spines on the inner front margins of the third, fourth, fifth and sixth joints, and a small claw at the tip of the seventh joint. There are four pairs of incubatory lamellae in the female, and the exopod of the first pleopods of the male is modified in the way I have described for the genus as a whole.

This species is most nearly allied to *A. coppingeri*, Miers, and *A. antarcticus*, Bouvier. It is distinguished from both these species by its smaller size, by the presence of two distinct though small cephalic horns, and by the greatly reduced length of the terminal spines of the abdomen.

47. *Antarcturus horridus*, sp. nov. Pl. IX, fig. 2.

Occurrence.—Station 314, 5 miles N. of Inaccessible Island, McMurdo Sound, 222–241 fathoms, bottom fauna, two males, 18 mm. (types).

Station 355, 77° 46′ S., 166° 8′ E., 300 fathoms, bottom fauna, one male, 16 mm.

Description.—This species is best described by a reference to pl. IX, fig. 2. It is a very spinous species, and it is difficult to describe the arrangement of the spines. The most prominent feature is the pair of large upright forwardly directed cephalic horns between the eyes, each of these horns bearing several secondary spines and spinules. There is a prominent spine on each of the side-plates of the segments, and in general a row of larger spines on the dorsal surface of each segment; but the great profusion of secondary spinules obscures the main arrangement. The pair of processes at the posterior end of the abdomen are rather short, but like the cephalic horns they bear secondary spines and spinules.

The first antennae are rather long, almost reaching the end of the third joint of the peduncles of the second antennae. The first joint of the peduncle has a spine on the anterior dorsal margin. The second joint is longer than the third, and the flagellum is equal to the second and third peduncular joints combined.

The second antennae are longer than the body, the third joint of the peduncle nearly three times as long as the second, the fourth joint twice as long as the third but considerably less stout, the fifth joint very long and slender, more than one and a half times as long as the fourth; flagellum broken in all the specimens, but composed of more than eight rather long and slender joints. The first four joints of the peduncle are very spinous, but the fifth joint is without spines. The general arrangement of the spines can be seen in the figure.

The thoracic limbs are rather long and slender and very spinous, but they are quite typical of the genus, and the figure shows the essential details of their form and armature.

Remarks.—This species may be distinguished from all other described species of the genus by the great development of the spines arming the body, by the large pair of cephalic horns with secondary spines, by the short terminal horns on the abdomen, also with secondary spines, and by the very long, slender and spinous antennae. Only male specimens occur in the collection, and they were all obtained in deep water in the Antarctic Ocean near the Ice Barrier.

Genus DOLICHISCUS, Richardson.

48. *Dolichiscus meridionalis*, Hodgson.

> *Antarcturus meridionalis*, Hodgson, 1910, p. 43, pl. VI, fig. 2.
> *Dolichiscus meridionalis*, Richardson, 1913, p. 17.

Occurrence.—Station 314, 5 miles N. of Inaccessible Island, McMurdo Sound, 222–241 fathoms, bottom fauna, one adult male, 38 mm.

Remarks.—I suspect *Dolichiscus pfefferi*, Richardson, will prove to be the adult female of this species. Richardson had only a female specimen at her disposal, and both Hodgson's single specimen and my own are males. The differences between the two species may quite well be sexual. It should, however, be noted that there is no trace in the above specimen of the long processes from the basal joints of the fourth pair of thoracic legs, almost meeting in the centre, which Richardson gives as one of the characters of the genus *Dolichiscus*.

Genus NEASTACILLA, nov.

Diagnosis.—Agreeing with the genus *Astacilla*, Cordiner, except that (1) the second thoracic somite is fused with the head, and its lateral parts are not expanded downwards and forwards to cover partially the mouth-organs; (2) the abdomen is unsegmented, all the segments being fused into one piece. Type, *Astacilla falclandica*, Ohlin.

An examination of the figures given in Sars' Crustacea of Norway to illustrate the genus *Astacilla* will show that in this genus the second thoracic somite is, as in the majority of Isopods, quite free from the cephalothorax and marked off distinctly by an articulation. Moreover, its lateral parts are expanded downwards and forwards so as partly to cover the oral area. Furthermore, Sars' figures show, and his description states that in this genus the abdomen is composed of two somites.

In his account of the "Challenger" Isopoda, Beddard describes a species, *Astacilla marionensis*, in which the second thoracic somite is fused with the head and not expanded laterally to cover partially the mouth-parts, but the abdomen is described as composed of three segments, though these segments are not shown in Beddard's figure. Vanhöffen has described a species, *A. kerguelensis*, which is very closely allied to, if not identical with, Beddard's species; and, in his figure, the abdomen is shown to be composed of three segments, thus bearing out Beddard's description. These two species are closely allied to *Astacilla falclandica*, Ohlin, but the composition of the pleon will not allow them to be referred to my new genus.

Astacilla falclandica and *A. magellanica* were described by Ohlin in 1901, and in both species the head is stated to be fused with the first segment of the thorax, and the segments of the pleon all fused together. In the present collection there is a single female specimen, from New Zealand waters, which I am unable to distinguish from *A. falclandica*, Ohlin, and an examination of its characters has led me to decide that the fusion of the true second thoracic somite with the cephalothorax, the fact that its lateral parts are not expanded to cover the oral area, and the unsegmented nature of the abdomen are characters of generic importance. I have, therefore, instituted the genus *Neastacilla* for its reception, and would refer *A. magellanica* to the same genus.

The genus *Neastacilla* agrees with *Astacilla* in having the flagellum of the second antenna composed of three joints, in having the seventh joint of the third to the fifth thoracic limbs represented only by a short nail, in having the last three thoracic limbs robust and bi-unguiculate, and in having four pairs of marsupial lamellae.

49. *Neastacilla falclandica* (Ohlin). Pl. X, figs. 1–3

Astacilla falclandica, Ohlin, 1901, p. 266, pl. XX, fig. 1; Stebbing, 1914, p. 353.

Occurrence.—Station 96, 7 miles E. of North Cape, New Zealand, 70 fathoms, bottom fauna, one ovigerous female, 8·5 mm.

Remarks.—I can find no valid characters to separate this specimen from *A. falclandica*, Ohlin. The only difference I can find is that, whereas Ohlin describes his specimen as without tubercles or spines, I can detect a few obscure tubercles on the elongate somite of the thorax in mine, which I have attempted to indicate in the figure. The whole body in my specimen is very transparent, and it is with great difficulty that the tubercles can be seen at all. They are very low and not at all prominent. Otherwise the specimen agrees absolutely with Ohlin's description, even to the presence of black pigment-spots all over the body. I have figured the fifth and eighth thoracic limbs to show their general form and structure. Stebbing has already called attention to the minute dactylus on the third, fourth and fifth pairs. The latter author is of the opinion that *A. magellanica*, Ohlin, is synonymous with this species. According to Ohlin, *A. magellanica* differs from *A. falclandica* in its smaller eyes, shorter and stouter second antennae, and the absence of black pigment-spots. These differences may be sexual, but Ohlin's specimens of both species were very small, and he does not give the sex. *N. falclandica* differs from *Astacilla marionensis*, Beddard, and *A. kerguelensis*, Vanhöffen, in having the abdomen unsegmented and without a prominent spine half-way down its lateral margin.

The species provides further evidence of the wide distribution of some of the Crustacea found in New Zealand waters.

Genus PSEUDARCTURELLA, nov.

Diagnosis.—Body of the usual Arcturid form, with a marked bend between the fifth and sixth thoracic somites; second to eighth thoracic somites clearly marked off and none of them elongated; side-plates well developed on all the free thoracic somites, but those of the second thoracic somite not expanded to cover partially the oral area; abdomen of two segments, but two further segments indicated laterally by grooves; first antenna relatively long and stout, with a regular series of sensory filaments in pairs all along the lower margin of the flagellum; second antenna not very long, rather stout, flagellum of two joints terminated by a strong spine and not pectinate; mouth-parts very similar to those of the genus *Arcturella*, but I could not find any coupling hooks on the maxillipedes; second thoracic limb with the proximal part of the dactylus narrow and linear; third to fifth thoracic limbs with the fourth joint not specially elongate, dactylus distinct though small; sixth to eighth thoracic limbs not bi-unguiculate but having two strong setae on the inner margin of the dactylus near the tip; first pleopods of the male modified, having a secondary lobe on the inside of the exopod. Type, *Pseudarcturella chiltoni*, Tattersall.

This interesting genus is distinguished from all the other genera of the Arcturidae by the peculiar modification of the first pleopod of the male. I know of nothing quite like it in other Isopoda, and it is a modification of quite a different order from that found in the genus *Antarcturus*.

Pseudarcturella approaches the genera *Arcturus*, *Antarcturus* and *Nearcturus* in having the fourth free somite of the body not appreciably longer than any of the other segments.

It differs from *Arcturus* in the reduced flagellum of the second antenna and in the non-expansion of the side-plate of the second thoracic somite to cover the oral area. In the last character it agrees with *Antarcturus*, but the latter agrees with *Arcturus* in the form of the antennal flagellum.

Pseudarcturella agrees with *Neoarcturus* in the characters of the segmentation of the thorax, in the reduced flagellum of the antennae, and in the coxal plates of the second thoracic segment; but *Nearcturus* has four segments in the abdomen, is without eyes, and the body is not geniculate, while the first pleopod of the male is not modified.

In the reduced flagellum of the antennae *Pseudarcturella* approaches the *Astacilla* group of genera, and among this group it approaches the genus *Arcturella* in the form of the second thoracic limbs with their linear dactylus. But from this group of genera it is at once distinguished by not having the fourth free somite of the thorax elongated. Altogether the genus is a quite peculiar one, combining characters of the *Astacilla* group with those of the *Arcturus* group and strongly marked off from both by the extraordinary form of the first pleopod of the male.

50. *Pseudarcturella chiltoni*, sp. nov. Pl. X, figs. 4–11.

Occurrence.—Station 135, Spirits Bay, near North Cape, New Zealand, 3 metres, tow-net at night, one male, 4·5 mm.

Description.—Body of the usual Arcturid-like shape, geniculate at the junction of the fourth and fifth free thoracic somites; head with the anterior margin quite straight and not excavated; eyes prominent and bulging, pigment black; head with a pair of small cephalic conical horns; last seven thoracic somites clearly marked off, none of them elongate or differing in size markedly from the others, without spines or tubercles; side-plates present on all the thoracic somites, those of the second somite not expanded to cover the oral area; abdomen (pl. X, fig. 4) of two somites, but two other somites indicated laterally by grooves; terminal somite with a well-marked keel on each side of the median line, terminating some way in front of the apex in small spines, the area between the keels flat, and the lateral and terminal portions of the abdomen sloping sharply down from the keels, so that in lateral view the pleon resembles the inverted keel of a flat-bottomed boat.

First antennae (pl. X, fig. 5) rather long and robust, extending almost to the end of the third joint of the peduncle of the second antennae; flagellum as long as the peduncle, and with sensory setae arranged in regular pairs, ten in number, the whole way along the lower margin.

Second antennae (pl. X, fig. 6) robust, two and one-fifth times as long as the first; fourth joint of the peduncle one and a half times as long as the third, fifth joint one and a quarter times as long as the fourth; flagellum two-thirds as long as the fifth joint of the peduncle, composed of two joints terminated by a strong spine, none of the joints pectinate on the inner margin.

Mouth-parts very much as in the genus *Arcturella* as figured by Sars, except that I could not find any coupling hooks on the maxillipedes.

Second thoracic limb (pl. X, fig. 7) with the inner distal corner of the carpus produced into a short blunt spine-like process; proximal portion of the dactylus linear as in *Arcturella*, and not expanded as in *Astacilla*.

Third to fifth thoracic limbs (pl. X, fig. 8) with the fourth joint not elongated, fifth joint shorter than sixth, dactylus distinct though small.

Sixth to eighth thoracic limbs (pl. X, fig. 9) robust, dactylus not bi-unguiculate but with two spiniform setae on the inner margin near the tip.

First pleopod of the male (pl. X, fig. 10) with a specially modified lobe on the inside of the exopod. This lobe is expanded at the base and tapers to a point, and is only slightly shorter than the rami of the pleopods. On its inner margin it bears seven long plumose setae near the base, and the tip shows several transverse thickenings of the chitin.

Second pleopod in the male (pl. X, fig. 11) with the stylet on the endopod long and pointed, nearly twice as long as the rami.

Remarks.—I have discussed the affinities of this species under the genus. There is only one specimen, a male measuring 4·5 mm., but, judging from the pleopods at least, sexually mature.

Sub-order GNATHIIDEA.

Family GNATHIIDAE.

Genus EUNEOGNATHIA, Stebbing.

51. *Euneognathia gigas* (Beddard).

Anceus gigas, Beddard, 1886 (1), p. 120; Beddard, 1886 (2), p. 137, pl. XVIII, figs. 8–10.
Euneognathia gigas, Stebbing, 1893, p. 338, pl. XIV; Hodgson, 1910, p. 15, pl. I, figs. 3–3*b*.

Occurrence.—Station 294, Ross Sea, 74° 25′ S., 179° 3′ E., 158 fathoms, January 15, 1913, bottom fauna, one adult male, 12 mm., one Praniza larva, 12 mm.

Genus GNATHIA, Leach.

52. *Gnathia antarctica* (Studer).

Anceus antarcticus, Studer, 1884, p. 4.
Gnathia polaris, Hodgson, 1902, p. 241, pl. XXXII.
Gnathia antarctica, Richardson, 1906 (2), p. 3; Richardson, 1908, p. 3; Hodgson, 1910, p. 11, pl. I, fig. 2; Vanhöffen, 1914, p. 486, text-figs. 23 and 24.

Occurrence.—Station 331, off Cape Bird Peninsula, entrance to McMurdo Sound, 250 fathoms, January 14, 1912, bottom fauna, 10 males, one female, five larvae.

Cumberland Bay, South Georgia, collected by P. Stammwitz, one male, four larvae.

Remarks.—In his report on the Isopoda of the German South Polar expedition, Vanhöffen (1914) has named two varieties of this widely distributed form, *G. antarctica continentalis*, a deep-water form with pale eyes found generally in deep water off the Antarctic continent, and *G. antarctica insularis*, a form with darkly pigmented eyes found in shallow water among the Sub-antarctic Islands. The specimens I have examined do not quite bear out this rigid demarcation. It is true that the specimens from South Georgia all have dark, almost black eyes, but among those from Station 331 the larvae are all pale-eyed, but the males show considerable variation in the pigment of the eyes, some specimens having it quite dark and of only slightly less intensity than the shallow-water specimens from South Georgia.

53. *Gnathia hodgsoni*, Vanhöffen.

G. hodgsoni, Vanhöffen, 1914, p. 448, text-fig. 25.

Occurrence.—Station 331, off Cape Bird Peninsula, entrance to McMurdo Sound, 250 fathoms, January 14, 1912, two males.

Remarks.—Among the numerous specimens of *Gnathia* collected at Station 331, I detected two males which agree completely with Vanhöffen's description of *G. hodgsoni*. Vanhöffen separated this specimen from *G. antarctica*, Studer, on (1) the longer curved pre-ocular lobes with their armature of subsidiary spinules; (2) the more spiny contour of the head and the first three somites of the body; (3) the coarser spinules covering the anterior part of the body generally; (4) the more scanty clothing of setae on the body. The two specimens I have referred to this species bear out Vanhöffen's description. They were very easily picked out from the dozen or so *G. antarctica* which accompanied them.

54. *Gnathia calva*, Vanhöffen. Pl. XI, figs. 1–3.

G. calva, Vanhöffen, 1914, p. 449, text-fig. 26.

Occurrence.—Station 314, 5 miles N. of Inaccessible Island, McMurdo Sound, 222–241 fathoms, Jan. 23, 1911, one female.

Station 331, off Cape Bird Peninsula, entrance to McMurdo Sound, 250 fathoms, Jan. 14, 1912, five males.

Remarks.—Five males of this species were detected among the *Gnathia antarctica* and *G. hodgsoni* collected at Station 331. They measured from 5·5 mm.–6·5 mm., and are thus slightly larger than Vanhöffen's types. I have given a new figure (pl. XI, fig. 1) of one of these specimens for comparison with Vanhöffen's figure, since the spinulation of the body seems scarcely so pronounced and rather finer than Vanhöffen shows it to be. Otherwise the specimens are in complete agreement with Vanhöffen's description. The species may be distinguished from the other Antarctic species of *Gnathia* by the absence of hairs on the body generally, by the absence of pre-ocular processes, by the shape of the anterior margin of the head, by the relatively longer peduncles of the antennae and antennules, and by the form of the mandibles (pl. XI, fig. 2).

From Station 314 I obtained a single female *Gnathia*, which I regard as the female of this species. It measures 5 mm. in length and is devoid of hairs on the body. It may be distinguished at once from the females of *G. antarctica* by the form of the frontal process, which is very much longer and more prominent, with parallel sides and emarginate apex. A comparison of the figure here given (pl. XI, fig. 3) of the front part of the present female specimen with Vanhöffen's figure (1914), p. 487, text-fig. 24*b*, will bring out this distinction.

It is a matter of interest that all the three species of *Gnathia* in this collection were collected together at the same station.

PRANIZA LARVAE.

Praniza larvae were collected at the following Stations, but have not been identified with any known species.

Station 317, hole in ice between Cape Evans and Inaccessible Island, 74 fathoms, June 7, 1911, from *Trematomus* sp., one.

Station 338, 77° 13′ S., 164° 18′ E., 207 fathoms, Jan. 23, 1912, one.

Station 339, 77° 5′ S., 164° 17′ E., 140 fathoms, Jan. 24, 1912, one.

INCERTAE SEDIS.

Genus RHABDOCHEIRUS, Bonnier.

55. *Rhabdocheirus incertus,* Bonnier. Text-figs. 3, 4, pl. XI, figs. 4–13.

R. incertus, Bonnier, 1898, p. 198, text-figs. 1 and 2.

Occurrence.—Station 66, 25° 35′ N., 34° 10′ W., at surface, several specimens, ·5 mm.

Remarks.—I am indebted, for the opportunity of examining these specimens, to Dr. Calman, who detected them in the *débris* of the plankton from this station, and who forwarded them to me with the suggestion that they were specimens of *Rhabdocheirus incertus,* Bonnier. This proved to be the case. This extraordinary little Isopod was described by Bonnier twenty years ago. His two specimens were found in exactly similar circumstances among the *débris* of a bottle of plankton taken in the North Atlantic, 34° N., 10° 30′ W., at the surface. I am not able to add much to the elucidation of the species, and I cannot suggest to what family it should be referred. Having a large number of specimens, I have been able to dissect out the antennae and thoracic appendages and to figure them in detail. But beyond a pair of appendages, which I take to be maxillipedes, the mouth-parts have eluded my search.

As Bonnier's account of this form is not readily accessible, I quote it here in full and reproduce his figures :—

" Le petit Crustacé qui fait l'objet de cette note ne rentre dans aucune des subdivisions actuellement admises dans la famille des Isopodes. Je n'en ai trouvé que deux exemplaires seulement en examinant de très près les résidus d'un bocal contenant le produit d'une pèche pélagique exécutée au filet de surface par le Prince de Monaco, l'année dernière, au large des côtes du Maroc. C'est en cherchant les larves cryptonisciennes d'un Épicaride d'espèce nouvelle (*Aspidophryxus frontalis*) parasite de *Sirella norvegica,* G. O. Sars, qu'au milieu des débris de ce Schizopode, de larves de Crustacés Décapodes, de poissons pélagiques, de fragments de Salpes solitaires ou en chaine, que je rencontrai ce type singulier qu'au premier abord, par la forme ramassée de son corps et le développement de quatre de ses paires de pattes, on aurait pu prendre pour un Acarien.

" Les deux exemplaires étaient identiques et mesuraient 0 mm. 55 dans leur plus grande dimension ; la forme générale du corps régulièrement aplati et la présence de sept paires de pattes thoraciques plus ou moins développées les caractérisent évidemment comme Isopodes ; mais la réduction de la partie pléale et l'absence complète d'appendices dans cette partie du corps, fait qui n'existe dans ce groupe que chez quelques formes mâles dégradées de certains Épicarides, les distinguent nettement des sept tribus qui constituent la famille.

" Les figures ci-jointes, représentant l'animal vu par la face dorsale et régulièrement étalé [fig. 3] et par la face ventrale alors qu'il est légèrement recourbé sur lui-même [fig. 4], donnent une idée suffisante de sa forme générale. La tête, complètement privée d'organes visuels, porte antérieurement une paire de fortes antennules formées de six articles garnis de quelques petites soies ; un peu plus bas est insérée une paire d'antennes tout à fait rudimentaires et réduites à un seul petit article très peu visible. Les pièces buccales forment par leur réunion un rostre proéminent constitué par des appendices d'aspect rudimentaire, et, pour ainsi dire, embryonnaire ; on y distingue, sous une lèvre supérieure, une paire de mandibules, deux paires de maxilles et une paire de maxillipèdes. Le thorax est formé de sept somites à peu près d'égales dimensions, sauf le septième qui est beaucoup plus réduit que les autres. Les deux premières paires de pattes thoraciques sont ramenées sous la face ventrale et, comme les appendices buccaux, sont rudimentaires : elles sont courtes et formées de sept

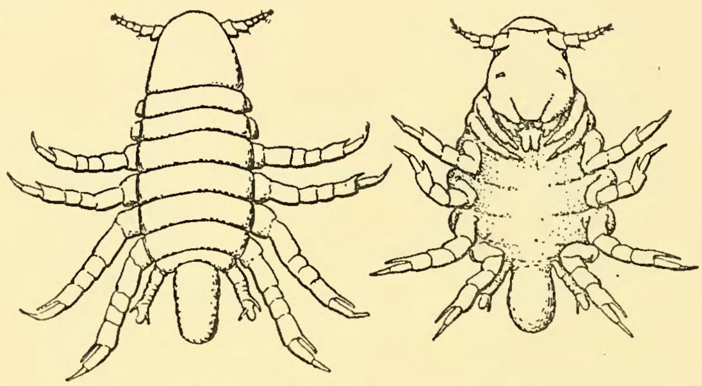

FIG. 2.—*Rhabdocheirus incertus*, Bonnier. A, Dorsal view. B, Ventral view. [After Bonnier.]

articles à peu près semblables, sauf le dernier, le dactylopodite, qui est plus court et plus aigu : les deux paires suivantes sont beaucoup plus robustes et plus de deux fois plus longues ; le basipodite est allongé et le carpopodite se prolonge latéralement par une forte épine chitineuse un peu plus courte que la moitié du propodite ; le dactylopodite allongé se termine par une toute petite griffe. Les cinquième et sixième paires de pattes ont le même aspect et le même développement que les deux précédentes, mais elles s'en distinguent par l'allongement de l'épine du carpopodite qui est ici de la même longueur que l'article suivant. Enfin la septième paire de pattes, quoique encore très robuste, est beaucoup plus courte que les autres : le propodite en est étalé et son extrémité arrondie se projette au delà de l'insertion du dactylopodite. L'abdomen est court, à peu près cylindrique, avec quelques traces encore visibles de sa segmentation primitive ; il est absolument dépourvu d'appendices.

" La morphologie anormale de cet Isopode, l'état rudimentaire des antennes, des pièces buccales, des deux premières paires de pereiopodes, la forme si spéciale des suivants, surtout de ceux de la septième paire, la réduction de la partie pléale, semblent bien indiquer, à défaut d'autres renseignements éthologiques, que nous sommes en présence d'un type dégradé par la vie parasitaire et qui, sans doute, aura été détaché de son hôte au moment de sa capture. L'absence d'organes et de produits génitaux font pensér à une forme jeune, mais d'autre part la régression de certains appendices, comme la spécialisation si caractérisée de certains autres, montre bien que c'est un type sinon adulte, du moins déjà parfaitement adapté à un genre de vie bien particulier.

"Je désignerai cet Isopode sous le nom de *Rhabdocheirus incertus* pour rappeler et la conformation caractéristique des cinq dernières paires de pereiopodes et l'incertitude où nous sommes de son genre de vie."

My examination of this species on the whole confirms Bonnier's description. The only point in which I differ from him is in the interpretation of the antennules and antennae. The single-jointed appendages which Bonnier calls the antennae, I should interpret as the antennules. The head appears to me to be folded downwards and backwards, and this curious bending of the head has led to the antennules appearing on the ventral surface of the head and actually behind the antennae. It follows, therefore, that the appendages called antennules by Bonnier, I believe to be the antennae.

The figures (pl. XI, figs. 4–13) which I give herewith of the appendages show their essential structure in detail, and bear out Bonnier's account. They show specially the sub-cheliform appearance of the dactylus of the fourth to seventh thoracic limbs and the curious form of the last pair of appendages.

The animals are, I think, almost certainly immature, and will probably prove to be young specimens of one of the Epicaridea parasitic on some of the Pelagic Decapoda or Mysidacea. If so, however, the adult must probably belong to a type of Epicaridea hitherto undiscovered, for *Rhabdocheirus* differs widely from any young stage of Epicaridea yet known.

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PLATE I

Tanais novae-zealandiae, G. M. Thomson (?).

FIG. 1.—Second thoracic limb of male. × 20.
FIG. 2.—Third ,, ,, ,, × 20.
FIG. 3.—Fifth ,, ,, ,, × 20.
FIG. 4.—Eighth ,, ,, ,, × 20.
FIG. 5.—Uropod. × 20.

Janira longicauda, Chilton.

FIG. 6—Ovigerous female, dorsal view. × 25.

Ianthopsis, sp.

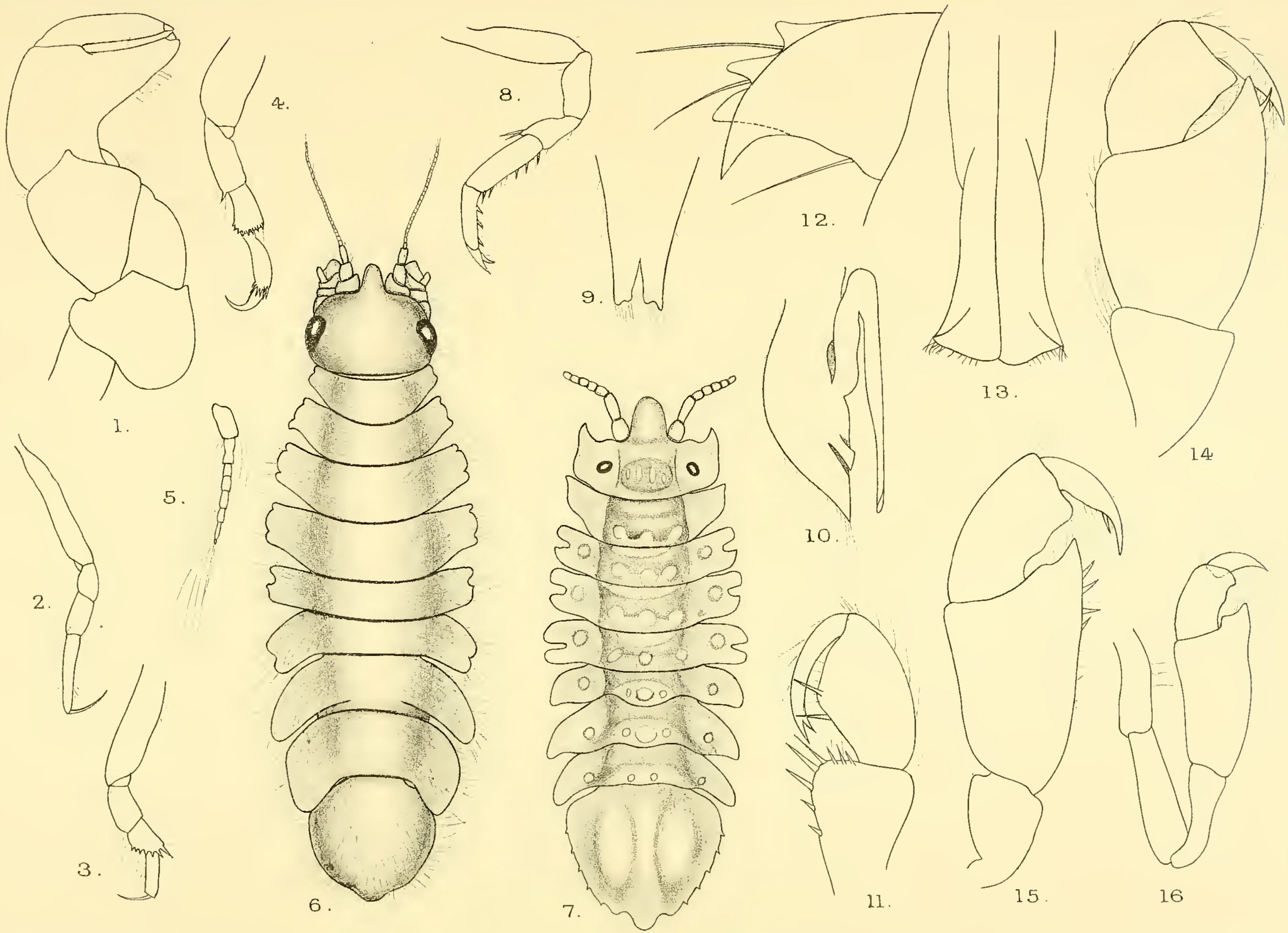
FIG. 7.—Male, dorsal view. × 17.
FIG. 8.—Second thoracic limb. × 35.
FIG. 9.—Distal part of the median lamellae of the operculum of the male.
FIG. 10.—Endopod of the second pleopod of the male. × 35.

Munna maculata, Beddard (?).

FIG. 11.—Distal part of the second thoracic limb of the female. × 95.
FIG. 12.—Uropod. × 660.
FIG. 13.—Median lamellae of the operculum of the male. × 95.
FIG. 14.—Distal part of the second thoracic limb of the male. × 74.

Haliacris antarctica, Pfeffer.

FIG. 15.—Distal part of the second thoracic limb of a young male from St. 220. × 74.
FIG. 16.—Second thoracic limb of a sub-adult male from S. Georgia. × 24.



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Crustacea, Part VI, Pl. I.

PLATE II.

Haliacris antarctica, Pfeffer.

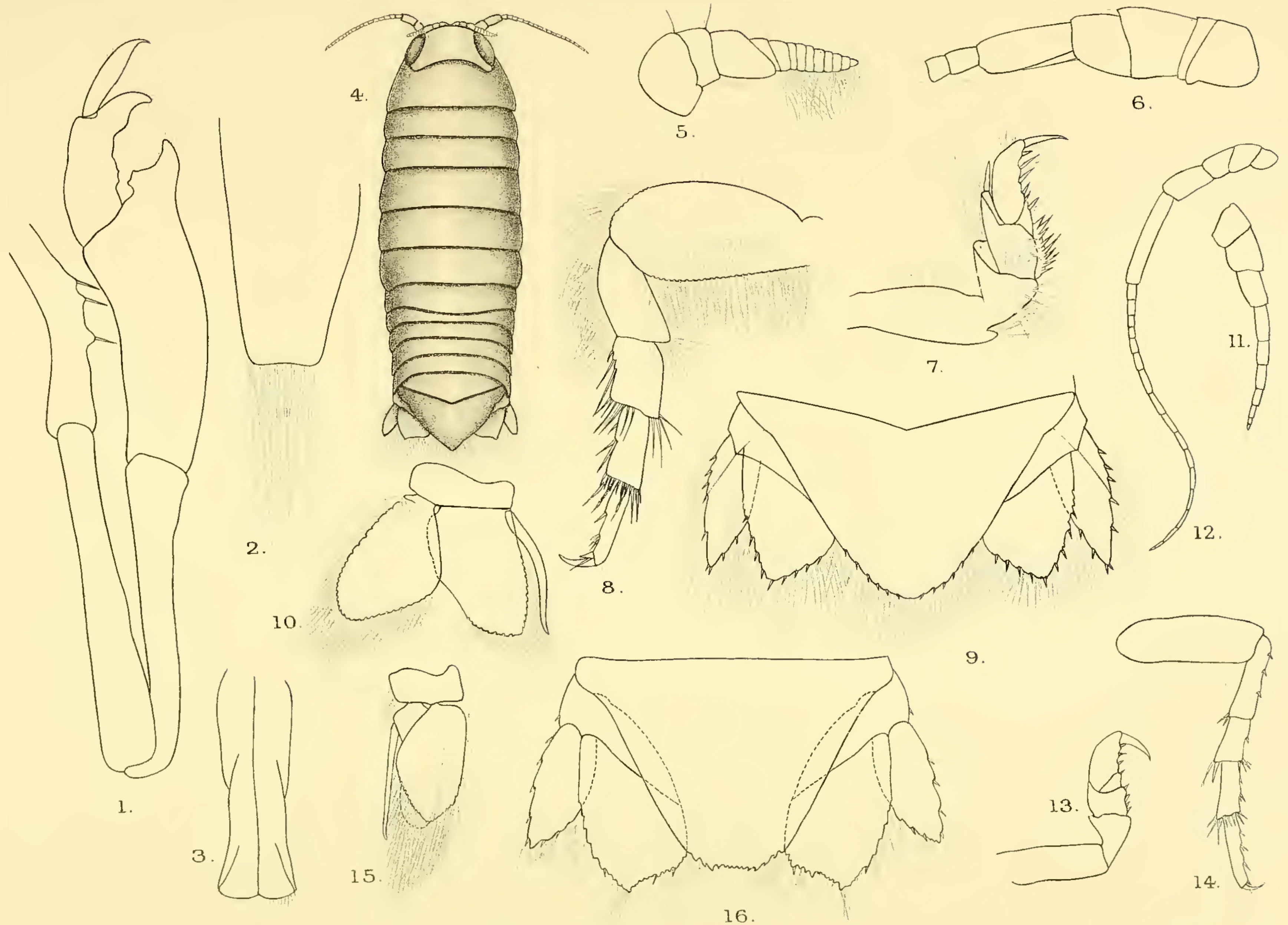
FIG. 1.—Second thoracic limb of an adult male from S. Georgia. × 24
FIG. 2.—Uropod. × 495.
FIG. 3.—Median lamella of the operculum of the male. × 74.

Cirolana pellucida, n. sp. [St. 130.]

FIG. 4.—Adult female, dorsal view. × 7·5.
FIG. 5.—Antennule. × 40.
FIG. 6.—Antenna. × 40.
FIG. 7.—Second thoracic limb. × 20.
FIG. 8.—Eighth ,, ,, × 20.
FIG. 9.—Telson and uropods. × 22.
FIG. 10.—Second pleopod of the male. × 16.

Cirolana japonica, Hansen. [St. 110.]

FIG. 11.—Antennule of the female. × 20.
FIG. 12.—Antenna ,, ,, × 12.
FIG. 13.—Second thoracic limb of the female. × 25.
FIG. 14.—Eighth ,, ,, ,, × 25.
FIG. 15.—Second pleopod of the male. × 40.
FIG. 16.—Telson and uropods of the female. × 25.



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Crustacea, Part VI, Pl. II.

PLATE III.

Cirolana canaliculata, n. sp. [St. 134.]

FIG. 1.—Lateral view of the female. × 17.
FIG. 2.—Antennule of the female. × 40.
FIG. 3.—Antenna ,, ,, × 40.
FIG. 4.—Second thoracic limb of the female. × 40.
FIG. 5.—Eighth ,, ,, ,, × 40.
FIG. 6.—Second pleopod of the male. × 40.
FIG. 7.—Epistome.
FIG. 8.—Telson and uropods of the female. × 40.

Eurydice subtruncata, n. sp. [St. 89.]

FIG. 9.—Antennule of the female. × 40.
FIG. 10.— ,, ,, male. × 40.
FIG. 11.—Peduncle of the antenna of the female. × 40
FIG. 12.—Second thoracic limb of the female.
FIG. 13.—Eighth ,, ,, ,,
FIG. 14.—Second pleopod of the male. × 40.
FIG. 15.—Uropod of the female. × 40.
FIG. 16.—Epistome (clypeus).
FIG. 17.—Telson of the female. × 40.

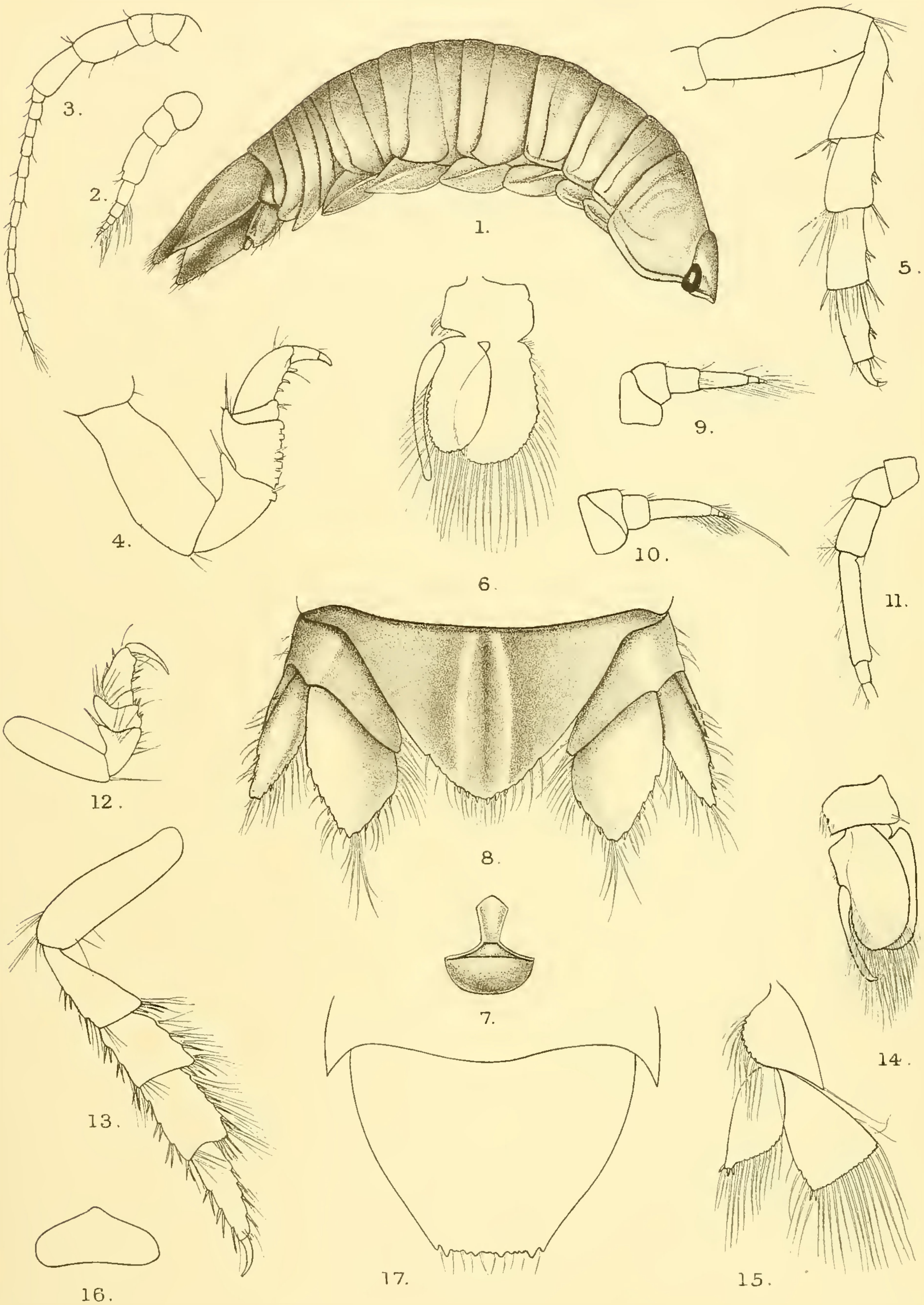

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PLATE IV.

Aega glacialis, n. sp. [St. 316.]

Fig. 1.—Female, dorsal view. × 2.
Fig. 2.— ,, lateral view. × 2.
Fig. 3.—Head from in front to show the eyes and the distance between them. × 2.
Fig. 4.—Epistome.
Fig. 5.—Peduncle of the antennule.
Fig. 6.— ,, ,, antenna.
Fig. 7.—Maxillipede.
Fig. 8.—Second thoracic limb. × 5.
Fig. 9.—Sixth ,, ,, × 5.
Fig. 10.—Second pleopod of the male.

Aega novi-zealandiae, Dana.

Fig. 11.—Maxillipede. × 20.
Fig. 12.—Second thoracic limb. × 10.
Fig. 13.—Eighth ,, ,, × 10.
Fig. 14.—Telson and uropods. × 10.

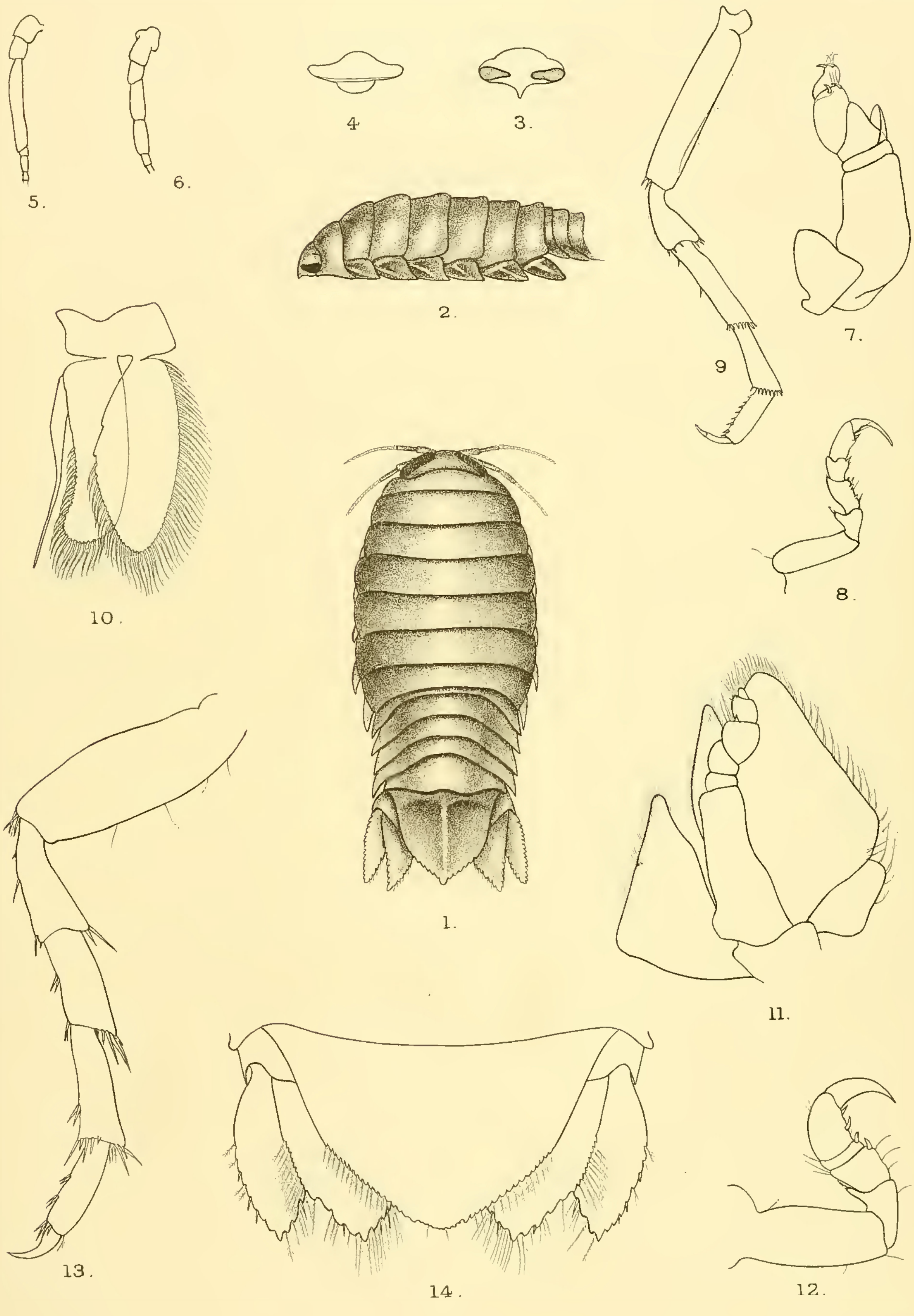

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PLATE V.

Exosphaeroma falcatum, n. sp.

FIG. 1.—Male, dorsal view. × 40.
FIG. 2.—Telson and uropods of the female. × 40.
FIG. 3.—Antennule. × 40.
FIG. 4.—Antenna. × 40.
FIG. 5.—Second thoracic limb. × 40.
FIG. 6.—Eighth ,, ,, × 40.
FIG. 7.—Second pleopod of the male. × 40.
FIG. 8.—Epistome.

Isocladus armatus (Milne-Edw.).

FIG. 9.—Adult male, dorsal view. × 8.
FIG. 10.— ,, female, ,, ,, × 8.
FIG. 11.—Young male, ,, ,, × 8.
FIG. 12.—Antennule. × 13.
FIG. 13.—Antenna. × 13.
FIG. 14.—Second thoracic limb. × 20.
FIG. 15.—Eighth ,, ,, × 20.
FIG. 16.—Second pleopod of the male. × 20.
FIG. 17.—Epistome.

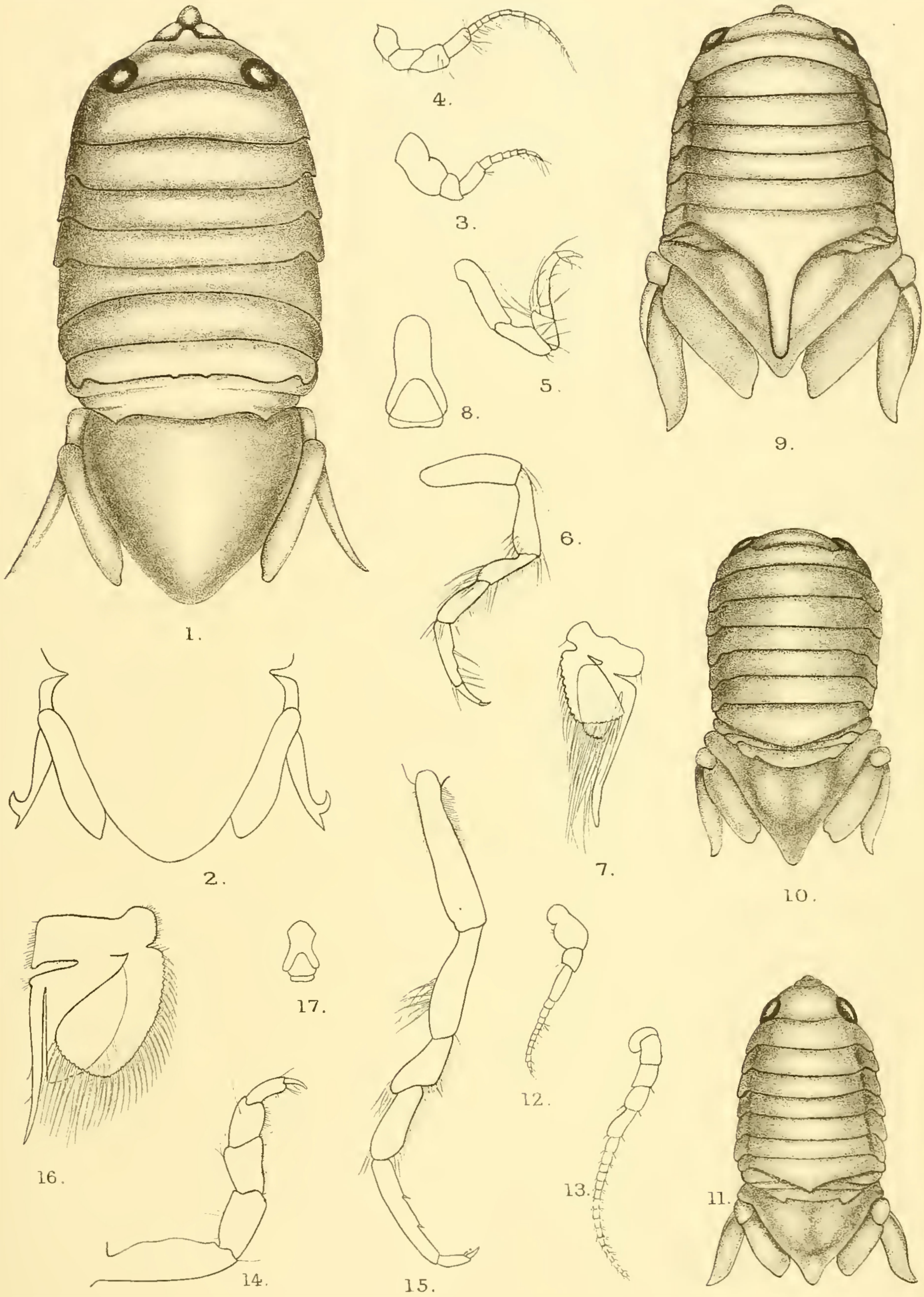

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PLATE VI.

Cymodoce hodgsoni, n. sp.

Fig. 1.—Adult male, dorsal view. × 10.
Fig. 2.— ,, ,, lateral view. × 10.
Fig. 3.—Epistome.
Fig. 4.—Antennule.
Fig. 5.—Antenna.
Fig. 6.—Second thoracic limb.
Fig. 7.—Uropod.
Fig. 8.—Second pleopod of the male.

Cymodoce bituberculata, Filhol (?). [St. 135.]

Fig. 9.—Female, lateral view. × 25.
Fig. 10.—Telson and uropods of the male. × 25.
Fig. 11.—Epistome.
Fig. 12.—Antennule. × 40.
Fig. 13.—Antenna. × 40.
Fig. 14.—Second thoracic limb. × 40.
Fig. 15.—Eighth ,, ,, × 40.

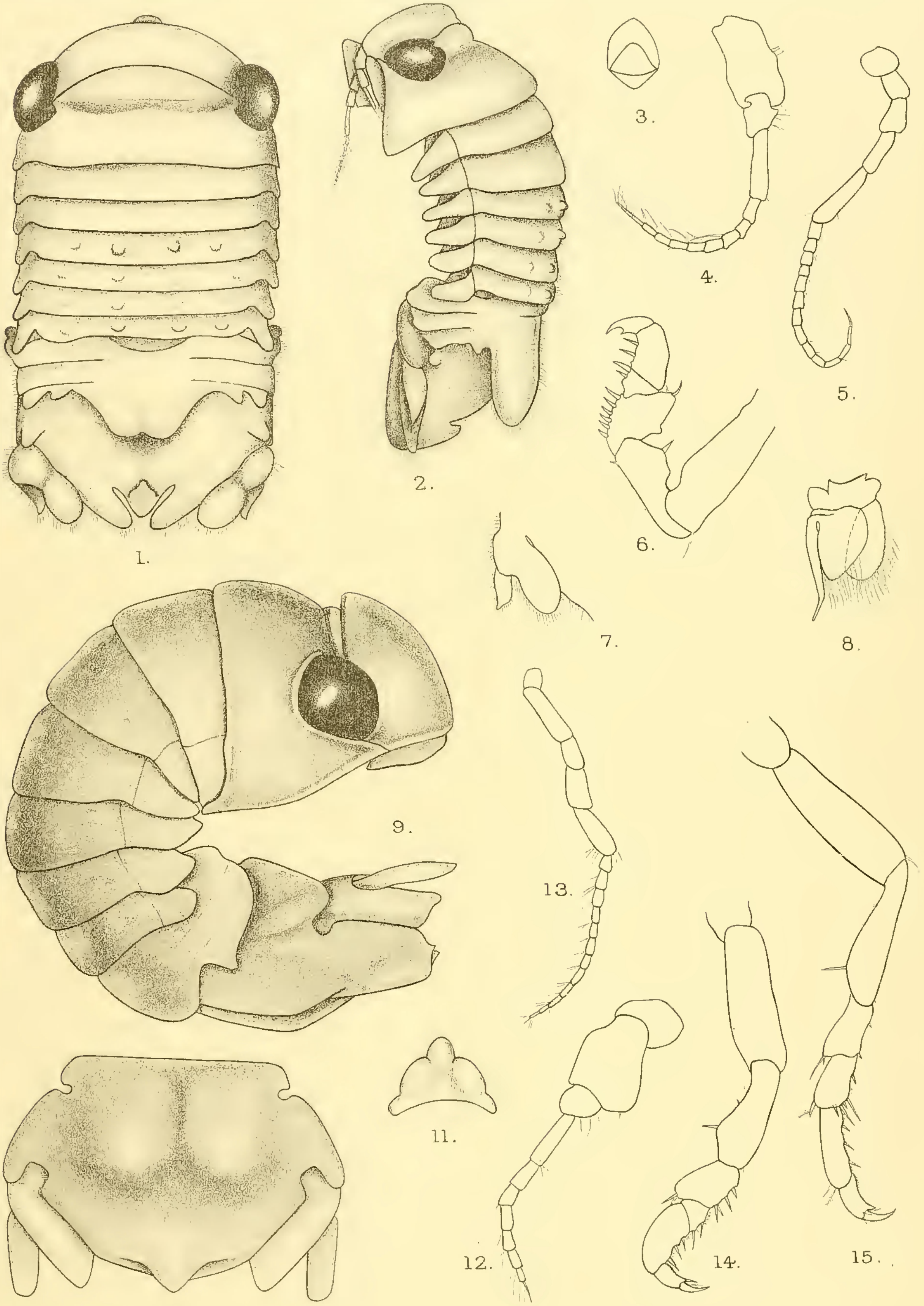

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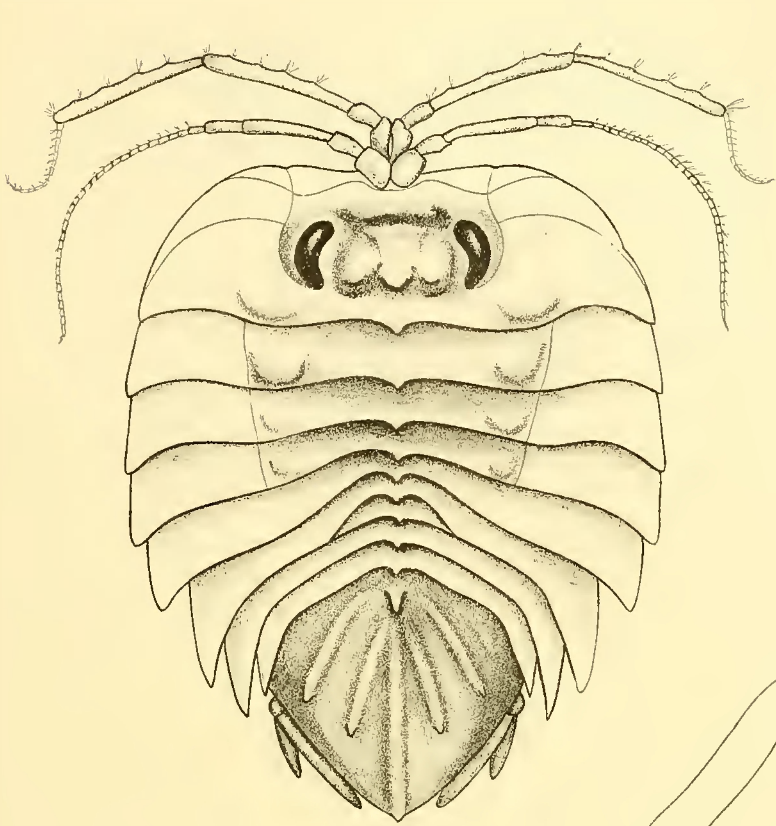
PLATE VII.

Serolis glacialis, n. sp.

FIG. 1.—Adult male, dorsal view. × 5.
FIG. 2.—Second thoracic limb of male. × 10.
FIG. 3.— ,, ,, ,, ,, portion of the palmar margin of the propodus. × 95.
FIG. 4.—Third ,, ,, ,, × 10.
FIG. 5.—Fourth ,, ,, ,, × 10.

Serolis polita, Pfeffer.

FIG. 6.—Third thoracic limb of the male.



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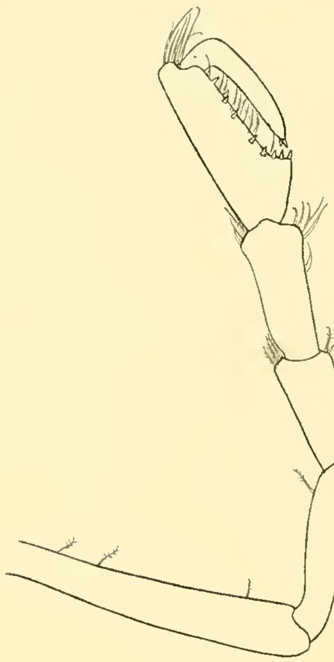

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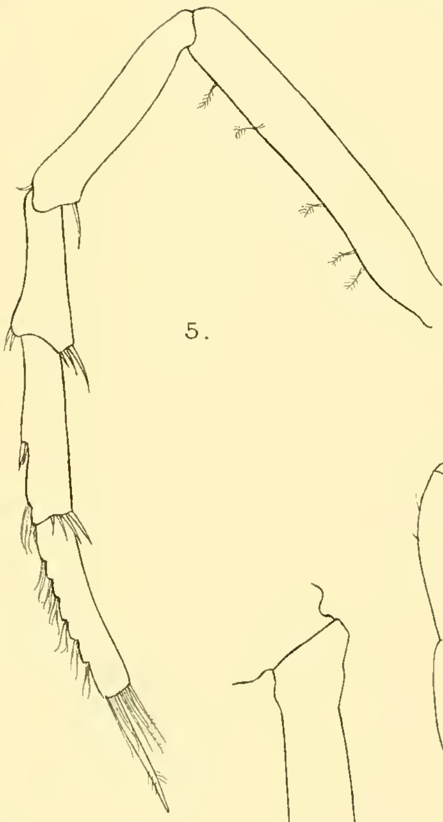

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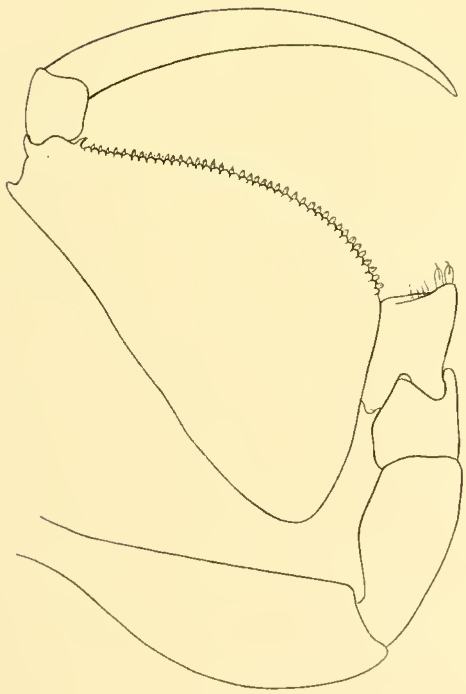

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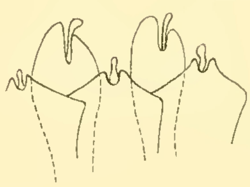

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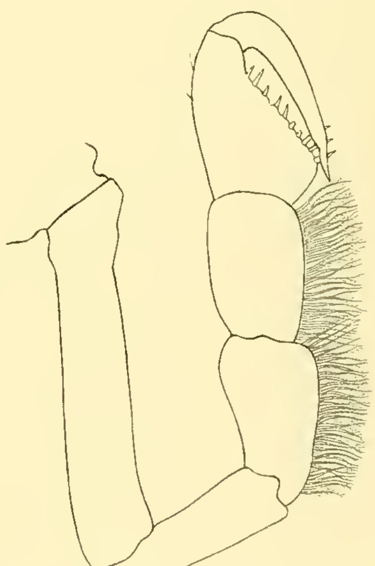

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PLATE VIII.

Antarcturus furcatus (Studer). [St. 314.]

Fig. 1.—Exopod of the first pleopod of the male viewed from the lower posterior surface. × 25.
Fig. 2.—Distal portion of the same viewed from the anterior surface. × 25.

Antarcturus polaris (Hodgson). [St. 220.]

Fig. 3.—Immature specimen, dorsal view. × 5.
Fig. 4.— ,, ,, lateral view. × 5.

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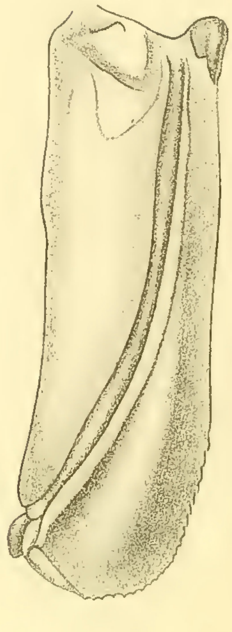

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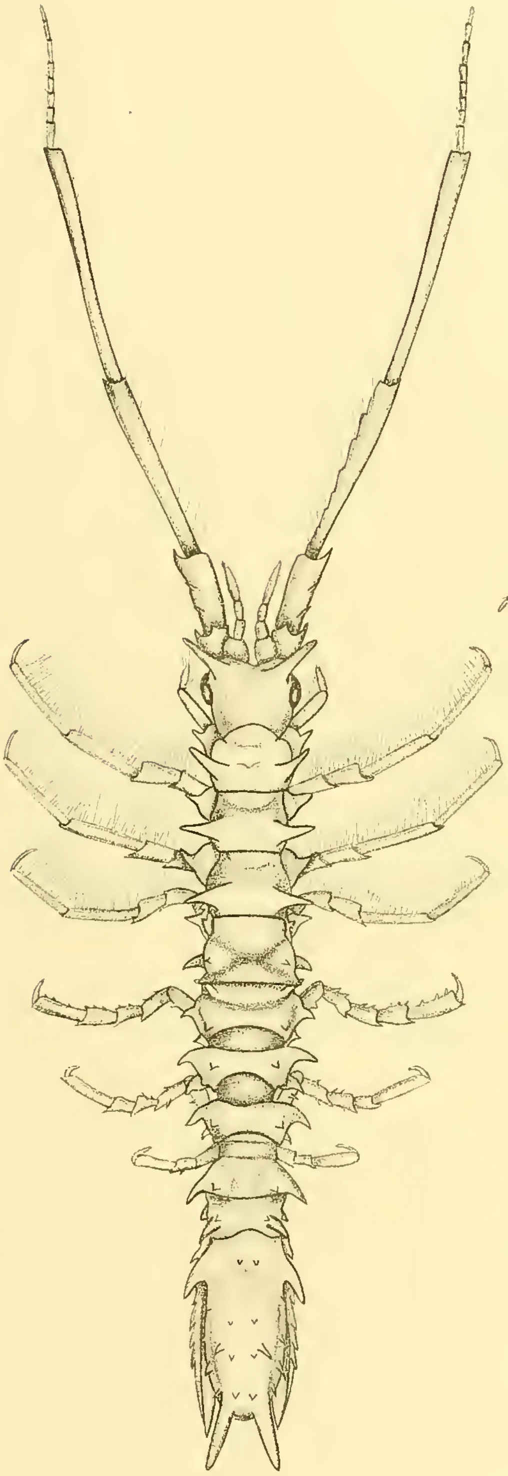

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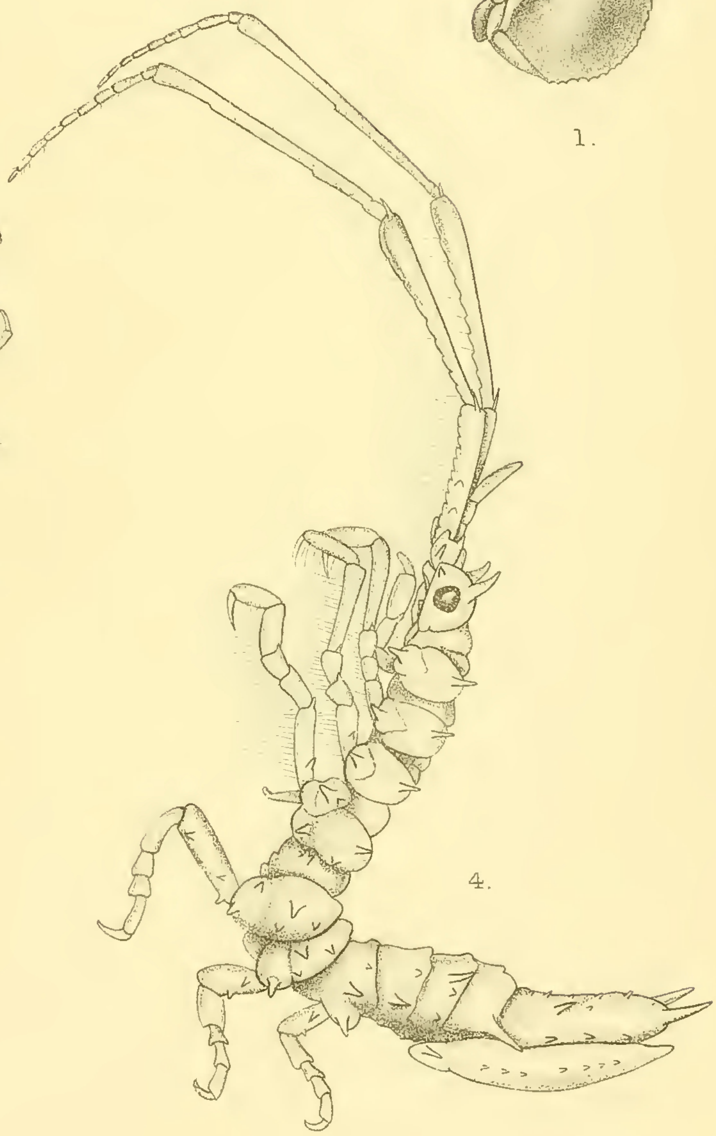

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PLATE IX.

Antarcturus lilliei, n. sp. [St. 355.]

Fig. 1.—Male, dorsal view. × 7.

Antarcturus horridus, n. sp. [St. 314.]

Fig. 2.—Male, lateral view. × 7.

Glyptonotus antarcticus, Eights, var. *acutus*, Richardson.

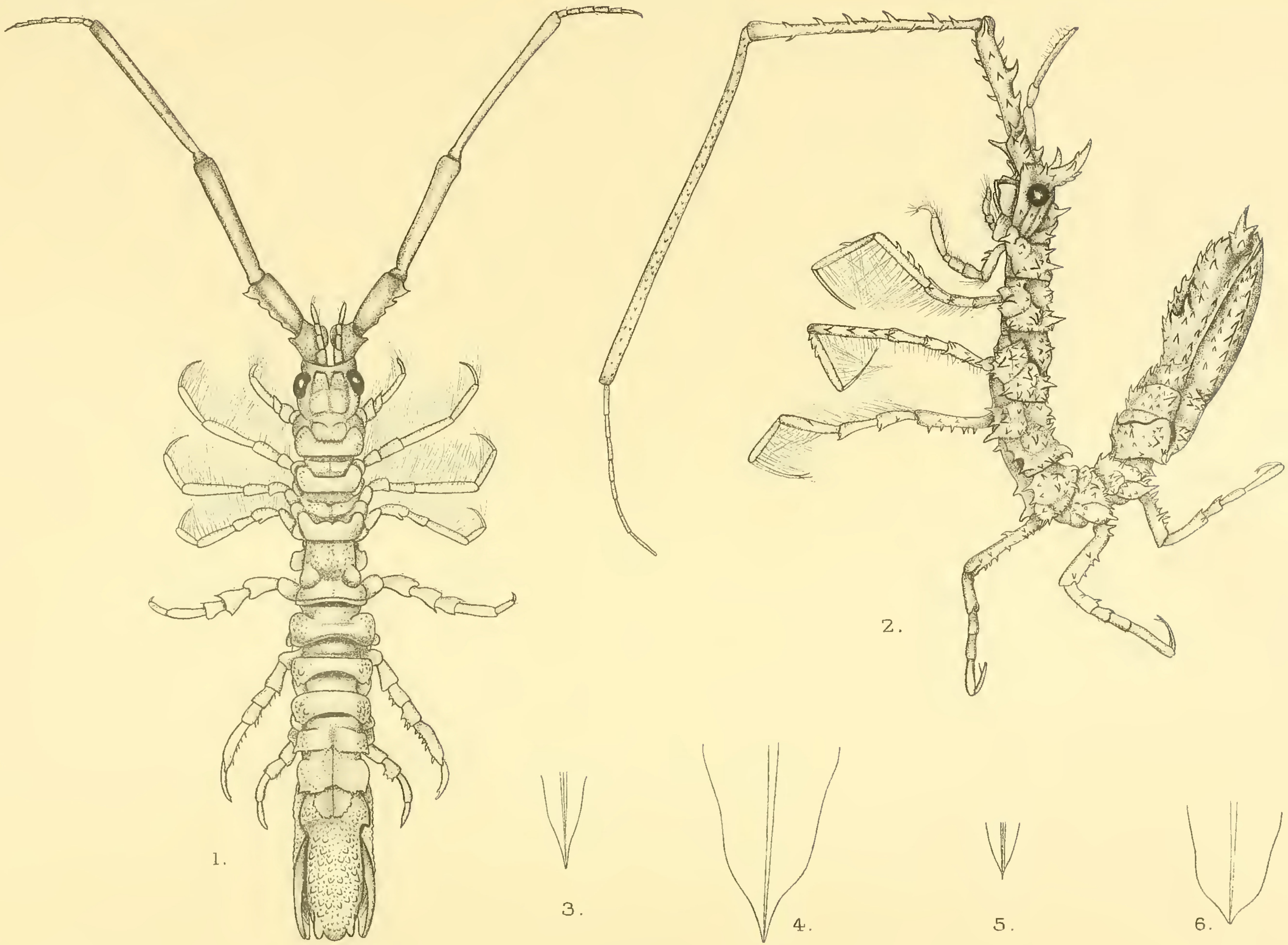
Fig. 3.—Telson of a young male, 23 mm. [St. 356.] × 2.
Fig. 4.— ,, an adult male, 99 mm. [North Bay.] Natural size.

Glyptonotus antarcticus, Eights. [Cumberland Bay.]

Fig. 5.—Telson of a young male, 12·5 mm. × 2.
Fig. 6.— ,, an adult male, 62 mm. Natural size.

Brit. Antarctic (Terra Nova) Exped. 1910.

Brit. Mus. (Nat. Hist.) Zoology, Vol. III. Crustacea, Part VI, Pl. IX.



Crustacea, Part VI, Pl. IX.

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PLATE X.

Neastacilla falclandica (Ohlin).

FIG. 1.—Adult female, lateral view. × 15.
FIG. 2.—Fifth thoracic limb. × 25.
FIG. 3.—Eighth „ „ × 25.

Pseudarcturella chiltoni, gen. et sp. nov.

FIG. 4.—Urosome, lateral view, dorsal side uppermost, uropods omitted. × 33.
FIG. 5.—Antennule. × 33.
FIG. 6.—Antenna. × 33.
FIG. 7.—Second thoracic limb. × 33.
FIG. 8.—Fifth „ „ × 33.
FIG. 9.—Eighth „ „ × 33.
FIG. 10.—First pleopod of the male. × 33.
FIG. 11.—Second „ „ „ × 33.

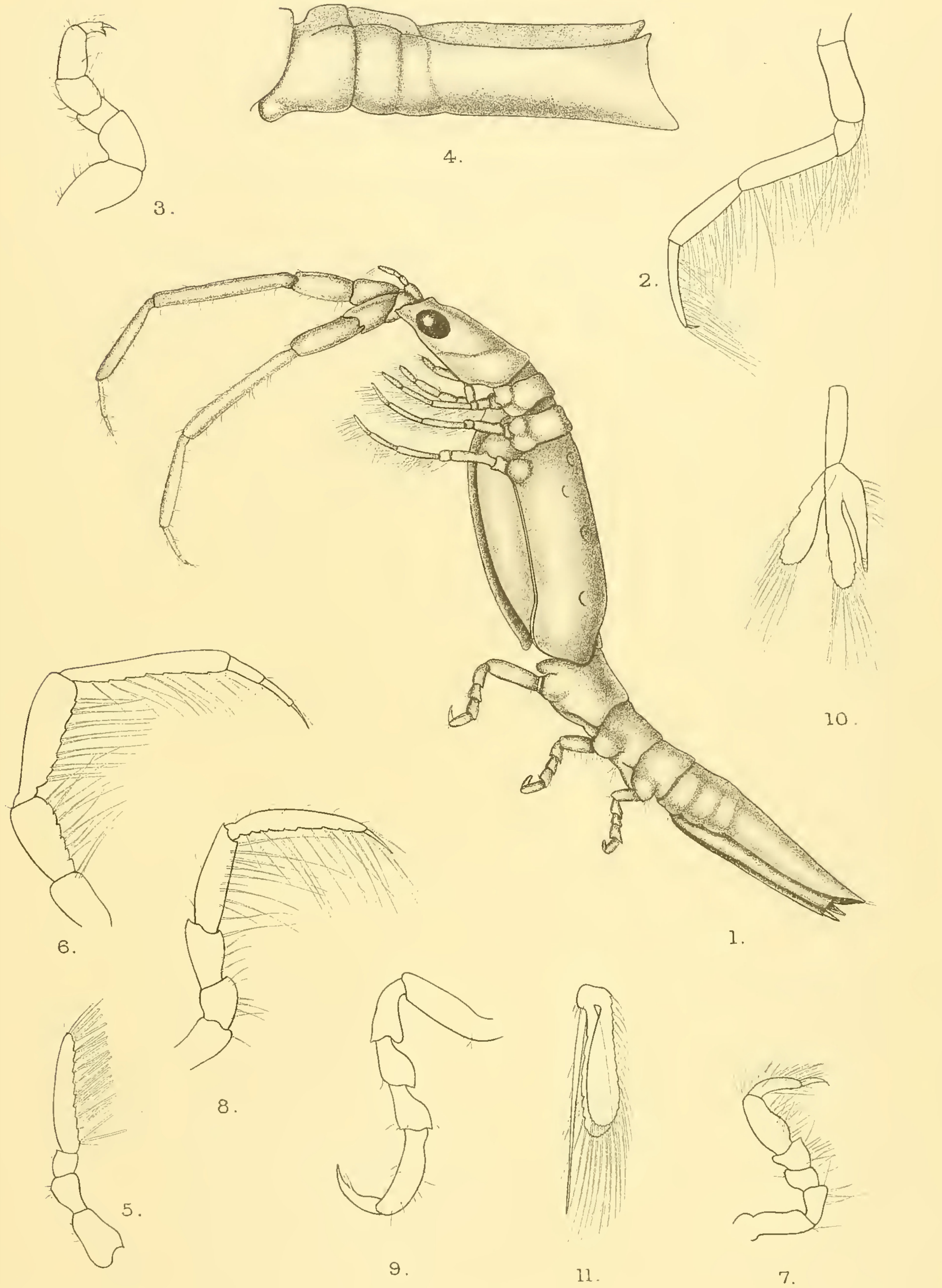

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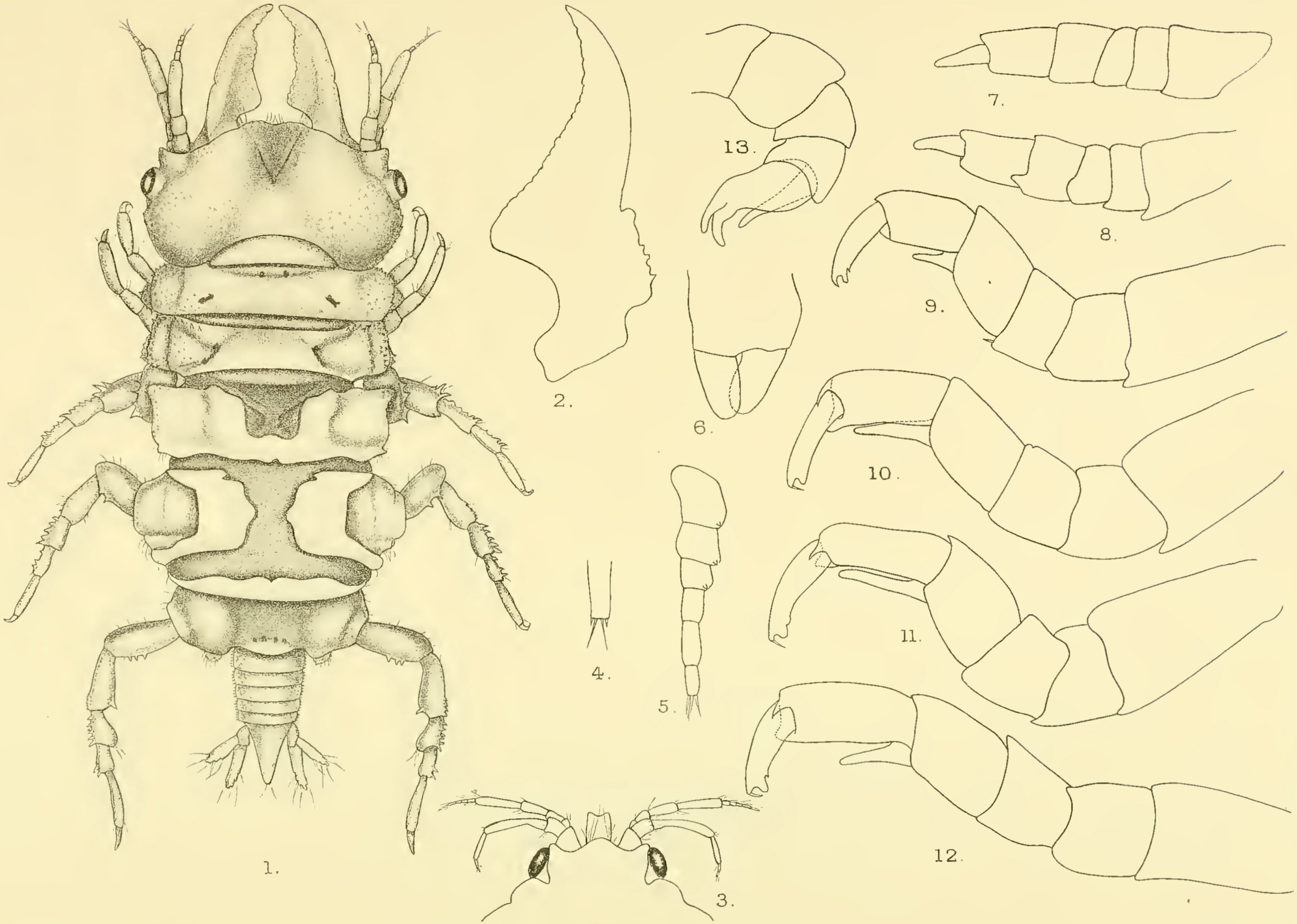
PLATE XI.

Gnathia calva, Vanhöffen.

FIG. 1.—Adult male, dorsal view. [St. 331.] × 20.
FIG. 2.—Mandible of male. × 40.
FIG. 3.—Anterior end of female. [St. 314.] × 20.

Rhabdocheirus incertus, Bonnier.

FIG. 4.—Antennule. × 495.
FIG. 5.—Antenna. × 300.
FIG. 6.—Maxillipedes. × 300.
FIG. 7.—Second thoracic limb. × 300.
FIG. 8.—Third ,, ,, × 300.
FIG. 9.—Fourth ,, ,, × 300.
FIG. 10.—Fifth ,, ,, × 300.
FIG. 11.—Sixth ,, ,, × 300.
FIG. 12.—Seventh ,, ,, × 300.
FIG. 13.—Eighth ,, ,, × 300.



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NATURAL HISTORY REPORT.

ZOOLOGY. VOL. III., No. 9. Pp. 259 272.

INSECTA.

PART I. COLLEMBOLA.

BY

GEORGE H. CARPENTER, D.Sc., M.R.I.A.,
Professor of Zoology in the Royal College of Science, Dublin

WITH ONE PLATE.

PART II. MALLOPHAGA.

BY

JAMES WATERSTON, B.D., B.Sc.

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"TERRA NOVA" REPORT.

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INSECTA.

PART I.—COLLEMBOLA.

BY GEORGE H. CARPENTER, D.Sc., M.R.I.A.,

Professor of Zoology in the Royal College of Science, Dublin.

WITH ONE PLATE.

Among the collections made during Capt. R. F. Scott's first ("Discovery") expedition to the Antarctic were some specimens of moss (*Bryum algens*, Cardot), from Granite Harbour, South Victoria Land, in 77° S. lat. and 162° 30′ E. long., containing fragments of a small dark-blue springtail clearly referable to the Poduridae, and described (Carpenter, 1908) as a new genus and species—*Gomphiocephalus hodgsoni.* The naturalists of the "Terra Nova," in their western journey during the summer of 1911–12, spent a month in the geological study of the Granite Harbour district, and Mr. Griffith Taylor, on the night of November 30, found a number of *Gomphiocephalus* on the surface of a small pool at Cape Geology, a point on the southern shore of Granite Harbour, where the party had established its headquarters. Taylor's account of his discovery (1914, pp. 243–4) may be quoted, as it gives some interesting information on the habits of this most southerly of all the free-living insects yet known to us.

"At 10 P.M. I made a great discovery. I saw something black floating in a little pool, and closer inspection revealed a cluster of minute insects. . . . Later, Debenham found there were lots under many of the pebbles. Here they clustered in a film of ice. As one turned a pebble to the sun they would thaw out and crawl around for exercise. I got a brush out of the medical chest and spread a sheet of paper with seccotine, then brushed them off carefully on to the paper and so embalmed several thousands. We also got a few lively little beggars about one-quarter the size of the big blue ones. The latter were nearly one millimetre long."

On receiving these specimens from Mr. Taylor, Mr. E. W. Nelson, one of the biologists of the expedition, transferred them into 70 per cent. alcohol, with the result that many are in quite good condition for study, though the "seccotine treatment" has tended to obscure delicate features of the cuticle and to remove bristles. In a letter to Dr. C. J. Gahan, Keeper of Entomology in the British Museum (who has most kindly entrusted me with these insects for description), Mr. Nelson refers to Taylor's note quoted above, suggesting the presence of a second species. "I could not find a second species myself," writes Mr. Nelson, "and should on cursory examination refer them all to *Gomphiocephalus hodgsoni*, Carp." The springtails seem to be, indeed, all referable to this species, and the $\frac{1}{4}$ mm. specimens mentioned by Taylor are probably young individuals.

The fragmentary nature of the specimens described in 1908 necessarily made the account then given incomplete, and I regret to find that in some particulars it was inaccurate. Before proceeding to details, it may be well to state briefly that the reference of *Gomphiocephalus* to the Poduridae, in association with the genera *Achorutes* and *Xenylla*, proves to be fully justified, but that the structure of the insect is less aberrant than I imagined in 1908, so that there is no occasion to establish a new sub-family for its reception. *Gomphiocephalus* proves to be a close ally of *Xenylla*, and falls naturally into the Achorutinae (Hypogastrurinae of Börner, 1906).

Order COLLEMBOLA.

Sub-Order ARTHROPLEONA.

Family PODURIDAE.

Sub-Family ACHORUTINAE.

(= *Hypogastrurinae*, Börner, 1906.)

Gomphiocephalus, Carpenter, 1908.

Revised diagnosis.—Cuticle finely granulate. Abdomen with two anal spines. Catch and spring present but reduced, mucro fused with dens. Foot bearing tenent hairs, but without empodial appendix. *Seven ocelli* and a simple post-antennal organ on each side of head. Feeler with a protrusible apical sense-organ on the fourth segment, and a row of sensory spines bordering a sinuous, chitinous ridge on the third. *Jaws of the normal collembolan type*, the mandibular condyle (see fig. 7, *c*) acute and prominent, the maxilla with typical elongate galea and vestigial palp.

Type.—*Gomphiocephalus hodgsoni*, Carpenter (1908), Granite Harbour, South Victoria Land.

The two important features in which the original description (1908) of this genus needs correction are emphasised by italics.

Ocelli can be distinctly seen in some of the specimens and are probably present in all. There are seven on each side of the head, the arrangement being shown in fig. 3, which represents the position of the left ocelli in relation to the post-antennal organ; the third ocellus of the inner row is the one wanting from the normal Collembolan eight.

Antennal sense-organs.—As to these, there is nothing to add to the description given in the 1908 paper. The organ on the front edge of the third antennal segment (figs. 4, *an*, 6) appears to be characteristic of the genus, resembling that found in some species of *Achorutes*, though here more strongly developed ; it differs from the thick spines in a cuticular groove or furrow that form the corresponding organ in the genus *Xenylla* (see Linnaniemi, 1912, p. 41, Pl. V., figs. 3, 4, etc.). The presence of a post-antennal organ also serves to distinguish *Gomphiocephalus* from *Xenylla*.

Jaws.—In my previous account of this insect (1908, pp. 2–4, figs. 1, *f*, 3, 4, 5) I commented on the supposed absence of the basal region of the normal collembolan mandible, on an apparently mandibuliform maxillula, and on a supposed tooth-like sense-organ on the hinder region of the head. These turn out to be mistakes into which I ought not to have fallen, even though the material at disposal for study was unsatisfactory. I can now withdraw and explain these errors.

Mandible.—The mandible is of the usual collembolan type (see fig. 7). In the insects from the "Discovery" collections, the middle and basal regions of the jaw had disappeared, leaving the molar area and apex which I figured (1908, figs. 3, 4), and also the very acute condyle (fig. 7, *c*), which, breaking, in some of the specimens, through the cuticle of the head, seemed to be an external spine (1908, fig. 1, *f*), so that I was misled into describing a non-existent cephalic sense-organ.

Maxillula.—This appendage (fig. 8, *M*) is also of the normal collembolan type and has the usual relation to the tongue (fig. 8, *T*). In my previous paper (1908, fig. 5) I represented it like a small and delicate mandible. From recent studies it is now clear that I was examining an immature insect in which the cuticle of the next instar had already been formed beneath the mandibular cuticle then in use, giving the deceptive appearance of another appendage.

Maxilla.—This jaw also agrees closely in structure with its homologue in allied genera (figs. 8, 9). The lacinial head (figs. 8, *la*, 9) ends in two prominent teeth and bears internally an elongate, curved bifid process, and three delicate leaf-like lamellae, between which projects a slender spine (fig. 9). The elongate process (fig. 8, *g*) of the maxilla—probably to be regarded as a galea and not as a palp (see Börner, 1908)—has a bluntly conical tip, below which is the short papilla (fig. 8, *p*), now regarded as a vestigial palp with its long terminal bristle. The maxillae, and indeed the jaws altogether in *Gomphiocephalus*, resemble closely those of *Achorutes*.

Legs.—There is little to be added to my former description (1908) of the legs. The feet, as then stated, with their simple claw and tenent hairs, resemble those of a *Xenylla*. In many of the specimens, at least, there are two tenent hairs on each fore foot (fig. 10) and three on each intermediate and hind foot (fig. 11).

Abdominal Segments.—The abdominal terga have elongate stiff spines arranged for the most part in three transverse rows on each segment. Each abdominal tergum carries a pair of sensory hairs, two pairs being visible on the fourth and also on the fifth segment (fig. 2, *s*).

Spring and Catch.—The specimens now available for examination show that these organs, though reduced, are not in the vestigial condition suggested in the former description (1908). The *manubrium* of the spring (figs. 12, 13, *ma*) is short and stout, exceeding slightly in length the pointed, distal segments (fig. 12, 13, *d*) each of which represents the *dens* and *mucro* fused together. This condition of the spring agrees closely with that found in several species of *Xenylla*. The *catch* (fig. 12, *R*) has each of its paired distal segments with two minute teeth.

Terminal Abdominal Segments.—The opening of the reproductive organs is situated close to the hinder edge of the fifth abdominal sternum (fig. 14, *gn*), a somewhat cruciform slit in a delicate plate beset with numerous short hairs. Just behind, on the sixth abdominal segment, may be seen the rounded edges of the paired sternal plates which mark the position of the anus (fig. 14, *a*). These structures correspond closely with those of *Achorutes* and *Xenylla*.

Specific Characters.—The specific diagnosis given in my previous paper (1908, p. 3) needs no amendment, except that the largest extended specimens attain a length of 1·3 mm., and that the intersegmental cuticle is pale; otherwise the colour of the insects is a dense blue-violet, indeed, almost black in many of the preserved specimens.

AFFINITIES OF GOMPHIOCEPHALUS.

From the foregoing descriptions, students of the Collembola will realise that *Gomphiocephalus* is allied to *Achorutes* (= *Hypogastrura*), *Beckerella* and *Xenylla*. It is especially close to the last-named, from which it is distinguished by possessing a post-antennal organ, seven ocelli on each side instead of five, and a simpler sense-organ on the third segment of the feeler. In all these characters, *Gomphiocephalus* is more primitive than *Xenylla*. The simple post-antennal organ resembles that found in the Entomobryidae (Isotominae), but *Gomphiocephalus* is not peculiar among the Poduridae in possessing such an organ; one of somewhat similar build characterises *Beckerella*, a genus lately established by Linnaniemi (1912, pp. 39–40, Pl. IV., figs. 13–17) for *Achorutes inermis*, Tullberg, a North European species readily distinguished from most Achorutinae by the absence of anal spines. *Gomphiocephalus* does not differ, therefore, to any great extent, from other genera of its sub-family. The habits also of the Granite Harbour insects—crowding on the surface-film of water, or on ice or snow, lurking under stones, or sheltering among the moss which affords them food—recall those of our North European species of *Achorutes* and *Xenylla*.

DISTRIBUTIONAL NOTES.

The presence of this springtail and also of an Isotoma (*sens. lat.*, see Carpenter, 1902) on the continental area of South Victoria Land, raises some interesting distributional questions, both insects being related to allies that have a wide range in the northern regions. We have seen that *Gomphiocephalus* is akin to *Achorutes* and to *Xenylla*; *Achorutes viaticus* (Linn.) common in the Arctic regions and in Northern Europe, is now known from Tierra del Fuego (Wahlgren, 1906) and from Macquarie Island to the south of New Zealand (Carpenter, 1909), while *Xenylla humicola* (Fab.), another arctic and northern species, has been recognised in South Georgia, according to Wahlgren (*l.c.* p. 5), who enumerates eight species of Achorutinae, referable to six different genera from various antarctic and sub-antarctic localities.

In an account of some Collembola from the South Orkneys (1906) I discussed the close relationship of certain species, such as *Proisotoma brucei* from that archipelago with arctic and northern springtails, and suggested that wingless insects with such geographical relationship "at or beyond the southern limits of the present American continent must be either comparatively recent immigrants—Pliocene or later—or else carry us back to early Mesozoic times." Naturalists who believe in the "accidental" dispersal across great ocean-tracts of insects like these will possibly incline to the former alternative, while those who doubt the adequacy of such modes of transit will probably agree that the distribution of the Antarctic Collembola suggests the existence of Mesozoic land-tracts between Antarctica and the countries to the north. It seems that this latter opinion is supported by the presence on South Victoria Land of the springtail described in the present paper. The locality whence it comes and its mode of occurrence suggest that it is one of the few survivors of an ancient land fauna, and many lines of evidence converge to indicate a comparative richness of plant and animal life on the extended Antarctica of Mesozoic and Cainozoic times, as Hedley (1912) and others have shown.

In Graham Land and on the South Orkneys, as well as in Campbell Island (south of New Zealand) there are found Collembola—the genera *Cryptopygus* and *Triacanthella* for example (see Wahlgren, 1906, Carpenter, 1906, 1909)—of a type distinct from those Antarctic springtails which—like *Gomphiocephalus* and *Proisotoma brucei*—resemble certain members of the general northern continental fauna. These genera —apparently peculiar to antarctic and sub-antarctic lands—are of high interest; though possibly less ancient than their companions with a range wider and more discontinuous, they appear to have become specialised within the limits of the great Southern Continent of former periods. It is at least possible that the discovery of some of their representatives may reward the efforts of future explorers on the mainland of Antarctica.

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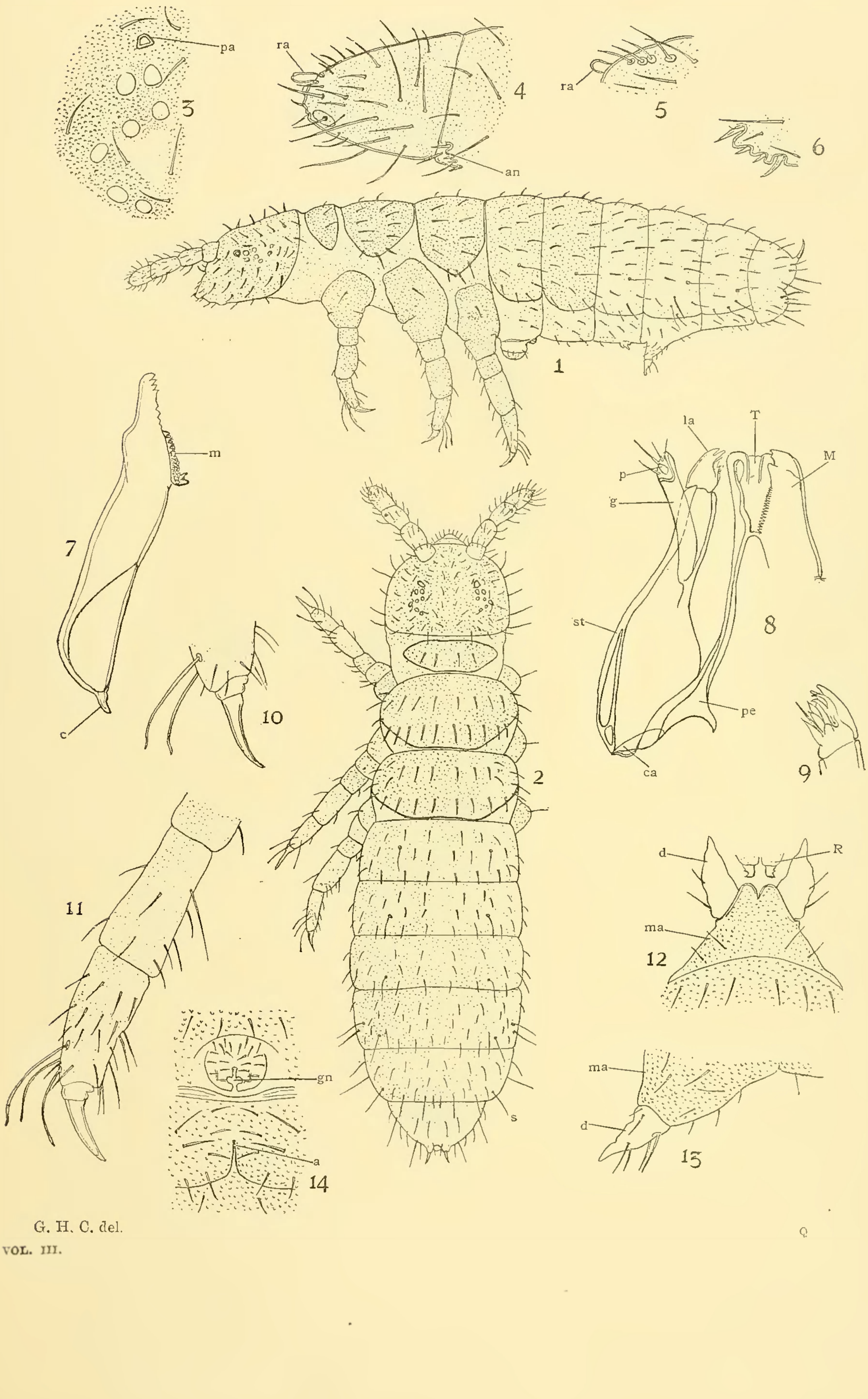
Gomphiocephalus hodgsoni, Carpenter.

FIG. 1. Lateral view of insect. × 75.
FIG. 2. Dorsal view. *s*. A sensory hair. × 75.
FIG. 3. Ocelli and post-antennal organ (*pa*) of left side. × 470.
FIG. 4. Extremity of left feeler, dorsal-lateral aspect. *ra*. Retractile sense-organ at tip of fourth segment; *an*, sensory spines on third segment. × 470.
FIG. 5. Tip of fourth antennal segment, ventral aspect. *ra*. Retractile sense-organ. × 470.
FIG. 6. Edge of third antennal segment, dorsal aspect, showiug sinuous ridge with sensory spines. × 470.
FIG. 7. Right mandible, ventral view. *m*, Molar area; *c*, condyle. × 300.
FIG. 8. Left maxilla, right maxillula (M) and tongue (T), dorsal view. *ca*, Cardo of maxilla; *g*, galea; *la*, lacinia; *p*, palp; *pe*, foot of tongue; *st*, stipes. × 300.
FIG. 9. Head of maxillary lacinia, ventral view. × 470.
FIG. 10. Fore foot, showing claw and two tenent hairs. × 300.
FIG. 11. Hind leg, showing claw and three tenent hairs. × 300.
FIG. 12. Catch (*R*) and spring (*ma*, manubrium; *d*, dens and mucro), ventral view. × 300.
FIG. 13. Spring, lateral view, *ma*, manubrium; *d*, dens and mucro. × 300.
FIG. 14. Ventral aspect of fifth and sixth abdominal segments. *gn*, Genital aperture; *a*, anus. × 300.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G. H. C. del.

PART II.—MALLOPHAGA.

BY JAMES WATERSTON, B.D., B.Sc.

COMPARATIVELY little material belonging to this sub-order was collected, there having been submitted only some fifty examples representing six species and three families, as follows :—

FAMILY TRICHODECTIDAE, Burmeister.

GENUS TRICHODECTES, Nitzsch.

1. *Trichodectes equi*, Linn.

Pediculus equi, Linnaeus. Syst. Nat. X. 1758, p. 612.

From pony, S. Trinidad (Dr. Atkinson Coll.).

FAMILY PHILOPTERIDAE, Burmeister.

GENUS ESTHIOPTERUM, Harrison.

1. *Esthiopterum gracilicorne*, Piag.

Lipeurus gracilicornis, Piaget. Les Pediculines, 1880, p. 309, Pl. 25, fig. 6.

From Frigate bird, S. Trinidad (Dr. Atkinson Coll.).

2. *Esthiopterum* sp.

Host uncertain. Two females which represent a new species belonging to a group whose typical hosts are to be found in the genus *Puffinus*. The females of all this group are critical though the males are very distinct. It would be unwise therefore to offer a description based on the present material. I have known the species for some years and believe that Mr. Harrison has already drawn up some notes on it which are possibly now in press.

3. *Esthiopterum* sp.

One example (♀ ?) too immature for certain identification but recognised as a tubinarial parasite.

FAMILY MENOPONIDAE, Mjöberg.

GENUS MENOPON, Nitzsch.

1. *Menopon aurifasciatum*, Kell.

Menopon aurifasciatum, Kellog (V. L.) New Mallophaga, iii, 1899, p. 43, Pl. 4, fig. 5.

Frigate bird, S. Trinidad (Dr. Atkinson Coll.).

Genus COLPOCEPHALUM, Nitzsch.

1. *Colpocephalum spineum*, Kell.

Colpocephalum spineum, Kellog (V. L.) New Mallophaga, iii, 1899, p. 38, Pl. 4, fig. 1.

Frigate bird, S. Trinidad (Dr. Atkinson Coll.).

Note.—Kellogg records *Esthiopterum gracilicorne*, Piag. and his own species *Menopon aurifasciatum* and *Colpocephalum spineum* from the Frigate bird *Fregata aquila*, a species secured by the expedition. The hosts of both the undetermined species of *Esthiopterum* are uncertain.

INDEX.

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NATURAL HISTORY REPORT.

ZOOLOGY. VOL. III, No. 10. Pp. 273–304.

CRUSTACEA.

PART VII.—MYSIDACEA.

BY

W. M. TATTERSALL, D.Sc.

(*Professor of Zoology, University College, Cardiff*).

WITH FOUR PLATES.

B. M.
(N.H.)

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CRUSTACEA.

PART VII.—MYSIDACEA.

BY W. M. TATTERSALL, D.Sc.

(*Professor of Zoology, University College, Cardiff*).

WITH FOUR PLATES.

I.—INTRODUCTION.

THE collection of Mysidacea obtained by the "Terra Nova" includes twenty species, of which six were captured in Antarctic waters, twelve off New Zealand, and three (including one also caught in New Zealand waters) in the Atlantic.

It was perhaps hardly to be expected that the collections would contain much in the way of novelties from the Antarctic seas. At least nine expeditions have explored these waters in the last twenty years, and our knowledge of the fauna, though not by any means complete, is considerable. Additions to the list of known forms are to be looked for among smaller material collected by special means rather than from collections made by dredging and trawling in the ordinary way. Only one new species, *Mysidetes brachylepis*, was collected by the "Terra Nova" in the Antarctic Ocean, and only six species were obtained there altogether.

It may not be without interest to summarise the results of recent Antarctic exploration, with reference to the Mysidacea, in tabular form. Regan (1914), as a result of his examination of collections of Antarctic fishes, has divided the waters of the south polar regions into two zoo-geographical areas:—(1) Antarctic zone—including the Antarctic continent and islands to the south of the isotherm of 6° C.—with two districts, Glacial and Kerguelen; and (2) Sub-antarctic zone—including the Falklands, southern extremity of S. America, extreme south of New Zealand and the outlying sub-antarctic islands, an area bounded to the north and south by the isotherms of 12° C. and 6° C. respectively—with two districts, Magellan and Antipodes. The following list includes all the species of Mysidacea of which I can find records from the two zones as defined by Regan, and the species have been tabulated under the same districts as used by him for fishes. As far as the evidence available from this list goes, it supports Regan's conclusion that the Antarctic zone should include both the South Georgia area and Kerguelen. It should be emphasised, however, that the Mysidaceans included in the table do not present any evidence of a distinct and definite Antarctic Mysidacean fauna. They represent part of a deep and cold water fauna which is more or less distributed over the deeper oceans of the world. Only one genus, *Antarctomysis*, is peculiar to southern polar waters. All the other genera have representatives in the deep water of the North Atlantic, Mediterranean and Pacific Oceans, and are therefore inconclusive for separating an Antarctic from a general deep water element. It should, however, be borne in mind that the records of Mysidacea from the Antarctic zone, as defined by Regan, are all from deep water. Nothing is yet known of the littoral Mysids of the various lands and islands in that zone, and it is from such a littoral fauna, if it exists, that evidence will be obtained from which deductions of a zoo-geographical kind can be made. Similarly, ignorance of the Mysidacean fauna of the sub-antarctic zone, as defined by Regan, makes it impossible to institute a comparison between that zone and the Antarctic. The only record from the Antipodes district is of a species allied to the littoral fauna of temperate New Zealand. From the Magellan region, *Mysidopsis acuta* and *Neomysis patagona* are representatives of temperate genera, *Mysidetes crassa*, of a deep water genus of wide distribution, and *Antarctomysis* sp., of a genus whose known distribution is otherwise purely Antarctic.

Accepting Regan's definition of the Antarctic zone, twenty-one species of Mysidacea are at present known from that region. It should be noted that *Echinomysis chuni*, stated by Illig (1905) in his preliminary paper to have been obtained in the Antarctic Ocean, is probably not Antarctic at all, as in his later paper dealing with this species Illig (1912) gives no Antarctic localities at which it was taken.

As with the Isopoda collected by the "Terra Nova," the Mysidacea are interesting from the light which they throw on the Mysidacean fauna of New Zealand, a region hitherto practically unexplored from this point of view. The first Mysid to be recorded from New Zealand was *Siriella denticulata*, described by G. M. Thomson in 1880 under the genus *Mysis*, and subsequently in 1900 referred to its correct genus. In 1881 Kirk described a New Zealand species under the name *Mysis meinertzhagenii*, but it is impossible to recognise even the genus from the short and inadequate description, and efforts to trace the type specimen have failed. This species must remain, therefore, for the present, problematical. In 1900 G. M. Thomson described a species common in brackish waters near Dunedin under the name *Tenagomysis novae-zealandiae*, and this

DISTRIBUTION OF ANTARCTIC AND SUB-ANTARCTIC MYSIDACEA.

—	Kerguelen.	South Georgia.	South Orkneys.	Graham Land.	Victoria Land.	Wilhelm Land.	Antipodes.	Magellan.	Falklands.	—
Eucopia australis	x	x	x	x	x	x	–	–	–	
Hansenomysis antarctica	–	–	–	x	x	x	–	–	–	——
Boreomysis distinguenda	x	–	x	–	–	–	–	–	–	——
Boreomysis brucei	–	–	x	–	–	–	–	–	–	——
Pseudomma belgicae	–	–	–	x	x	x	–	–	–	——
Pseudomma armatum	–	x	–	–	–	–	–	–	–	——
Pseudomma sarsii	x	x	–	–	–	–	–	–	–	——
Pseudomma antarcticum	–	–	–	–	–	x	–	–	–	——
Amblyops crozetti	x	–	–	–	–	–	–	–	–	——
Amblyops tattersalli	–	–	–	–	x	x	–	–	–	——
Dactylamblyops hodgsoni	–	–	–	–	x	x	–	–	–	Also collected by the "Valdivia," but exact locality not stated.
Dactylamblyops antarctica	–	x	–	–	–	–	–	–	–	——
Mysidopsis acuta	–	–	–	–	–	–	–	–	x	——
Tenagomysis tenuipes	–	–	–	–	–	–	x	–	–	——
Mysidetes posthon	–	x	–	x	x	x	–	–	–	——
Mysidetes similis	–	–	–	–	–	x	–	–	–	——
Mysidetes crassa	–	–	–	–	–	–	–	–	x	——
Mysidetes kerguelensis	x	–	–	–	–	–	–	–	–	——
Mysidetes hanseni	–	–	–	–	–	x	–	–	–	——
Mysidetes illigi	–	–	–	–	–	x	–	–	–	——
Mysidetes brachylepis	–	–	–	–	x	–	–	–	–	——
Neomysis patagona....	–	–	–	–	–	–	–	x	x	Zimmer, 1907; Hansen, 1913.
Antarctomysis maxima	–	x	x	x	x	x	–	–	–	——
Antarctomysis ohlinii	–	x	–	–	x	–	–	–	–	——
Antarctomysis sp.	–	–	–	–	–	–	–	x	–	Zimmer, 1915 (2).

species has been recorded since by Chilton (1906) from further localities. In 1908 Calman recorded a specimen from New Zealand which he referred to the genus *Pseudomma*, but this was too immature to name specifically. In 1913 I recorded *Siriella denticulata* from Auckland Harbour, and in 1918 I described a second species of *Tenagomysis*, *T. tenuipes*, from Carnelly Harbour, Auckland Islands, while Zimmer, in 1918, recorded *Theganomysis* sp. (obviously a misprint for *Tenagomysis* sp.), from the Bay of Plenty.

This, in brief, is the history of our knowledge of the Mysidacean fauna of New Zealand to date, and the net result is three good species and two doubtful. The "Terra Nova" collected twelve species off the coasts of New Zealand, only one of which, *Siriella denticulata*, had been recorded from there before. In addition, I describe below a new species of *Tenagomysis*, not collected by the "Terra Nova," but sent to me by Professor Chilton, so that the total number of New Zealand species of Mysidacea is now brought up to fifteen. Of the twelve species collected by the "Terra Nova," seven are described as new and, of these, no fewer than six are referred to the genus *Tenagomysis*. Unknown elsewhere, this is the characteristic Mysid genus of New Zealand. Nine species in all are now known, and I have taken the opportunity afforded by the present material to summarise our knowledge of the genus and to provide a key to the species. Further species of Mysidacea undoubtedly await the energetic collector in New Zealand. Professor Chilton has sent me a single damaged Mysid, collected at Akaroa in 6 fathoms of water by the late H. Suter. I am unable to identify it, or to refer it to its correct genus, because of its condition, but it most certainly represents a new species of a genus allied to *Neomysis*, possibly identical with it. I hoped, at first, that it might prove to be Kirk's forgotten species, but it does not agree with his description. Here, then, are at least three species to be found and described, and there must be many others.

The most interesting of the remaining species collected by the "Terra Nova," is one captured off the east coast of South America, which I have referred to Dana's long-forgotten genus *Promysis*, with which I regard Hansen's *Uromysis* as synonymous.

My thanks are due to the authorities of the British Museum for entrusting me with this collection for examination and report, and especially to Dr. W. T. Calman for much help and advice. I am indebted to Professor W. B. Benham for the opportunity of examining the type specimens of *Tenagomysis novae-zealandiae*, and for other material of this genus, and to Professor C. Chilton, who kindly sent me all the Mysidae in his collections, and gave me much assistance in my endeavours to trace the whereabouts of Kirk's type specimens. To my wife I owe a special debt of thanks for the drawings which illustrate this report.

II.—LIST OF SPECIES.

The classification and arrangement of species followed in this report are those suggested by Hansen (1910) in his report on the "Siboga" collections of this group.

ORDER MYSIDACEA.

SUB-ORDER LOPHOGASTRIDA.

FAMILY LOPHOGASTRIDAE.

GENUS PARALOPHOGASTER, Hansen.

1. *Paralophogaster glaber*, Hansen.

SUB-ORDER MYSIDA.

FAMILY MYSIDAE.

SUB-FAMILY SIRIELLINAE.

GENUS SIRIELLA, Dana.

2. *Siriella thompsonii* (M.-Ed.).
3. ,, *denticulata* (G. M. Thomson).

SUB-FAMILY GASTROSACCINAE.

GENUS ANCHIALINA, Norman.

4. *Anchialina typica* (Kr.).

GENUS GASTROSACCUS, Norman.

5. *Gastrosaccus australis*, sp. nov.

SUB-FAMILY MYSINAE.

TRIBE ERYTHROPINI.

GENUS EUCHAETOMERA, G. O. Sars.

6. *Euchaetomera typica*, G. O. Sars.
7. ,, *oculata*, Hansen.

GENUS PSEUDOMMA, G. O. Sars.

8. *Pseudomma belgicae* (Hansen, MS.), H. & T.

GENUS AMBLYOPS, G. O. Sars.

9. *Amblyops tattersalli*, Zimmer.

TRIBE LEPTOMYSINI.

GENUS PROMYSIS, Dana.

10. *Promysis atlantica*, sp. nov.

GENUS MYSIDETES, H. & T.

11. *Mysidetes posthon*, H. & T.
12. ,, *brachylepis*, sp. nov.

GENUS TENAGOMYSIS, G. M. Thomson.

13. *Tenagomysis novae-zealandiae*, G. M. Thomson.
14. *Tenagomysis chiltoni*, sp. nov.
15. ,, *similis*, sp. nov.
16. ,, *macropsis*, sp. nov.
17. ,, *robusta*, sp. nov.
18. ,, *thomsoni*, sp. nov.
19. ,, *producta*, sp. nov.
20. ,, *scotti*, sp. nov.
21. ,, *tenuipes*, W. M. T.

TRIBE MYSINI.

GENUS ANTARCTOMYSIS, Coutière.

22. *Antarctomysis maxima* (Hansen, MS.), (H. & T.).
23. *Antarctomysis ohlinii*, Hansen.

III.—LIST OF STATIONS AT WHICH MYSIDACEA WERE TAKEN.

TROPICAL AND SUB-TROPICAL ATLANTIC.

Station 31. July 9, 1910, 11° 20′ N., 24° 37′ W., 2 metres, 2.30–3.30 p.m. Plankton.

,, 39. April 27, 1913. Six miles off mouth of Rio de Janeiro Harbour, 2 metres, 11 p.m.–1.30 a.m. Plankton.

,, 40. ,, 27, ,, Six miles off mouth of Rio de Janeiro Harbour, 2 metres, 2.30–5 a.m. Plankton.

TROPICAL AND SUB-TROPICAL ATLANTIC—*continued.*

Station 53.	May	12, 1913,	5° S., 27° 15′ W., 2 metres, 6–7 p.m. Plankton.
,, 58. ,, 59.	,,	16, ,,	0° 25° 15′ W., surface, 1–1.30 a.m. Plankton.
,, 61.	,,	17, ,,	2° N., 24° 45′ W., surface, 1–1.30 a.m. Plankton.
,, 62.	,,	18, ,,	4° 50′ N., 24° W., surface, 1–1.30 a.m. Plankton.
,, 63.	,,	19, ,,	6° 10′ N., 24° 5′ W., surface, 2–2.30 a.m. Plankton.
,, 64. ,, 65.	,,	26, ,,	23° 28′ N., 34° 45′ W., surface, 1.30–2 a.m. Plankton.
,, 67.	,,	27, ,,	25° 35′ N., 34° 10′ W., surface, 1.30–2 a.m. Plankton.
,, 68.	,,	28, ,,	27° 22′ N., 33° 40′ W., surface, 1.30–2 a.m. Plankton.
,, 69.	,,	29, ,,	29° 10′ N., 33° 36′ W., surface, 1.30–2 a.m. Plankton.
,, 70.	June	3, ,,	Off Horta Harbour, Fayal, Azores, 12 metres, 6 p.m.–8 a.m. June 2–June 3. Plankton.

NORTH OF NEW ZEALAND AND NEIGHBOURING WATERS.

Station 75.	July	17, 1911,	From summit, Gt. King, W., 8 miles, surface, 3–3.30 p.m. Plankton.
,, 80.	,,	22, ,,	From summit, Gt. King, N. 87° W., 11 miles, 0–100 metres, 5 p.m. Plankton.
,, 83.	,,	23, ,,	From summit, Gt. King, S. 40° E., 29 miles, 2 metres, 1–4 p.m. Plankton.
,, 84.	,,	23, ,,	From C. Maria van Diemen Light, S.W. by W., 15 miles, 2 metres, 8–9 p.m. Plankton.
,, 85.	,,	24, ,,	From C. Maria van Diemen Light, W.N.W., 24 miles, 2 metres, 1–5 a.m. Plankton.
,, 86.	,,	25, ,,	Off Three Kings Islands, 3 metres, 8 p.m.–5 a.m. (24th–25th). Plankton.
,, 89.	,,	25, ,,	Off Three Kings Islands, surface, 8–10 p.m. Plankton.
,, 90.	,,	25, ,,	From summit, Gt. King, Three Kings Islands, S. 14° W., 8 miles, 100 fathoms (183 metres), bottom fauna (rock).
,, 92.	,,	27, ,,	From summit, Gt. King, S. by W., 24 miles, surface, 9 p.m.–4 a.m. (26th–27th). Plankton.
,, 93.	,,	28, ,,	From summit, Gt. King, S.E. by S., 13 miles, surface, 9 p.m.–4 a.m. (27th–28th). Plankton.
,, 100.	Aug.	4, ,,	From West Island, Three Kings Islands, S.W., 5 miles, surface, 1–2 p.m. Plankton.
,, 101.	,,	4, ,,	From West Island, Three Kings Islands, S.W., 5 miles, surface, 4–5 p.m. Plankton.
,, 106.	,,	4, ,,	From West Island, Three Kings Islands, S.W., 5 miles, surface, 7–8 p.m. Plankton.
,, 108.	,,	5, ,,	34° 15′ S., 172° 0′ E., surface, noon–4 p.m. at intervals. Plankton.
,, 109.	,,	5, ,,	34° 15′ S., 172° 0′ E., 3 metres, 8 p.m.–8 a.m. (5th–6th). Plankton.
,, 110.	,,	6, ,,	34° 4′ S., 171° 55′ E., surface, 9 p.m.–4 a.m. (6th–7th). Plankton.
,, 113.	,,	9, ,,	33° 12′ S., 171° 05′ E., 3 metres, 9 a.m.–noon. Plankton.
,, 120.	,,	18, ,,	34° 26′ S., 172° 14′ E., surface, 9 p.m.–5 a.m. (17th–18th). Plankton.
,, 122.	,,	19, ,,	From C. Maria van Diemen, S. 80° W., 21 miles, surface, 9 p.m.–5 a.m. (18th–19th). Plankton.
,, 126.	,,	24, ,,	34° 13′ S., 172° 15′ E., surface, 9 a.m.–noon. Plankton.
,, 127.	,,	25, ,,	Off Three Kings Islands, surface, 9 p.m.–5 a.m. (24th–25th). Plankton.
,, 130.	,,	27, ,,	Off Three Kings Islands, surface, 8 p.m.–6.30 a.m. (26th–27th). Plankton.
,, 132.	,,	29, ,,	Spirits Bay, near North Cape, 10 metres, 9 a.m.–noon. Plankton.

NORTH OF NEW ZEALAND AND NEIGHBOURING WATERS—*continued.*

Station 133. Aug. 30, 1911, Spirits Bay, near North Cape, 20 metres, 8 p.m.–6 a.m. (30th–31st). Plankton.
,, 135. Sept. 1, ,, Spirits Bay, near North Cape, 3 metres, 9 p.m.–6.30 a.m. (31st–1st). Plankton.
,, 136. ,, 2, ,, Spirits Bay, near North Cape, surface, 9 p.m.–6.30 a.m. (1st–2nd). Plankton.
,, 139. ,, 6, ,, 34° 30′ S., 171° 53′ E., surface, 9 p.m.–6.30 a.m. (5th–6th). Plankton.
,, 148. Aug. and Sept., 1912, Bay of Islands, 35° 15′ S., 174° 10′ E., 0–24 metres. Plankton.
,, 242. April 2, 1912, Off Akaroa Heads, New Zealand, 10 metres, 10 a.m. Plankton.

ANTARCTIC OCEAN (ROSS SEA AREA).

Station 194. Feb. 22, 1911, Off Oates Land, 69° 43′ S., 163° 24′ E., 180–200 fathoms (329–366 metres). Bottom fauna (undecomposed animal débris).
,, 314. Jan. 23, ,, 5 miles N. of Inaccessible Island, McMurdo Sound, 222–241 fathoms (406–441 metres). Bottom fauna (mud).
,, 316. Feb. 9, ,, Off Glacier Tongue, about 8 miles N. of Hut Point, McMurdo Sound, 190–250 fathoms (348–457 metres), 5.30 p.m. Bottom fauna (undecomposed animal remains and mud).
,, 331. Jan. 14, 1912, Off Cape Bird Peninsula, entrance to McMurdo Sound, 250 fathoms (457 metres). Bottom fauna (mud).
,, 332. ,, 16, ,, 77° 15′ S., 166° 0′ E., 0–550 metres, 2 a.m. Plankton.
,, 338. ,, 23, ,, 77° 13′ S., 164° 18′ E., 207 fathoms (379 metres). Bottom fauna (mud).
,, 339. ,, 24, ,, 77° 5′ S., 164° 17′ E., 140 fathoms (256 metres). Bottom fauna (mud).
,, 343. Feb. 1, ,, Off Cape Royds, 0–600 metres, noon. Plankton.
,, 346. ,, 3, ,, McMurdo Sound, 0–450 metres, 9 a.m.–5 p.m. Plankton.
,, 348. ,, 13, ,, Off Barne Glacier, McMurdo Sound, 200 fathoms (366 metres). Bottom fauna (mud).
,, 351. April 26–June 7, 1912, Hole in Ice between Cape Evans and Inaccessible Island, 205 metres. Plankton.
,, 355. Jan. 20, 1913, 77° 46′ S., 166° 8′ E., 300 fathoms (547 metres). Bottom fauna.

IV.—DESCRIPTIONS OF SPECIES.

SUB-ORDER LOPHOGASTRIDA.

FAMILY LOPHOGASTRIDAE.

GENUS PARALOPHOGASTER, Hansen.

1. *Paralophogaster glaber*, Hansen.

P. glaber, Hansen, 1910, p. 16, pl. I, figs. *2a–n*.

Occurrence.—Station 86, one, 13 mm.; Station 122, one immature; Station 127, seventeen, 7–11 mm.; Station 130, two; Station 139, nine, 14–18 mm.

All from north of New Zealand.

Remarks.—Hansen's description and figures are sufficient for the easy recognition of this interesting species, hitherto known only from the East Indian Archipelago.

Sub-order MYSIDA.

Family MYSIDAE, Dana.

Sub-family SIRIELLINAE, Norman.

Genus SIRIELLA, Dana.

2. *Siriella thompsonii* (H. Milne-Edw.).

Occurrence.—North and South Atlantic, Stations 31, 53, 58, 59, 61–65, 67–70. About 200 specimens, mostly immature.

New Zealand waters in the area between Three Kings Islands and the North Cape of New Zealand, Stations 75, 83–86, 89, 92, 93, 100, 101, 106, 108–110, 113, 120, 122, 126, 130. About 150 specimens.

This abundant and widely-distributed species occurred in thirteen hauls in the Atlantic, and nineteen hauls in New Zealand waters. At ten Atlantic stations and twelve New Zealand stations it was captured at the surface. Only one of the remaining hauls was made at a greater depth than 3 metres, namely, at Station 70, off the Azores, where the net was lowered to 12 metres.

On the journey out, thirty-three hauls of plankton were made in the Atlantic Ocean, all of them during daylight, and *S. thompsonii* occurred in only one. On the return journey through the Atlantic, thirty-one plankton gatherings were made, five by day, and twenty-six at night. *S. thompsonii* was captured in eleven of the night hauls, but not once by day.

Similarly, in the New Zealand area, seventy-one plankton gatherings were made, forty-six by day, and twenty-five by night. This species occurred in seven (or 15 per cent.) of the day hauls, and in twelve (or 48 per cent.) of those made during hours of darkness. Moreover, all the gatherings of plankton in which more than ten specimens of *S. thompsonii* were found, were night hauls. These facts, while showing that this species is a pelagic, oceanic and essentially surface form, would seem to indicate that it is more abundant at the surface during hours of darkness, and probably descends to greater depths during the daytime. A diurnal movement is thus suggested.

Distribution.—Very generally distributed in the tropical and sub-tropical waters of the world.

Previous records of this species for the oceanic waters in the neighbourhood of Australia and New Zealand are given by Sars (1885) for specimens taken by the "Challenger" on the voyage between Sydney and Wellington, and by Colosi (1918 and 1920) for specimens caught in Lat. 28° 20′ S., Long. 170° 5′ E.

3. *Siriella denticulata* (G. M. Thomson).

Mysis denticulata, G. M. Thomson, 1880, p. 1; 1881, p. 205, pl. VII, fig. 6; *Siriella denticulata*, G. M. Thomson, 1900, p. 482, pl. 33, figs. 1–5; Hutton, 1904; Thomson, 1913 and 1921; Tattersall, 1913.

Occurrence.—North of New Zealand. Station 85, one female, 10 mm.; Station 93, four females, three males; Station 133, one male, three females; Station 135, about twenty; Station 136, one male, two females.

I have also examined specimens, kindly sent to me by Professor Chilton, from Hawkes Bay (coll. Hutchinson) and Ocean Beach (coll. Crosby Smith).

Remarks.—This material enables me to supplement Thomson's description, and to indicate the position of the species in relation to other Pacific forms. It belongs to Hansen's Group 1, but departs in some few points from his definition of this group. It, however, agrees with this group in the characters of the male pleopods and their pseudobranchial rami, and is thereby excluded from all the other groups. A brief description may be useful.

Frontal plate of the carapace only slightly produced into a broad, low triangular projection, of which the apex is bluntly pointed and its angle somewhat greater than a right angle. Beneath the frontal plate is a prominent pseudo-rostral process, which projects beyond the rostral plate. Eyes of moderate size, pigment black. Antennular peduncle with the first joint larger than the combined second and third. Antennal peduncle equal in length to the first joint of the antennular. Antennal scale equal in length to the antennular peduncle, three times as long as broad, outer margin terminated by a strong spine, beyond which the terminal lobe of the scale extends. Thoracic limbs stout, tarsus of the endopods two-jointed, the first joint short.

Last abdominal somite twice as long as the fifth. Telson one-third longer than the sixth abdominal somite, and equal in length to the proximal joint of the outer uropod, three times as long as broad at the base, proximal widened portion with from three to five strong spines on each side, distal part of the lateral margins having from fifteen to twenty spines, the proximal ones arranged regularly and increasing regularly in size, the distal ones arranged in two or three series of graded spines, apex of the telson with a single pair of prominent spines, between which are three equal spinules and a pair of plumose setae. Outer uropod one and a half times as long as the telson, proximal joint twice as long as the distal joint, its outer margin armed distally with from nine to eleven stout spines, which occupy slightly less than the distal half of the margin; distal joint twice as long as broad. Inner uropod extending half way between the apex of the telson and the tip of the outer uropod, its inner margin furnished with thirteen to seventeen spines extending from the statocyst to the tip.

Pseudobranchial rami of the first and fifth pleopods of the male straight, those of the second, third and fourth pleopods spirally twisted. Terminal setae of the third and fourth male pleopods unmodified. Males with a well-developed hirsute lobe on the antennules. Length of adult specimens of both sexes, 11 mm.

Among the species belonging to Hansen's Group 1, *S. denticulata* is distinguished by the greater length of the armed portion of the outer margin of the proximal joint of the outer uropods and the larger number of spines found there. It also has a greater number of stout spines on the proximal wider portion of the telson than any other of this group. It appears to be closely related to *S. watasei*, Nakazawa, from Japan, but may be distinguished by its much shorter and more obtuse rostral plate.

Distribution.—Known only from New Zealand. It has been recorded from Otago and Lyttleton Harbours (Thomson) and Auckland Harbour (Tattersall). The present records extend its known range in New Zealand, but emphasise the fact that it is a littoral species not found far away from land. It is not an oceanic pelagic species in the same sense as *S. thompsonii.*

Sub-family GASTROSACCINAE, Norman.

Genus ANCHIALINA, Norman.

4. *Anchialina typica* (Kröyer).

A. typica, Hansen, 1910, p. 52, pl. VII, figs. 2*a–k*.

Occurrence.—Station 40, off Rio de Janeiro. One immature female, 3·25 mm.

Genus GASTROSACCUS, Norman.

5. *Gastrosaccus australis*, sp. nov. (Pl. I, figs. 7–9; pl. II, figs. 1–4.)

Occurrence.—North of New Zealand. Station 133, 135 and 136, over one hundred specimens, adult and immature of both sexes, 6–12 mm.

Description.—A species of the *G. spinifer* group. Carapace with a very short obtusely rounded rostral plate, much shorter than the eyes. Below and in front of the rostrum is a prominent pseudo-rostral process, triangular and acute in dorsal view, blunter in lateral view and somewhat recurved. No lobes or filaments on the posterior margin of the carapace.

Antennular peduncle with the basal joint longer than the sum of the two following joints; two prominent spines on the outer margin of the second joint.

Antennal peduncle extending to about one-third of the way along the distal joint of the antennular peduncle.

Antennal scale extending almost to the level of the distal margin of the second joint of the antennular peduncle, about three times as long as broad, increasing in breadth outwards, outer margin terminating in a strong spine, beyond which the apical lobe of the scale does not project.

Fifth abdominal somite with the median dorsal portion of the posterior margin produced into a short linguiform process, which, viewed laterally, looks spiniform and is recurved at the apex.

Tarsal joint of the endopod of the third to the eighth thoracic limbs divided into eight to twelve joints, nail feeble.

Pleopods of the male agreeing in essential points with those of *G. spinifer.* Both exopod and endopod of the second pair multiarticulate, but the exopod is slightly shorter than the endopod and somewhat twisted. Exopod of the third pair greatly elongate, the first joint moderately long, the succeeding eight joints quite short, tenth joint longer and narrower than the ninth, eleventh and twelfth joints very long and narrow, the twelfth joint terminated by two short filaments.

Inner uropod slightly longer than the outer, with six distantly placed spines on the inner margin, the most distal one near the apex. Outer uropod with about thirteen spines on the outer margin.

Telson about two and a half times as long as broad, lateral margins armed with six spines, including the terminal spine on the apical lobes, fifth and sixth spines approximated, the remainder more distantly placed. Terminal spine about one-fifth of the length of the telson. Cleft about one-sixth of the entire length of the telson, about eighteen to twenty teeth on each side.

Length of adult specimens of both sexes, 12 mm.

Remarks.—The *spinifer* group of species of the genus *Gastrosaccus* is sharply marked off from the remaining species of the genus, by having the endopod of the third pleopods of the male normal in form and armature, and multiarticulate. It comprises the following eight species:—*G. spinifer* (Goës), *G. sanctus* (van Beneden), *G. muticus*, Tattersall, *G. simulans*, Tattersall, *G. kojimaensis*, Nakazawa, *G. dunckeri*, Zimmer, *G. kempi*, Tattersall, and the present species.

Of these, *G. spinifer*, *G. muticus* and *G. simulans* have the posterior margin of the carapace provided with a fringe of filaments.

G. sanctus, *G. kojimaensis* and *G. dunckeri* have a pair of forwardly directed lobes on the posterior margin of the carapace.

G. kempi and *G. australis* are without lobes or filaments on the posterior margin of the carapace.

G. australis may be distinguished from *G. kempi* by the lobe on the dorsal posterior margin of the fifth abdominal somite, by the fewer spines on the lateral margin of the telson and the absence of subsidiary spines between the larger spines of the telson, a feature in which *G. kempi* is unique.

All the species of this group are shallow-water littoral forms, in contrast with the *normani* group of species, which are pelagic and off-shore forms.

Sub-family MYSINAE.

Tribe ERYTHROPINI.

Genus EUCHAETOMERA, G. O. Sars.

6. *Euchaetomera typica*, G. O. Sars.

E. typica, G. O. Sars, 1884, p. 42; 1885, p. 211, pl. 37, figs. 1–20; Hansen, 1912, p. 199, pl. 2, figs. 5*a–e*; Zimmer, 1914, p. 373; *Brutomysis vogtii*, Chun, 1896, p. 179, taf. 15 (*nec* Lo Bianco, 1901 and 1904 = *E. tenuis*); *Euchaetomera limbata*, Illig, 1906, p. 293, fig. 10; *Euchaetomera Sennae*, Colosi, 1918, p. 7; 1920, p. 239, figs. 4*a*–4*c*.

Occurrence.—North of New Zealand. Station 80, one immature male, 5 mm.; Station 130, one immature, 4 mm.; Station 139. one ♀, damaged, *ca.* 7 mm.

Remarks.—To the many synonyms of this species, I think must be added *E. sennae*, Colosi. The type specimen measures only 4 mm., and the species is said to differ from *E. typica*: (1) by the absence of a prominent spine on the outer margin of the antennal scale; (2) by the shorter and more rounded form of the telson; and (3) by the relative lengths of the inner and outer uropods. Zimmer (1914) has pointed out that the first difference is due to immaturity. With this opinion I am in complete agreement. The smallest specimen in this collection measures 4 mm. in total length, and agrees substantially with Colosi's diagnosis of *E. sennae.* But close comparison with *E. typica* has led me to believe that all the differences between the two forms will be found to disappear with growth. Evidence that the non-development of the spine on the outer margin of the antennal scale is a juvenile character is provided by Hansen's species *E. pulchra*, which is described from an immature specimen 5 mm. long. On one side the antennal scale is provided with a prominent spine on the outer margin, and on the other side the scale is more or less like that described and figured for *E. sennae.* With this proof, the first and most serious difference between *E. typica* and *E. sennae* disappears, and the other two differences are much more readily explained on the same grounds.

Distribution.—Widely distributed in both the Atlantic and Pacific Oceans, but the present records represent the most southerly area in which the species has so far been found.

7. *Euchaetomera oculata*, Hansen.

E. oculata, Hansen, 1910, p. 66, pl. X, figs. 4*a–e*; Tattersall, 1911, p. 125.

Occurrence.—North of New Zealand. Station 80, one immature, 4 mm.; Station 130, one female, 8 mm.

Remarks.—The larger specimen is considerably damaged, and the identification of both must be considered doubtful. In the form of the eyes and in the degree of development of the rostral plate they appear to agree with *E. oculata* rather than with any of the closely allied species *E. tenuis*, *E. glyphidophthalmica* or *E. plebeja.*

Distribution.—East Indian Archipelago (Hansen); Indian Ocean (Tattersall). The present records therefore indicate a wide extension of its known geographical range.

Genus PSEUDOMMA, G. O. Sars.

8. *Pseudomma belgicae* (Hansen, MS.), Holt & Tattersall.

Pseudomma belgicae, H. & T., 1906, p. 8; Tattersall, 1908, p. 27, pl. VI, figs. 1–8; Hansen, 1908, p. 12, pl. II, figs. 2*a–c*; Hansen, 1913, p. 11, pl. 1, figs. 3*a–b*; Zimmer, 1914, p. 389; Hansen, 1921, p. 2.

Occurrence.—Antarctic, Station 314. One male and one female, 26 mm.

Remarks.—Both these specimens appear to be adult. The male, however, has no brush of setae on the antennulary process. This may be due to the fact that they have been broken off during the processes of capture and preservation. The specimens are considerably mutilated, and nearly all the setae on the appendages are missing. The pleopods of the male do not appear to be any longer than those described by Hansen in this species.

Distribution.—Circumpolar, having been taken by the "Discovery" and the "Belgica," and by the Swedish and German Antarctic Expeditions. The longitude given for this species in my "Discovery" report is incorrect, and 185° E. should read 165° E.

Genus AMBLYOPS, G. O. Sars.

9. *Amblyops tattersalli*, Zimmer. (Pl. I, figs. 3–4.)

A. tattersalli, Zimmer, 1914, p. 390, taf. XXIII, figs. 13–16.

Occurrence.—Antarctic, Station 355, one female, broken, *ca.* 30 mm.

Remarks.—The single specimen available is somewhat fragmentary, but agrees substantially with Zimmer's description and figures. The eyes are microscopically spinulose, especially on the outer distal corner. The papilliform process on the eye is rather stouter than shown by Zimmer, and in lateral view is somewhat curved and acute. A central mass of nerve cells is clearly seen at the base of the process. The outer spine of the antennal scale bears three subsidiary spines, not teeth. There are twenty-four spines on the telson.

Distribution.—Known only from two specimens obtained at the winter quarters of the German Antarctic Expedition in 66° 2′ S., 89° 38′ E., 385 metres.

Tribe LEPTOMYSINI.

Genus PROMYSIS, Dana, 1850.

= *Uromysis*, Hansen, 1910.

The genus *Promysis* was established in 1850 by Dana for a mysid captured in the China Sea, 450 miles N.E. of Singapore. The genus with its type and only species, *P. orientalis*, Dana, has since remained obscure. Hansen (1910), however, has described a mysid under the name *Uromysis armata*, which, it seems to me, must clearly be referred to Dana's genus. The form of the telson and the peculiar nature of the armature of the inner uropod, as shown in Dana's figures, agree essentially with the same parts as figured by Hansen, while the form of the antennal scale is likewise the same in both species. *Uromysis*, Hansen, must, in my opinion, be cancelled as a synonym of *Promysis*. It is extremely probable that *Promysis orientalis* and *P. armata* are synonyms, but there are discrepancies in the published descriptions and figures, which, without an examination of the type specimens of both, cannot be ignored, and it is best, at present, to regard each species as valid. *P. orientalis* differs from *P. armata*, as far as can be seen, in the following points—(1) it is double the size, (2) the antennal scale appears to be much longer, (3) the details of the arrangement of the spines on the telson are different, e.g. the most distal spine on the lateral margin is situated some distance from the apex, whereas in *P. armata* it is actually at the apex, (4) the uropods are more unequal in length. Dana does not mention or figure the prominent spine on the inner uropod, which is so characteristic a feature of Hansen's species. These differences are small, and may well disappear in the light of an examination of Dana's type, if it is available. Hansen's species was obtained in the waters of the East India Archipelago, and Zimmer (1915 (2)) and Colosi (1918 and 1920) have also recorded it from the same area. The geographical distribution of the two species is therefore not inconsistent with their specific identity.

10. *Promysis atlantica*, sp. nov. (Pl. I, figs. 5–6.)

Occurrence.—Off Rio de Janeiro, Station 39, one female, immature, 4 mm.

Description.—Agreeing closely with the description and figures of *P. armata* (Hansen), differing only in the following points :—

1. The eyes are longer in proportion to their breadth ($2\frac{3}{4}$: 1), and the cornea is only half as long as the stalk. In *P. armata*, female, the eye is one and a half times as long as broad, and the cornea is only slightly shorter than the stalk.
2. The rostral plate is shorter and more broadly rounded.
3. The antennal scale extends only to the middle of the third joint of the antennular peduncle. In *P. armata* it is slightly longer than the antennular peduncle.
4. The cleft of the telson is equal to one seventh of the total length of the telson. In *P. armata* it is one quarter.
5. There are eighteen spines on the lateral margin of the telson, confined to the distal three-fifths of the margin. In *P. armata* there are twelve spines occupying the distal five-sixths of the margin. In *P. atlantica*, therefore, there is a proportionally longer part of the margins of the telson unarmed, and the spines are more numerous and more crowded.
6. The endopod of the uropods is at least as long as, even slightly longer than the exopod. It bears sixteen spines on its inner margin, the two distal ones longer than the rest, slightly curved and situated at the apex. In *P. armata* the endopod of the uropods is slightly shorter than the exopod, though the arrangement of the spines is closely similar to that in *P. atlantica*.

P. atlantica bears a prominent spiniform protuberance on the outer face of the inner uropod similar to that in *P. armata*, but perhaps blunter.

The discovery of an Atlantic species of this genus is noteworthy. While it appears to be distinct from the Indo-Pacific species, there can be no question that it belongs to the same genus, which, therefore, presents an interesting case of discontinuous distribution. The genus is presumably pelagic and this may explain its wide distribution, but its apparent discontinuity will, no doubt, be explained away by future faunistic work.

GENUS MYSIDETES, Holt & Tattersall, 1906.

= *Metamysidella*, Illig, 1906.

11. *Mysidetes posthon*, Holt & Tattersall.

Mysidetes posthon, H. & T., 1906, p. 10; Tattersall, 1908, p. 33, pl. VII, figs. 1–13; Hansen, 1913, p. 17, pl. II, figs. 2*a–c*; Zimmer, 1914, p. 402, taf. XXV, fig. 36; Hansen, 1921, p. 3; *M. similis*, Zimmer, 1914, p. 402, taf. XXV, figs. 37–42; ? *M. illigi*, Zimmer, 1914, p. 404, taf. XXVI, figs. 47–49.

Occurrence.—Antarctic. Station 314, two males, three females, 28 mm.; Station 338, one male, posterior end only; Station 348, one head, three tails; Station 351, one immature, 9 mm.

Remarks.—Hansen (1921) has shown that this species is subject to considerable variation, in consequence of which Zimmer's species, *M. similis*, cannot be maintained. With this opinion I am in agreement. Zimmer distinguishes *M. similis* from *M. posthon* by the following characters:—(1) In *M. similis* the rostrum is longer than in *M. posthon*, its margins more strongly upturned, and it partially covers the eyestalks, whereas in *M. posthon* the latter are not covered by the rostrum. (2) The upper of the two spines on the outer part of the basal joint from which the scale springs is much shorter than the lower in *M. similis*, whereas in *M. posthon* the spines are more or less equal in size. Hansen has already dealt sufficiently with the variation in the shape and form of the rostral plate, and shown that that character is not constant enough in the species to form a basis for separation. The "Terra Nova" specimens are all badly mutilated, and it is impossible to examine critically the form of the rostral plate, but so far as I can make out it is in all cases similar to *M. posthon*, short and not covering the eyestalks. With regard to the second character Hansen has likewise shown that there is considerable variation. In the present specimens, three conform more or less to the condition described for *M. similis* and four to *M. posthon*.

The specimen from Station 351, which I regard as a young stage of *M. posthon*, presents one or two interesting features. There is a gap in the armature of the lateral margins of the telson, five or six spines on the proximal widest portion of the telson being separated by an unarmed portion from the distal series. Such a condition has been described by Illig in *M. kerguelensis* and by Zimmer in *M. illigi*, and considered by these authors as a specific character. I regard it as evidence of immaturity. Traces of such a gap can be seen in much larger specimens, and only in fully grown specimens is the series of lateral spines on the telson apparently uninterrupted. The spines on the telson appear to be formed in two groups, a proximal group of four or five and a distal series which develops from the posterior end and extends anteriorly, increasing in number, with growth. In fully grown specimens the proximal and distal series meet. The distal spines are thus older spines than the more proximal ones (except, of course, the original proximal series). *M. kerguelensis* is described as 10 mm. long and *M. illigi* as 13 mm., the latter, at any rate, admittedly immature. If my suggestion is correct, the armature of the telson in both these species must be regarded as evidence of their immaturity and not as a valid specific character. Both these species are thereby brought into much closer relation to *M. posthon*, but their real affinity cannot be established until larger specimens are examined. As far as can be seen at present, *M. kerguelensis* is distinguished by the much shorter antennal scale which is only very slightly longer than the antennular peduncle. In the young specimen here ascribed to *M. posthon*, the proportions of the antennal scale are as in adult specimens of that species.

M. illigi is further distinguished from *M. posthon*, according to Zimmer, by the larger and more produced rostral plate, by the small upper and large lower spines on the basal joint from which the scale springs, and by the greater comparative length of the inner uropod. In the last character my young specimen of *M. posthon* agrees with *M. illigi*. In the other two characters it agrees with adult *M. posthon*. In view, however, of Hansen's demonstration that these characters are very variable and cannot be relied on as specific marks, it would appear that *M. illigi* is founded on a young specimen of *M. posthon*. I think this is highly probable, and provisionally, at any rate, I would refer *M. illigi* to the synonymy of *M. posthon*.

M. hanseni, the third of the new species of *Mysidetes* described by Zimmer, appears to be distinguished by the much shallower cleft of the telson and its round apical lobes, and by the absence of spines on the inner margin of the inner uropods.

Distribution.—*M. posthon* has been obtained by both British Antarctic Expeditions, by the "Belgica," the "Gauss," and the Swedish expedition. I have seen specimens also in the Paris Museum which were obtained by Dr. Charcot during his 1909 expedition. The species is therefore circumpolar in range.

12. *Mysidetes brachylepis*, sp. nov. (Pl. I, figs. 1–2.)

Occurrence.—Antarctic, Station 331. One adult female, 17 mm.

Description.—The single specimen is much mutilated. There remain no appendages except the inner uropod of one side. Most of the setae from the antennal scale and most of the spines from the telson are broken off, and the specimen is generally fragmentary. But the essential characters of the rostrum, eyes, antennal scale, and telson can be made out, and these are so distinct that it is possible to institute a new species with some degree of confidence.

Carapace produced anteriorly into a moderately long triangular plate extending forward as far as the distal margin of the eyes, angle of the apex acute, but the tip bluntly rounded.

Process on the outer distal corner of the basal joint of the antennular peduncle shorter than the outer margin of the second joint.

Eyestalks minutely hispid, eyes not broader than the stalks, of moderate size, pigment light brown.

Antennal scale much shorter than the antennular peduncle and equal in length to its own peduncle, three times as long as broad, both margins convex.

Sixth abdominal somite almost one and a half times as long as the fifth.

Telson one and a half times as long as the sixth abdominal somite, two and a half times as long as broad at the base, apex cleft about one-third the length of the telson; cleft having each lateral margin armed with twenty-seven closely set spines; apical lobes bluntly pointed and bearing one stout spine; distal two-thirds of the lateral margins of the telson furnished with about twenty-eight short, regularly arranged spines, increasing slightly in length on the more distal portions of the margins.

Inner uropod equal in length to the telson, inner margins furnished with a row of spines about twenty-seven in number, extending from the statocyst to the apex.

The type specimen is a female with two pairs of incubatory lamellae fully developed, and measures 17 mm.

Remarks.—This species is most closely allied to *M. crassa*, Hansen, 1913, but differs from it in its larger size, much shorter antennal scale and in the larger telson more deeply cleft, and armed with many more spines both in the cleft and on the lateral margins. It cannot be confused with any other species.

Genus TENAGOMYSIS, G. M. Thomson, 1900.

= *Theganomysis*, Zimmer, 1918.

This genus for many years remained known only by the type species *T. novae-zealandiae*, Thomson. In 1918 I described a second species, *T. tenuipes*, taken by the Australian Antarctic Expedition at Carnelly Harbour, Auckland Islands. In the same year Zimmer recorded the genus under the misspelling *Theganomysis*, from the Bay of Plenty, but the specimens were so defective that a detailed description was impossible. No other species has been described and, in fact, the only records of the type species subsequent to Thomson's original record are some by Chilton (1906), from L. Waikare in the North Island.

The collections made by the "Terra Nova" are rich in specimens of this genus. I find six species in the material, all new to science. In addition, I am allowed, by the kindness of Professor Chilton, to include a description of another new species collected by him. With the two species already described, the genus will now include nine species. I was not able to identify any of the "Terra Nova" species with the type and, as in the light of my examination of this material, it became evident that Thomson's description was not adequate to identify the type species, I wrote to Mr. Thomson and to Professor Chilton asking for specimens. Mr. Thomson, through Professor W. B. Benham, very kindly sent me the types of *T. novae-zealandiae* and other specimens from further recorded localities; and Professor Chilton kindly placed all his material at my disposal. It is, therefore, possible for me to add to this report a description of *T. novae-zealandiae,* and to make my account of the whole genus complete by including a description of *T. tenuipes* as well.

In 1918 I gave a new definition of the genus, which, however, now requires modification in one or two points. In one of the new species described below, only the last thoracic somite is left exposed by the carapace, and the endopod of the fourth pair of pleopods in the male may have only one instead of two modified setae. With these emendations the diagnosis given in 1918 may be allowed to stand. The genus, so far as at present known, is peculiar to New Zealand, where, however, it appears to be very abundant and widespread.

A key to the nine species of the genus follows, and may be useful for the quick determination of species. Two main groups of species can be distinguished, one in which the antero-lateral angles of the carapace are produced into acute spines and the other in which they are rounded.

Key to the known species of the Genus *TENAGOMYSIS.*

A. Antero-lateral angles of the carapace produced into acute spines.
  (1) Antennal scale about twice as long as the antennular peduncle.
    (*a*) Rostrum rounded; antennal scale five times as long as broad; telson with 12–14 spines on the lateral margins. *T. novae-zealandiae,* G. M. Thomson.
    (*b*) Rostrum obtuse with a blunt apex; antero-lateral angles of the carapace set back; a prominent spine on the body of the mandibles external to the attachment of the palps; antennal scale ten times as long as broad; telson with 16–18 spines on the lateral margins. *T. chiltoni,* sp. nov.
  (2) Antennal scale barely extending beyond or even only equal in length to the antennular peduncle.
    (*a*) Rostrum sub-acute; eyes short and normal in shape; antennal scale three and a half times as long as broad; telson with nine spines on the lateral margins. *T. similis,* sp. nov.
    (*b*) Rostrum evenly rounded; eyes long and narrow; antennal scale six times as long as broad; telson with 12–14 spines on the lateral margins. *T. macropsis,* sp. nov.
B. Antero-lateral angles of the carapace rounded.
  (1) Inner and outer uropods subequal in length.
    Rostrum small, obtuse; eyes moderately large and normal in form; antennal scale four times as long as broad; antennular peduncle equal in length to the antennal, both robust in form; telson with 18–20 spines on the lateral margins; tarsus of the thoracic legs composed of two to three joints. *T. robusta,* sp. nov.
  (2) Outer uropod considerably longer than the inner uropod.
    (*a*) Antennal scale equal in length to the antennular peduncle; rostrum short and obtuse; eyes small and normal; antennal scale eight times as long as broad; last joint of the antennular peduncle almost as long as the first; telson with 26–28 spines on the lateral margins; generally a slender species. *T. thomsoni,* sp. nov.
    (*b*) Antennal scale at least one quarter longer than the antennular peduncle.
      (i) Rostrum greatly elongated in the form of a triangular plate with an acutely pointed apex, extending to the distal end of the first joint of the antennular peduncle.
        Eyes normal in shape; antennal scale six and a half times as long as broad, with an acutely pointed apex; telson with 26 spines on each margin. *T. producta,* sp. nov.

(ii) Rostral plate not longer than one third of the first antennular joint, apex obtuse.
 (a) A small species ; antennal scale seven times as long as broad ; tarsus of the thoracic limbs composed of four joints ; telson with 16–18 spines on its margins. *T. scotti*, sp. nov.
 (b) A large slender species ; antennal scale eleven times as long as broad ; tarsus of the thoracic limbs composed of nine to fourteen joints ; telson with 36 spines on its margins. *T. tenuipes*, W. M. T.

13. *Tenagomysis novae-zealandiae*, Thomson.

T. novae-zealandiae, Thomson, 1900, p. 484, pl. 33, figs. 6–8, pl. 34, figs. 9–17 ; Hutton, 1904, p. 256 ; Chilton, 1906 ; Thomson, 1913 ; Thomson, 1921, p. 108.

Occurrence.—Not taken by the "Terra Nova," but specimens from Brighton (labelled types) and Waikouaiti River (coll. C. Chilton) were kindly sent me by Professor W. B. Benham, F.R.S.

Description.—Carapace hardly at all produced to form a rostral plate, anterior margin between the eyes evenly rounded, antero-lateral angles produced into an acute spine.

Eyes not more than twice as long as broad, cornea hemispherical, occupying almost half the eye in dorsal view.

Antennal scale nearly twice as long as the antennular peduncle, five times as long as broad, lanceolate in shape, setose all round, terminal joint distinct, a prominent spine on the basal joint from which the scale springs.

Antennal peduncle extending to the level of the distal joint of the antennular peduncle.

Tarsal joint of the third to the eighth thoracic limbs composed of three joints, in addition to the terminal dactylus.

Telson shorter than the sixth abdominal somite, and about half as long as the outer uropod, cleft for about one-fifth of its length, cleft armed with a pair of plumose setae, and twenty-two to twenty-four teeth on each side, lateral margins of the telson armed with from twelve to fifteen short stout spines extending throughout their entire length.

Inner uropod one and a half times as long as the telson, lower inner margin with a row of spines about twenty in number, extending from the statocyst to about one-quarter of the length of the uropod from the apex, the proximal spines closely set, the distal ones more distantly separated.

Outer uropod one-third longer than the inner.

Length of an adult female, 8 mm.

Remarks.—The above particulars have been taken from the specimens labelled "types," from Brighton, near Dunedin. The length of the largest specimen is, however, only 8 mm., whereas Thomson gives the length of adult females as from 10–16 mm. A slight error may here be noticed in Thomson's description of the telson. He says, "Telson short, only about half as long as broad." The word "again" appears to have been omitted, and the description should read, "Telson short, only about half as long *again* as broad."

The only adult male among the specimens submitted to me is defective as regards the fourth pleopods, so I am unable to indicate the exact nature of the armature of the exopod.

The species is characterised by the acute spine at the antero-lateral corners of the carapace, the proportions of the antennal scale and its length relative to the antennular peduncle, and the short form of the telson.

Distribution.—Kaikorai lagoon (brackish water) estuary of the Waikouaita River, rock pools at Brighton, both localities near Dunedin (Thomson); Lake Waikare (Chilton, 1906); mouth of a little stream near Brighton, in water almost fresh to the taste though close to the sea, and affected by extra high tides (Chilton, 1906). All these records indicate that this species is an estuarine form, capable of living in almost fresh water and having, in fact, a habitat very similar to that of *Neomysis integer* in British waters.

The specimens recorded by Thomson from the Bay of Islands, 8 fms., which, through the courtesy of Professor Benham, I have been allowed to examine, do not belong to this species but to *T. similis*, one of the new species described below.

14. *Tenagomysis chiltoni*, sp. nov. (Plate II, figs. 5–8.)

Occurrence.—Tidal inlet, Parakai, 19–12–18, abundant (C. Chilton). The specimens sent to me are three females, 8–10 mm.

Not collected by the "Terra Nova."

Description.—Carapace larger than in most of the other species of the genus, leaving only the last thoracic somite exposed. Antero-lateral angles of the carapace produced into acute spines. Frontal plate short, obtuse and bluntly pointed, the proximal portion of the antero-lateral margin sloping away much more abruptly than the distal portion, so that the antero-lateral angles of the carapace are displaced rather far back. The whole appearance in dorsal view can best be judged from the figure accompanying this description.

Eyes of normal appearance, about twice as long as broad, the cornea occupying the distal half.

Antennal scale very long, extending beyond the antennular peduncle for at least half its length, ten times as long as broad, narrowly lanceolate in shape, setose all round, distal joint distinct, spine on the outer distal corner of the joint from which the scale arises very prominent.

There is a prominent acute spine on the body of the mandible immediately outside the attachment of the palp. I have not noticed this feature in any of the other species.

The thoracic limbs are, on the whole, short and robust, the anterior ones more so than the posterior. The tarsal joint in all is composed of four short joints, in addition to which the nail is distinct and robust. The outer distal corner of the basal joint of the exopod is acute.

Sixth abdominal somite more than twice as long as the fifth.

Telson about as long as the sixth abdominal somite and one and a quarter times as long as broad at the base, cleft for one quarter of its length ; cleft armed with two long plumose setae, a short proximal portion of each lateral margin of the cleft unarmed with teeth, the remainder of these margins with a dense row of closely set, comb-like teeth ; lateral margins of the telson armed with about 16–18 spines distributed throughout the whole length, the proximal three spines on each side longer than the others, the distance between the terminal spine and the one proximal to it greater than the distance between any other adjacent spines, terminal spine about one-twelfth of the entire length of the telson.

Inner uropod one and a third times as long as the telson, with a row of closely set spines, about 32 in number, on the inner margin, the spines increasing in size distally, the most distal spine situated a short distance from the apex of the uropod.

Outer uropod one and three quarters of the length of the telson.

Length of adult females, 10 mm.

I have not seen males belonging to this species.

Remarks.—This species is easily recognised by the extreme length of the antennal scale, the peculiar shape of the frontal plate and the greatly set-back position of the antero-lateral angles, and the form of the telson and uropods. The acute spine on the mandibles may be regarded as an additional specific character. It is present on all three specimens I have examined, and is probably characteristic of the species. I have pleasure in naming the species after its discoverer, Professor C. Chilton, to whose courtesy I am indebted for the opportunity of examining and describing it.

15. *Tenagomysis similis*, sp. nov. (Plate II, figs. 9–13.)

Occurrence.—" Terra Nova," Bay of Islands, August 1912, numerous; " Terra Nova," Station 136, four ; Ocean Beach, collected by Crosby Smith, four females, two males, 6–7 mm., from Professor Chilton ; Bay of Islands, two females, 5 mm. (recorded as *T. novae-zealandiae* by Thomson, 1900), from Professor W. B. Benham.

Description.—Carapace short, leaving the last three thoracic somites exposed, produced in front to form a short triangular rostral plate with the apex acute, almost spiniform ; antero-lateral angles produced into acute spines ; a prominent pseudo-rostral process below the rostral plate and almost as long as the latter.

Eyes not quite twice as long as broad, cornea hemispherical, occupying half the eye in dorsal view.

Antennal scale extending slightly beyond the distal end of the antennular peduncle, three and a half times as long as broad, ovate-lanceolate in shape, setose all round, terminal joint large, a prominent spine on the outer corner of the basal joint from which the scale springs.

Antennal peduncle extends to the level of the middle of the third joint of the antennular peduncle.

Tarsal joint of the third to the eighth thoracic limbs composed of only two joints in addition to the terminal dactylus which is well developed.

Sixth abdominal somite one and a half times as long as the fifth.

Telson shorter than the sixth abdominal somite (about two-thirds) and about three-fifths of the length of the inner uropod, cleft about one fifth of its length; cleft armed with a pair of plumose setae at the apex, extending beyond the terminal spines, and with about twelve teeth on each side; lateral margins of the telson armed with from nine to twelve spines, including the terminal ones, rather widely spaced and approximately equidistant, the three proximal spines longer than the remainder except the terminal ones, which are one-eighth of the length of the telson.

Inner uropod one and two thirds of the length of the telson, inner margin with a row of spines, about ten in number, the first five situated in the region of the statocyst, the remainder distantly placed along the margin, the most distal spine about one quarter of the length of the uropod from the apex.

Outer uropod one quarter longer than the inner.

Exopod of the fourth pleopods of the male with a long modified seta on each of the antepenultimate and penultimate joints.

Length of an adult female, with well-developed brood lamellae and eggs in the brood pouch, 7 mm.

Remarks.—This species is very closely allied to *T. novae-zealandiae*, but is a smaller species and differs in the characters of the rostral plate, the shorter and the relatively broader antennal scale, and the fewer spines on the margins of the telson and its cleft and on the inner uropods.

The specimens recorded by Thomson from the Bay of Islands as *T. novae-zealandiae* belong to this species, which appears also to differ from the former in its more purely marine habit.

16. *Tenagomysis macropsis*, sp. nov. (Plate III, figs. 1–12.)

Occurrence.—"Terra Nova," North of New Zealand. Station 132, one; Station 133, one; Station 135, eight; Station 136, one; Station 148, one; Station 242, numerous, immature. Ocean Beach, collected by Crosby Smith, January, 1904, one; Akaroa, collected by H. Suter, one; from Professor C. Chilton.

Description.—Carapace short, leaving the last three thoracic somites exposed, roundly arched in front without definite rostral projection, antero-lateral angles produced into acute spines, no pseudo-rostral process.

Eyes in the male about three times as long as broad, the cornea occupying the distal third of the eye, extending to the distal end of the antennular peduncle and equal to the antennal peduncle. In female and immature specimens the eye is somewhat longer and narrower, and the cornea occupies only the distal quarter of the whole eye.

Antennal scale equal in length to the antennular peduncle, six times as long as broad, ovate lanceolate in shape, setose all round, terminal joint distinct, a prominent spine on the outer distal corner of the joint from which the scale springs.

Antennular peduncle more slender in the female than in the male; antennal peduncle equal in length to the first two joints of the antennular peduncle.

Tarsal joint of all the thoracic limbs composed of three joints, the first longer than the last two combined, third slightly shorter than the second, dactylus rudimentary; the thoracic limbs are long and slender and well provided with fine setae. The outer corner of the basal joint of the exopod is rounded.

Sixth abdominal somite twice as long as the fifth.

Telson about three-quarters of the length of the sixth abdominal somite, two-thirds of the length of the inner uropod and half the length of the outer uropod, cleft for about a quarter of its length, about one and a half times as long as broad as its base. Cleft armed with a pair of plumose setae and with a regular series of teeth about thirty in number on each side. Lateral margins armed with about 12–14 spines arranged more or less regularly, the proximal spines somewhat larger and stouter than the distal ones, except the terminal spines which are about one-tenth of the length of the telson.

Inner uropod one and a half times as long as the telson with a group of 15–20 closely set spines on the inner margin, commencing slightly distal to the statocyst, and ending about one quarter of the length of the uropod from the apex.

Outer uropod twice as long as the telson and one-third longer than the inner.

Exopod of the fourth pleopod of the male longer than the endopod with a strong modified seta on each of the antepenultimate and penultimate joints, terminal joint small and furnished with two fine setae.

Length of adults of both sexes, 9 mm.

Remarks.—The male differs from the female, in addition to the usual secondary sexual characters, in having the eye rather shorter and stouter and in the stouter form of the antennular peduncle. The anterior end of this species recalls somewhat strongly that of the common *Mesopodopsis slabberi* (v. Ben.) of European waters in the form of the eyes, the roundly arched frontal plate, and the acute antero-lateral angles of the carapace. It is distinguished from all other species of the genus by the combination of these three characters in addition to the shape and armature of the telson.

17. *Tenagomysis robusta*, sp. nov. (Plate IV, figs. 1–5.)

Occurrence.—Station 135, north of New Zealand, one male, one female, two immature.

Description.—A small robust species in which the carapace leaves the last thoracic somite exposed, antero-lateral corners of the carapace rounded, front margin of the carapace produced into a very short obtusely pointed rostral plate.

Eyes moderately large, cornea occupying about half of the whole eye, pigment black, eyestalk minutely hispid on the anterior surface.

Antennular peduncle short and stout, outer distal corner of the basal joint produced into a lobe almost as long as the second joint and tipped by three setae.

Antennal peduncle equal in length to the antennular.

Antennal scale longer than the antennular peduncle, extending forward in the male to the level of the anterior end of the hirsute lobe, ovate-lanceolate in shape, setose all round, four times as long as broad, terminal joint distinct, a prominent spine on the outer corner of the basal joint from which the scale arises.

Tarsal joint of the thoracic limbs divided into two articulations in the third pair, into three articulations in the remaining pairs, nail in all the limbs distinct and moderately long.

Sixth segment of the abdomen nearly twice as long as the fifth and only slightly longer than wide.

Telson as long as the sixth abdominal somite and one and a half times as long as broad at the base, cleft for one-fifth of its length; cleft armed with a pair of plumose setae and with 8–11 teeth on each margin; lateral margins of the telson armed with 18–20 spines more or less regularly placed throughout the entire margin, the terminal spine about one-tenth of the length of the telson.

Inner and outer uropods subequal in length, about one and a half times as long as the telson, inner uropod with a row of closely set spines on the inner margin, about 30 in number, extending from the statocyst to the apex.

Exopod of the fourth pleopods of the male with a modified seta on each of the antepenultimate and penultimate joints, terminal joint small, bearing one long seta.

Length of an adult male, 7 mm.

Remarks.—This species is distinguished by its small robust form, the relative length and stoutness of the antennular and antennal peduncles and their relative proportions, the antennal scale, the small obtuse rostrum, the shape and armature of the telson and the subequal uropods.

18. *Tenagomysis thomsoni*, sp. nov. (Plate IV, figs. 12–16.)

Occurrence.—North of New Zealand. Station 128, one. Stations 132–133, 135–136, many.

Description.—Carapace leaving the last two thoracic somites exposed, antero-lateral corners rounded, front margin produced slightly as a low obtuse-angled triangle with the apex broadly rounded and the sides almost straight, no pseudo-rostral process

Eyes normal in form, rather small, cornea rather less than one-half of the complete eye, pigment black.

Antennal scale equal in length to the antennular peduncle, narrowly lanceolate in shape, setose all round, eight times as long as broad, tip obtuse, distal joint distinct, an inner and outer spine on the basal joint which carries the scale.

Terminal joint of the antennular peduncle relatively longer than in any of the other species almost as long as the basal joint

Antennal peduncle shorter than the first joint of the antennular.

Thoracic limbs long and slender, tarsal joint divided into five articulations in addition to a long, slender and distinct dactylus; outer distal corner of the basal joint of the exopod without a spine.

Sixth abdominal somite slightly more than twice as long as the fifth.

Telson four-fifths of the length of the sixth abdominal somite, and twice as long as broad at its base, cleft for one-fifth of its length; cleft armed with two plumose setae and with about 27 teeth on each margin; lateral margins of the telson armed throughout their entire length by about 26–28 spines, the three proximal ones longer than the succeeding ones except the terminal spines.

Inner uropod one and a quarter times as long as the telson, with about 32 spines on its inner margin extending from the statocyst to the apex, the proximal spines closely set, the distal five or six more distantly placed.

Outer uropod one and three-quarter times as long as the telson and one-third longer than the inner.

Exopod of the fourth pair of pleopods of the male with a strong modified seta on the antepenultimate and penultimate joints, the terminal joint small and furnished with two small setae.

Length of adults of both sexes, 8 mm.

Remarks.—This species is distinguished from *T. scotti* by the shorter antennal scale, longer terminal joint to the antennular peduncle, smaller eyes, almost obsolete rostrum, the number of spines on the margins of the telson and its cleft, and the exopod of the fourth pleopods of the male. It is, moreover, a littoral species.

19. *Tenagomysis producta*, sp. nov. (Plate III, figs. 13–18.)

Occurrence.—Sandy pool, Bay of Islands, New Zealand, five males and five females, 10–12 mm.

Description.—A large robust species with the carapace leaving only the last thoracic somite uncovered. Front margin of the carapace produced into a long acute-angled triangular rostrum with sharply pointed apex extending to the distal end of the first joint of the antennular peduncle, antero-lateral angles of the carapace rounded, no pseudorostral process.

Eyes large, normal, cornea occupying slightly less than the distal half of the complete eye, pigment black.

Antennal scale extending for at least half its length beyond the distal end of the antennular peduncle, lancet-shaped, setose all round, six and a half times as long as broad, apex acute, almost spiniform, distal joint short but distinct, an outer and an inner spine on the basal joint from which the scale springs.

Antennal peduncle extends only slightly beyond the distal end of the second joint of the antennular peduncle.

Tarsal joint of the thoracic limbs divided into four articulations in the third pair and five in the eighth, nail distinct, outer corner of the basal joint of the exopod rounded.

Sixth abdominal somite one and three quarter times as long as the fifth.

Telson slightly longer than the sixth abdominal somite, and more than twice as long as broad at the base, cleft for about one-quarter of its length; the cleft armed with two plumose setae and with about 26 teeth on each margin; lateral margins of the telson armed with 26 spines more or less regularly arranged along their entire length, the terminal spines not very much larger than the remainder.

Inner uropod about one-fifth longer than the telson, with about 15 spines on the inner margin extending from the statocyst almost to the apex, proximal spines placed closer together and smaller in size than the distal spines.

Outer uropod one-third longer than the telson and conspicuously broader than in most of the other species.

Exopod of the fourth pair of pleopods of the male with a strong modified seta on each of the antepenultimate and penultimate joints, terminal joint small with two long single setae.

Length of adults of both sexes, 12 mm.

Remarks.—This is one of the most distinct of the species of the genus. The long acute rostrum and the spiniform apex to the antennal scale are quite unlike the same parts in any of the other species. It is a larger and more robust form than the majority, and is apparently littoral in habit.

20. *Tenagomysis scotti*, sp. nov. (Pl. IV. figs. 6–11.)

Occurrence.—Station 85, five; Station 86, one; Station 93, thirty-six; Station 120, one; Station 122, four. All from north of New Zealand.

Description.—Carapace leaving the last two thoracic somites exposed, antero-lateral corners rounded, front produced into a short acute rostral plate with a blunt apex, extending half-way along the basal joint of the antennular peduncle, no pseudorostral projection.

Eyes normal, cornea occupying rather more than half the entire eye, pigment reddish brown rather than black.

Antennal scale extending beyond the antennular peduncle by about one-third of its length, narrowly lanceolate in form with apex obtuse, seven times as long as broad, an inner and an outer spine on the basal joint from which the scale arises.

Antennal peduncle not longer than the first two joints of the antennular.

Thoracic limbs long and slender, tarsal joint composed of four articulations in addition to a long and slender but distinct dactylus, a small spine on the outer corner of the basal joint of the exopod.

Sixth abdominal somite one and a half times as long as the fifth.

Telson as long as the sixth abdominal somite, deeply channelled dorsally, twice as long as broad at the base, cleft for one-fifth of its length; cleft rather wide and armed with two plumose setae and with seventeen teeth on each margin; lateral margins of telson armed with 17–19 spines, the two proximal of which are longer and stouter than the succeeding spines except the terminal ones, which are one-tenth of the length of the telson.

Inner uropod one and a third times as long as the telson, a row of thirty spines on the inner margin extending from the statocyst to the apex.

Outer uropod about twice as long as the telson.

Exopod of the fourth pleopods of the male with the penultimate joint twice as long as the antepenultimate, the former joint alone possessing a single long, stout, modified seta. No such seta is present on the antepenultimate joint as in most of the other species of the genus.

Length of adult specimens of both sexes, 9 mm.

Remarks.—This species belongs to that group of the genus having the antero-lateral angle of the carapace rounded, and in that group is distinguished by the length of the antennal scale, the form of the rostrum, the shape and armature of the telson, and the exopod of the fourth pleopod of the male. It appears to be also a more oceanic species than the others. All the specimens were taken in townets in the neighbourhood of Three Kings Island, and none in the vicinity of the mainland of New Zealand.

21. *Tenagomysis tenuipes*, Tattersall.

T. tenuipes, Tattersall, 1918, p. 10, pl. XVIII, figs. 1–7.

Occurrence.—Not taken by the "Terra Nova." The type and only known specimen was taken by the Australian Antarctic Expedition in Carnelly Harbour, Auckland Islands.

Description.—Antero-lateral angles of the carapace rounded; anterior margin of the carapace produced into a triangular rostral plate with bluntly pointed apex, shorter than the eyes, and about one-third of the length of the first joint of the antennular peduncle.

Antennal scale considerably longer than the antennular peduncle, eleven times as long as broad, terminal joint minute but distinct.

Tarsus of the third to the eighth thoracic limbs divided into 9–14 joints.

Fourth pair of pleopods of the male with a long, stout, plumose seta on the antepenultimate and penultimate joints.

Telson longer than the sixth abdominal somite, two and a half times as long as broad at its base, cleft for one-fifth of its length, lateral margins armed throughout their entire length with about thirty-six spines.

Inner uropod one and a quarter times as long as the telson, inner margin armed with a row of spines from the statocyst to the apex, closely set proximally, more distantly placed distally and irregularly arranged in series.

Outer uropod one and a half times as long as the inner. Length 21 mm.

Remarks.—This species is easily distinguished by its exceedingly long and narrow scale, by the large number of joints in the tarsus of the thoracic limbs, and by the form and armature of the telson.

Tribe MYSINI.

Genus ANTARCTOMYSIS, Coutière, 1906.

22. *Antarctomysis maxima* (Hansen, MS.), (Holt & Tattersall).

Mysis maxima, Holt & Tattersall, 1906, p. 11; *Antarctomysis maxima*, Coutière, 1906, p. 1, pl. 1 and 2, figs. 1–20; Tattersall, 1908, p. 36, pl. VIII, fig. 1; Hansen, 1908, p. 13, pl. II, figs. 3*a*–*m*; Hansen, 1913, p. 19; Tattersall, 1913, p. 872; Zimmer, 1915 (1), p. 203, text figs. 1–2; Tattersall, 1918, p. 12.

Occurrence.—Antarctic. Station 194, one female, 50 mm.; Station 316, one female, 42 mm.; Station 339, one adult male, 45 mm., two females (posterior ends only); Station 355, one male.

Distribution.—Circumpolar in Antarctic Seas.

23. *Antarctomysis ohlinii*, Hansen.

Antarctomysis, sp., Tattersall, 1908, p. 36, pl. VIII, figs. 2–12; *A. ohlinii*, Hansen, 1908, p. 13; Hansen, 1913, p. 20, pl. III, figs. 2*a*–*d*.

Occurrence.—Antarctic. Station 332, one male, 58 mm., one female carrying eggs, 71 mm., one immature female, 52 mm., one young, 24 mm.; Station 343, three young, 10–12 mm.; Station 346, one young, 10 mm.; Station 355, one female, 50 mm.

Remarks.—The largest of these specimens is of much greater length than any of those examined by Hansen. The latter had adult females 50 mm. long, and his largest male measured 52.5 mm. The female of 52 mm. in the present collection has the incubatory lamellae only just developing, while the one with eggs in the brood pouch is 71 mm. long. Hansen has remarked that *A. maxima* appears to grow to a larger size in more southerly and therefore colder latitudes. The same would seem to apply to *A. ohlinii*, since Hansen's specimens were from latitude 54° S., while the "Terra Nova" collected it at least 23° further south.

Distribution.—Previously recorded by the "Discovery" and by the Swedish Antarctic Expedition only.

V.—LIST OF PAPERS REFERRED TO.

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PLATE I.

Mysidetes brachylepis, sp. nov.

Fig. 1.—Anterior end including rostral process, eye, antennular peduncle and antennal scale. × 43.

Fig. 2.—Telson. × 48.

Amblyops tattersalli, Zimmer.

Fig. 3.—Eye, dorsal view.

Fig. 4.—Eye, lateral view.

Promysis atlantica, sp. nov.

Fig. 5.—Anterior end, including rostral process, eye, antennular peduncle and antennal scale. × 100.

Fig. 6.—Telson and uropods. × 100.

Gastrosaccus australis, sp. nov.

Fig. 7.—Anterior end including rostrum, eye, antennular peduncle, antennal peduncle and scale. × 25.

Fig. 8.—First thoracic limb. × 33.

Fig. 9.—Second thoracic limb. × 33.

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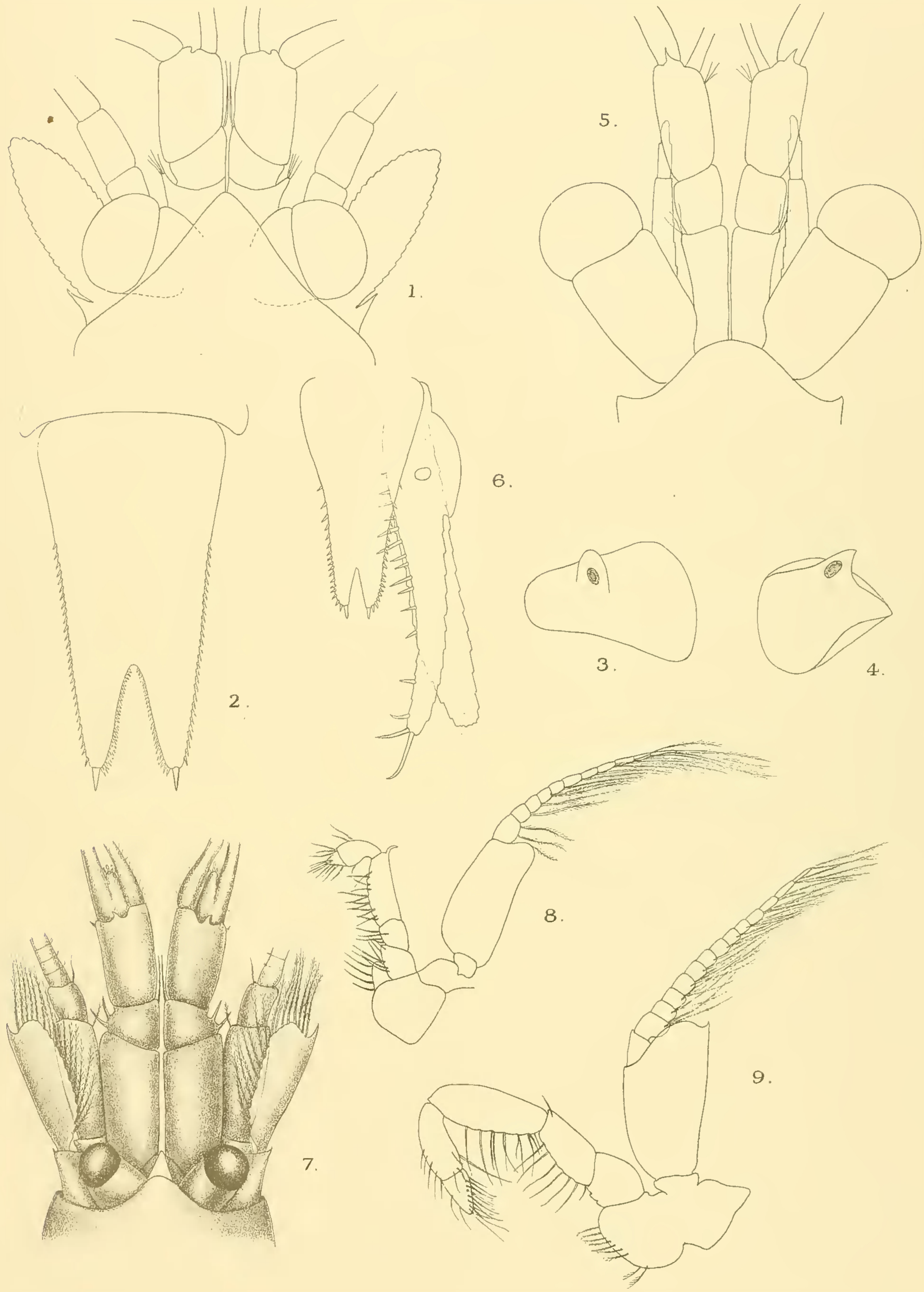

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PLATE II.

Gastrosaccus australis, sp. nov.

FIG. 1.—Eighth thoracic limb. × 33.
FIG. 2.—Second pleopod of male. × 33.
FIG. 3.—Third pleopod of male. × 33.
FIG. 4.—Telson. × 33.

Tenagomysis chiltoni, sp. nov.

FIG. 5.—Anterior end, including rostral plate, antero-lateral angles, eye, antennular peduncle and antennal scale. × 33.
FIG. 6.—Endopod of the third thoracic limb. × 33.
FIG. 7.—Endopod of the eighth thoracic limb. × 33.
FIG. 8.—Telson and uropods. × 33.

Tenagomysis similis, sp. nov.

FIG. 9.—Anterior end, including rostral plate and antero-lateral angles, eye, antennular peduncle and antennal scale. × 50.
FIG. 10.—Antennal scale. × 65.
FIG. 11.—Endopod of the third thoracic limb. × 65.
FIG. 12.—Telson and uropods. × 65.
FIG. 13.—Distal end of the exopod of the fourth pleopods of the male. × 160.

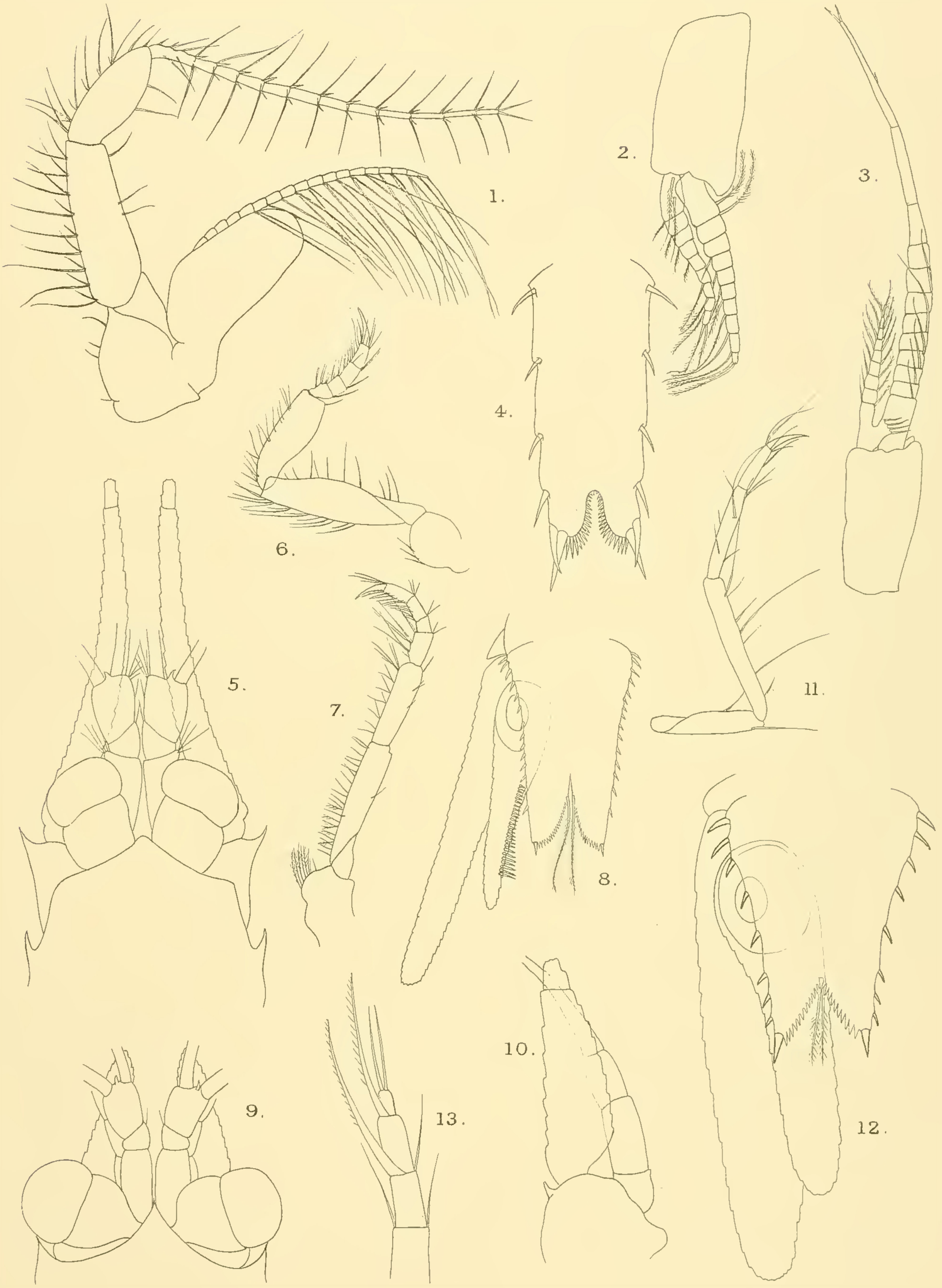

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PLATE III.

Tenagomysis macropsis, sp. nov.

FIG. 1.—Anterior end of male, including rostral plate and antero-lateral angles, eye, antennular peduncle and antennal scale. × 33.
FIG. 2.—Rostral plate and antero-lateral angles. × 33.
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FIG. 4.—Eye of female. × 33.
FIG. 5.—Antennular peduncle of male. × 33.
FIG. 6.—Antennal scale. × 33.
FIG. 7.—Eighth thoracic limb. × 33.
FIG. 8.—Distal extremity of endopod of eighth thoracic limb. × 106.
FIG. 9.—Fourth pleopod of male. × 33.
FIG. 10.—Distal extremity of exopod of the fourth pleopod of male. × 75.
FIG. 11.—Telson. × 65.
FIG. 12.—Uropods. × 65.

Tenagomysis producta, sp. nov.

FIG. 13.—Anterior end, including rostral plate and antero-lateral angles, eye, antennular peduncle. × 33.
FIG. 14.—Antennal scale. × 33.
FIG. 15.—Endopod of third thoracic limb. × 33.
FIG. 16.—Distal extremity of exopod of the fourth pleopod of the male. × 66.
FIG. 17.—Telson. × 33.
FIG. 18.—Uropod. × 33.

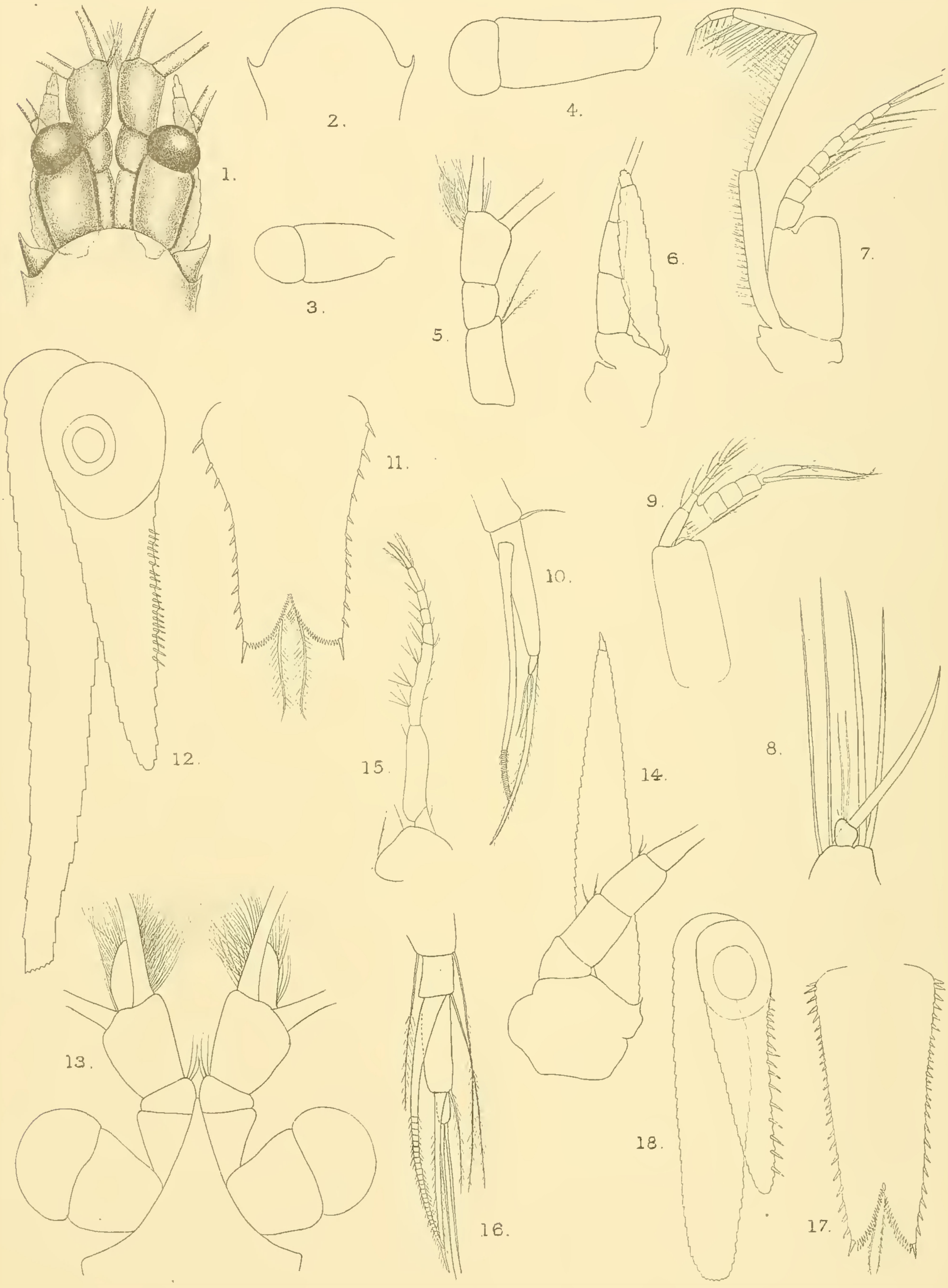

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PLATE IV.

Tenagomysis robusta, sp. nov.

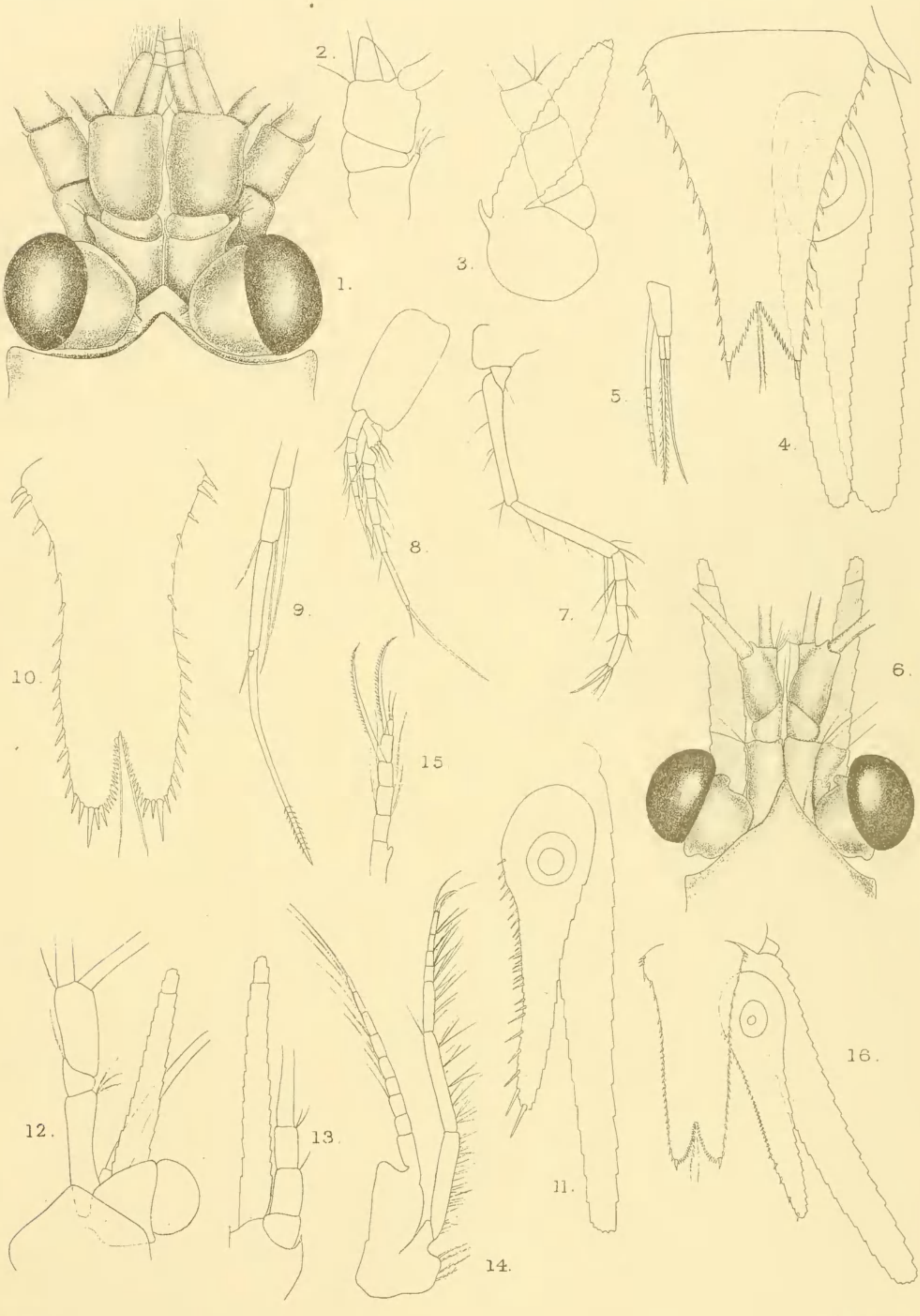
FIG. 1.—Anterior end, including rostral plate and antero-lateral angles, eye, antennular and antennal peduncles. × 50.
FIG. 2.—Antennular peduncle of male. × 48.
FIG. 3.—Antennal scale. × 48.
FIG. 4.—Telson and uropods. × 98.
FIG. 5.—Distal extremity of exopod of fourth pleopod of male. × 100.

Tenagomysis scotti, sp. nov.

FIG. 6.—Anterior end, including rostral plate and antero-lateral angles, eye, antennular peduncle and antennal scale. × 33.
FIG. 7.—Endopod of third thoracic limb. × 33.
FIG. 8.—Fourth pleopod of the male. × 33.
FIG. 9.—Distal extremity of the exopod of the fourth pleopod of the male. × 70.
FIG. 10.—Telson. × 65.
FIG. 11.—Uropod. × 48.

Tenagomysis thomsoni, sp. nov.

FIG. 12.—Anterior end, including rostral plate, antero-lateral angles, eye, antennular peduncle and antennal scale. × 33.
FIG. 13.—Antennal scale. × 33.
FIG. 14.—Third thoracic limb. × 33.
FIG. 15.—Distal extremity of exopod of fourth pleopod of male. × 33.
FIG. 16.—Telson and uropods. × 38.



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