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NATURAL HISTORY REPORT.

ZOOLOGY. VOL. III, No. 1. Pp. 1–74.

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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PYCNOGONIDA.

BY W. T. CALMAN, D.Sc.

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

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 Excluding names subsequently withdrawn by their authors, or definitely placed as synonyms in the present report, the "Discovery" obtained twenty-six species, the "Français" seven, the "Scotia"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 T. V. Hodgson, who has very kindly made available to me much of the unpublished results of his study of the "Gauss" collection, and has allowed me to borrow for examination the types of many of his new species.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.
,, *praecox*, 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.

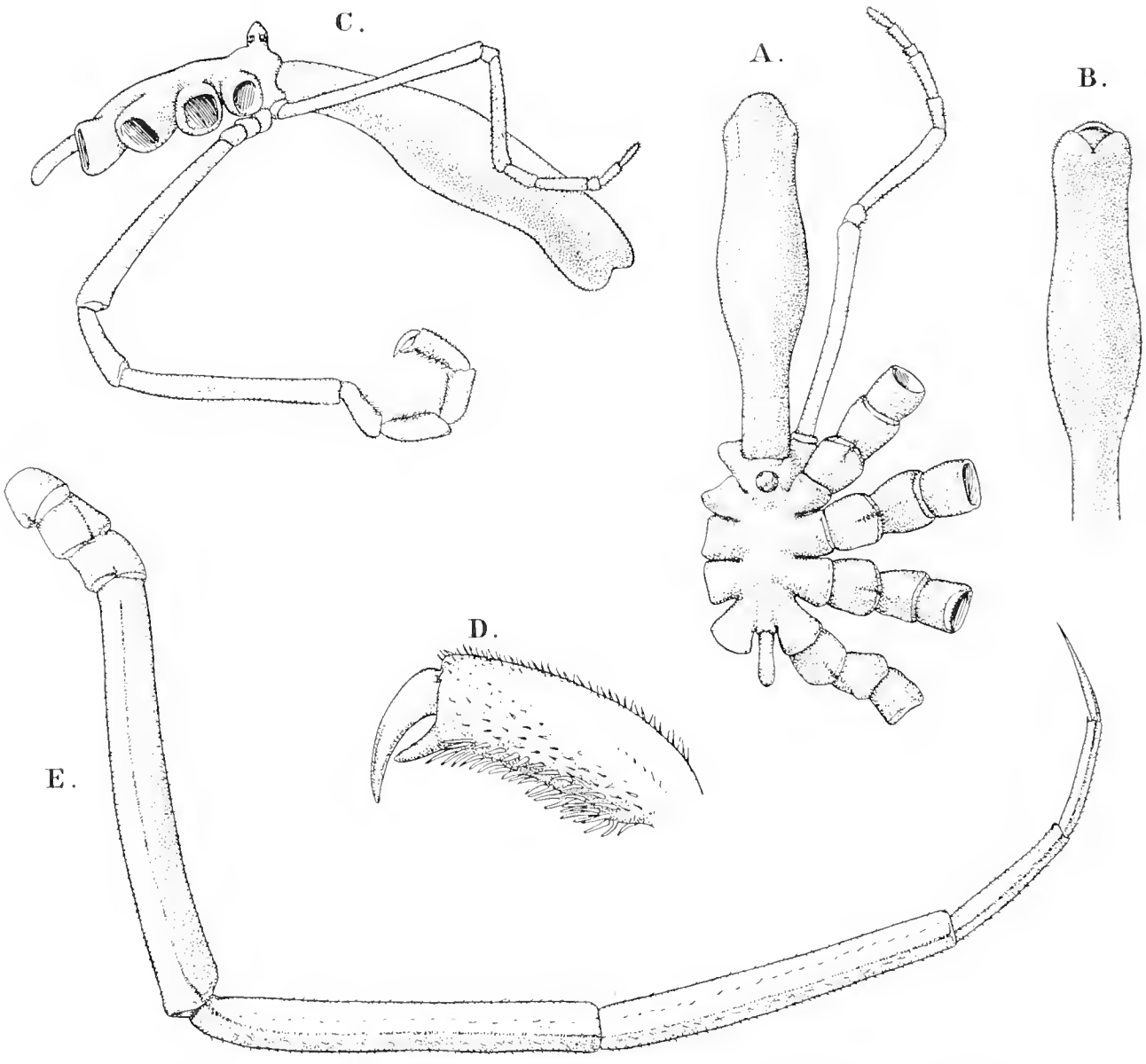

FIG. 1.—*Colossendeis scotti*, sp. n., Male. A. Dorsal view of body with palp and coxæ of one side. B. Ventral view of proboscis. C. Lateral view of body with palp and oviger. D. Terminal segment of oviger, further enlarged. E. Third leg of right side.

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.	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." Stn. 349. ♂	"Terra Nova." Stn. 338. ♀	"Terra Nova." Stn. 220. ♂	"Discovery." Syntypes. 5 fms. ♀	"Discovery." Syntypes. 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,

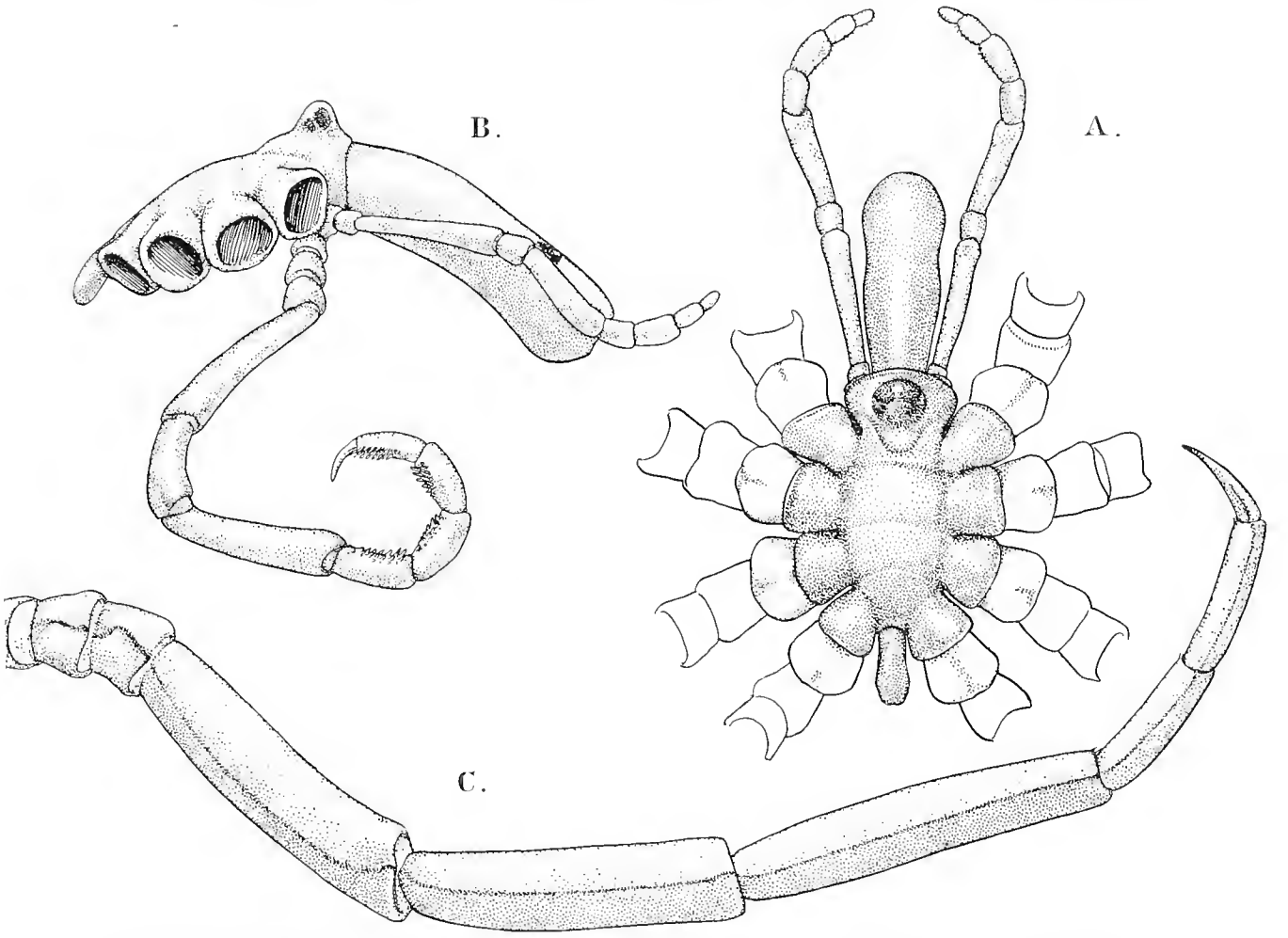

Fig. 2.—*Colossendeis wilsoni*, sp. n., Female. A. Dorsal view of body with palps and coxæ. B. Lateral view of body with palp and oviger. C. Third leg of right side.

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

	Holotype.
Third right leg (distal segments from fourth)—	
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."		"Discovery."
	Stn. 194.	Stn. 338.	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."		"Discovery."
	Stn. 194.	Stn. 338.	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

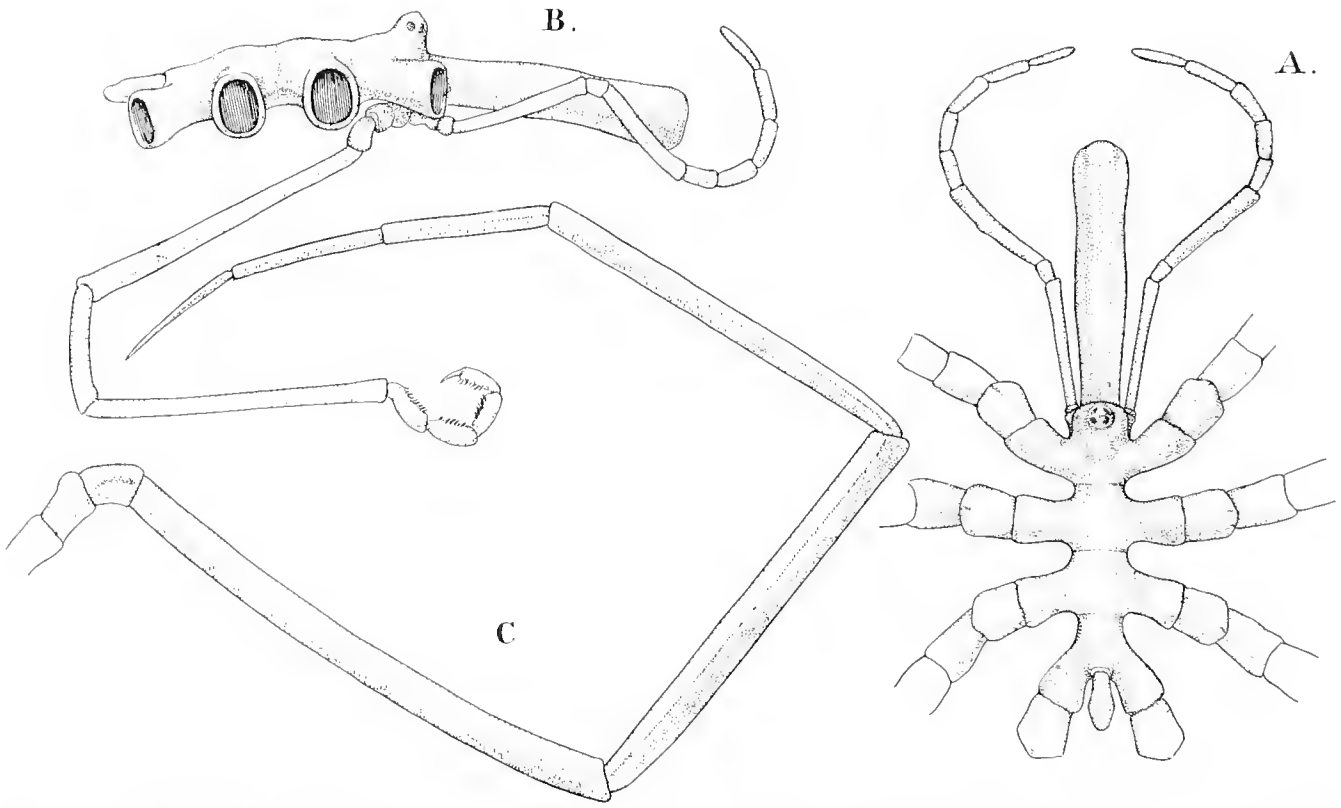

Fig. 3.—*Colossendeis drakei*, sp. n., Female. A. Dorsal view of body with palps and coxæ. B. Lateral view of body with palp and oviger. C. Third leg of right side.

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.

Origer 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*.

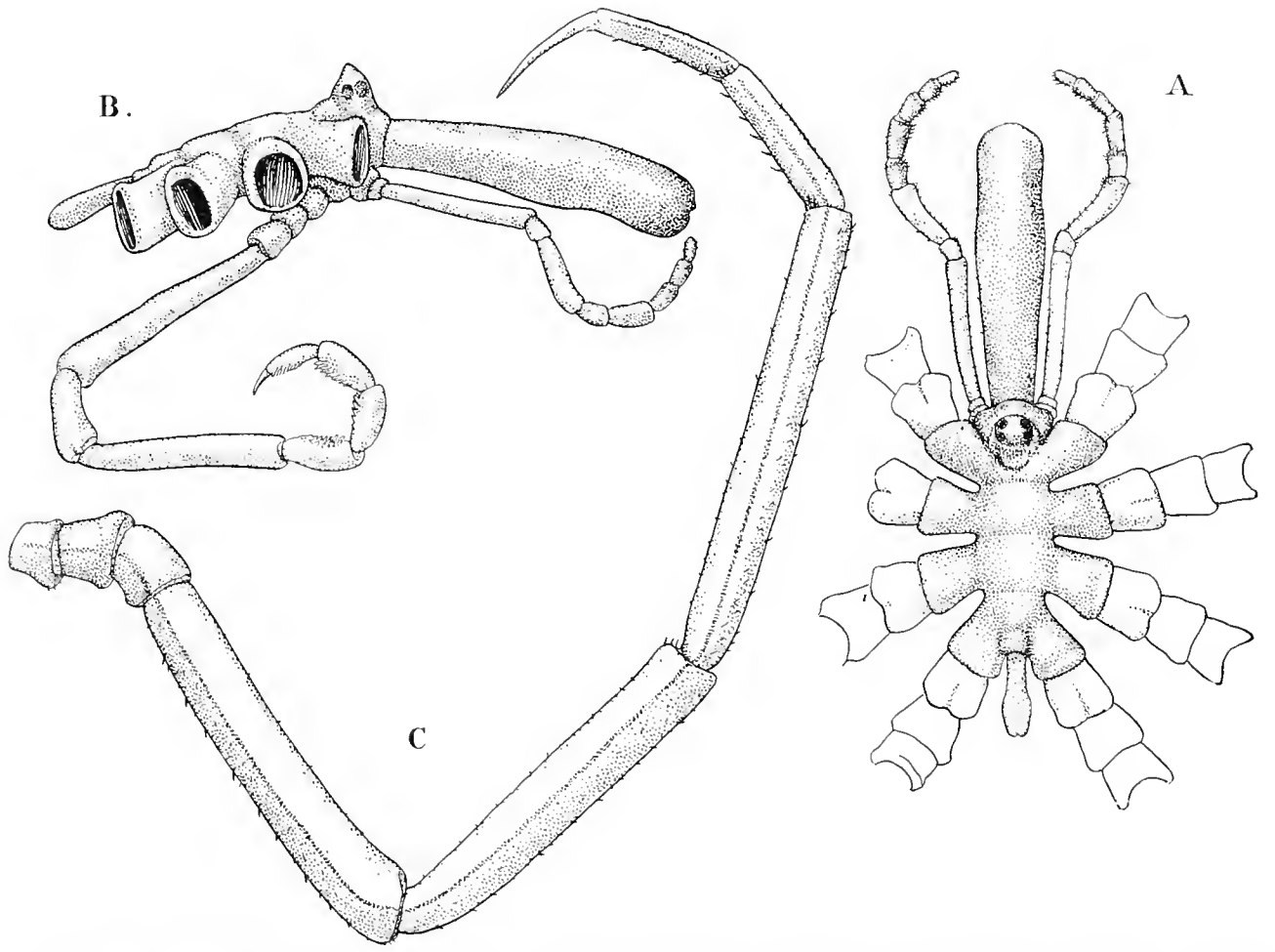

FIG. 4.—*Colossendeis lilliei*, sp. n., Female. A. Dorsal view of body with palps and coxæ. B. Lateral view of body with palp and oviger. C. Third leg of right side.

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.

1415. 1.24.46-50

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.

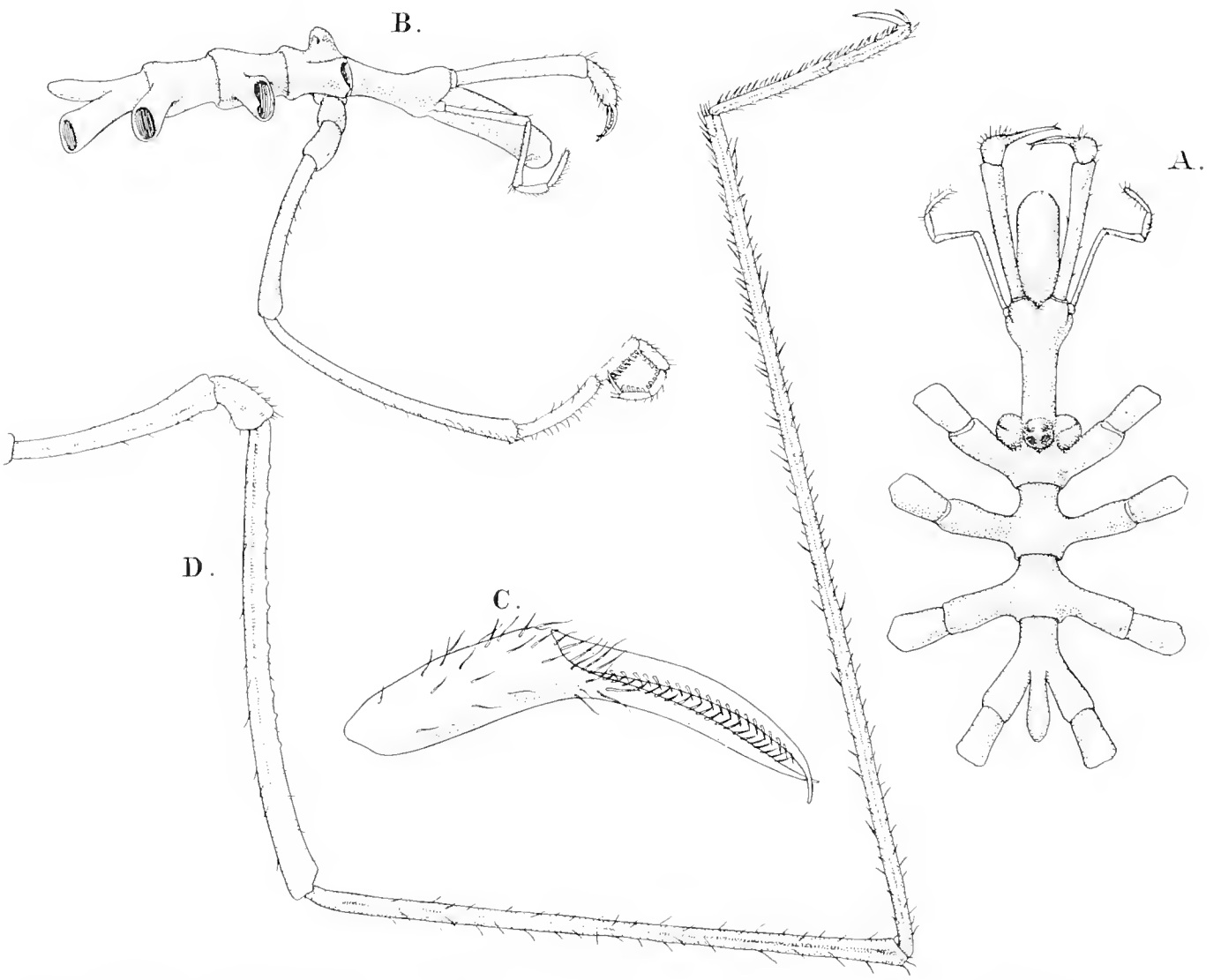

Fig. 5.—*Nymphon gracillimum*, sp. n., Male. A. Dorsal view of body with chelophores, palps, and first coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Chela, further enlarged. D. Third leg of right side.

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*, Hoek, 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

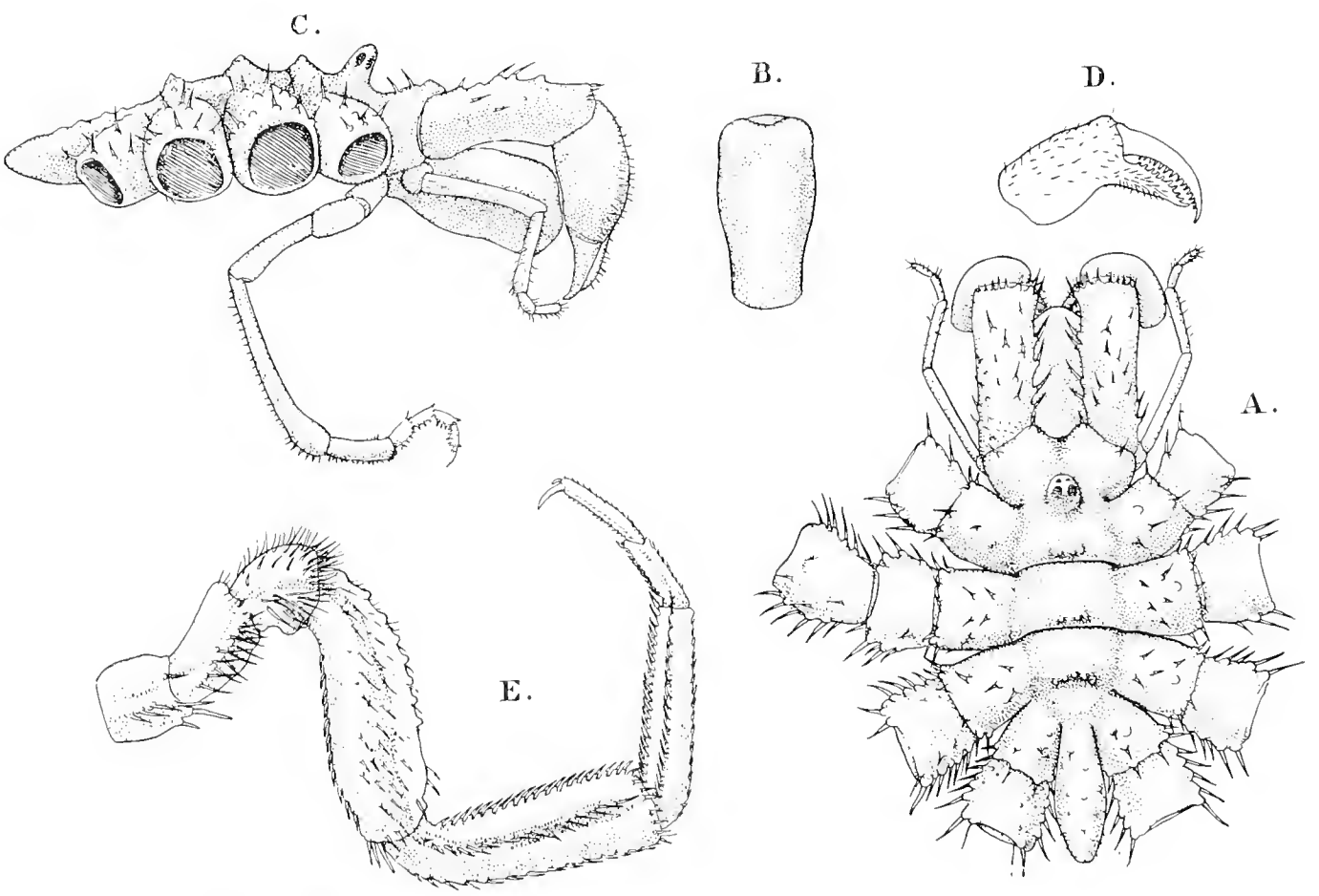

FIG. 6.—*Nymphon proximum*, sp. n., Male. A. Dorsal view of body with chelophores, palps, and coxæ. B. Ventral view of proboscis. C. Lateral view of body with chelophore, palp, and oviger. D. Chela, further enlarged. E. Third leg of right side.

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

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.

1915.7.24.83

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.

1915.7.24.84-103

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. *australorum*.
[3] Specimen approaching typical form.
[4] Specimen approaching var. *australorum*. 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 *australorum*. 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 *australorum*, 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.

1915.7.24.144-152

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.

1915.7.24.154-157

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).

1915.7.24.158-162

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

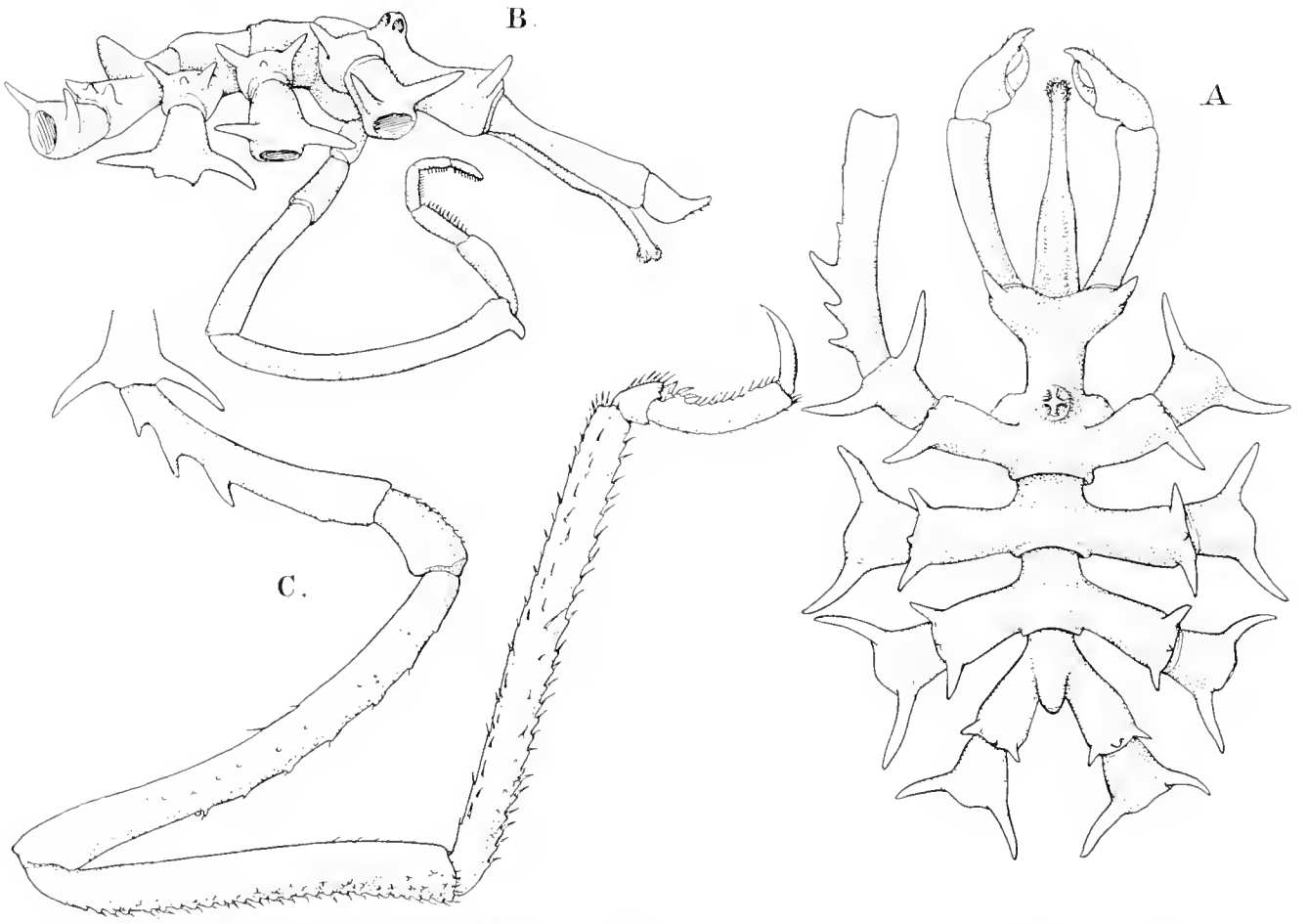

Fig. 7.—*Austropallene tibicina*, sp. n., Male. A. Dorsal view of body with chelophores and first and second coxæ. B. Lateral view of body with chelophore and oviger. C. Third leg of right side.

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

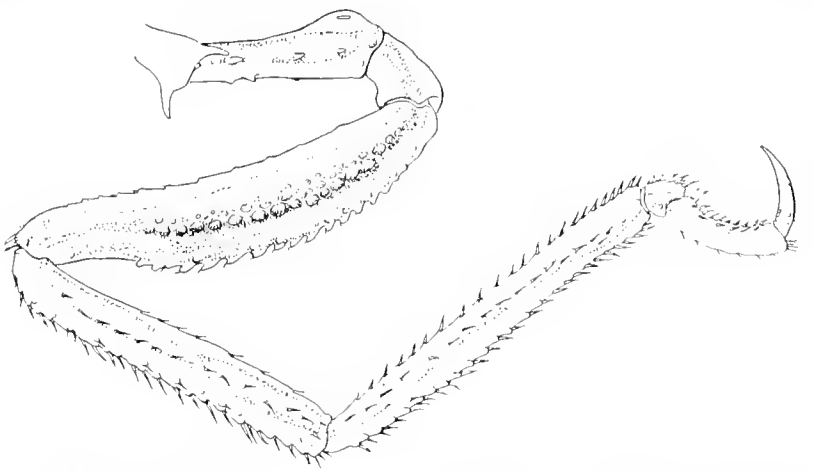

Fig. 8.—*Austropallene tibicina*, sp. n., Female. Third leg of right side.

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*.

* 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

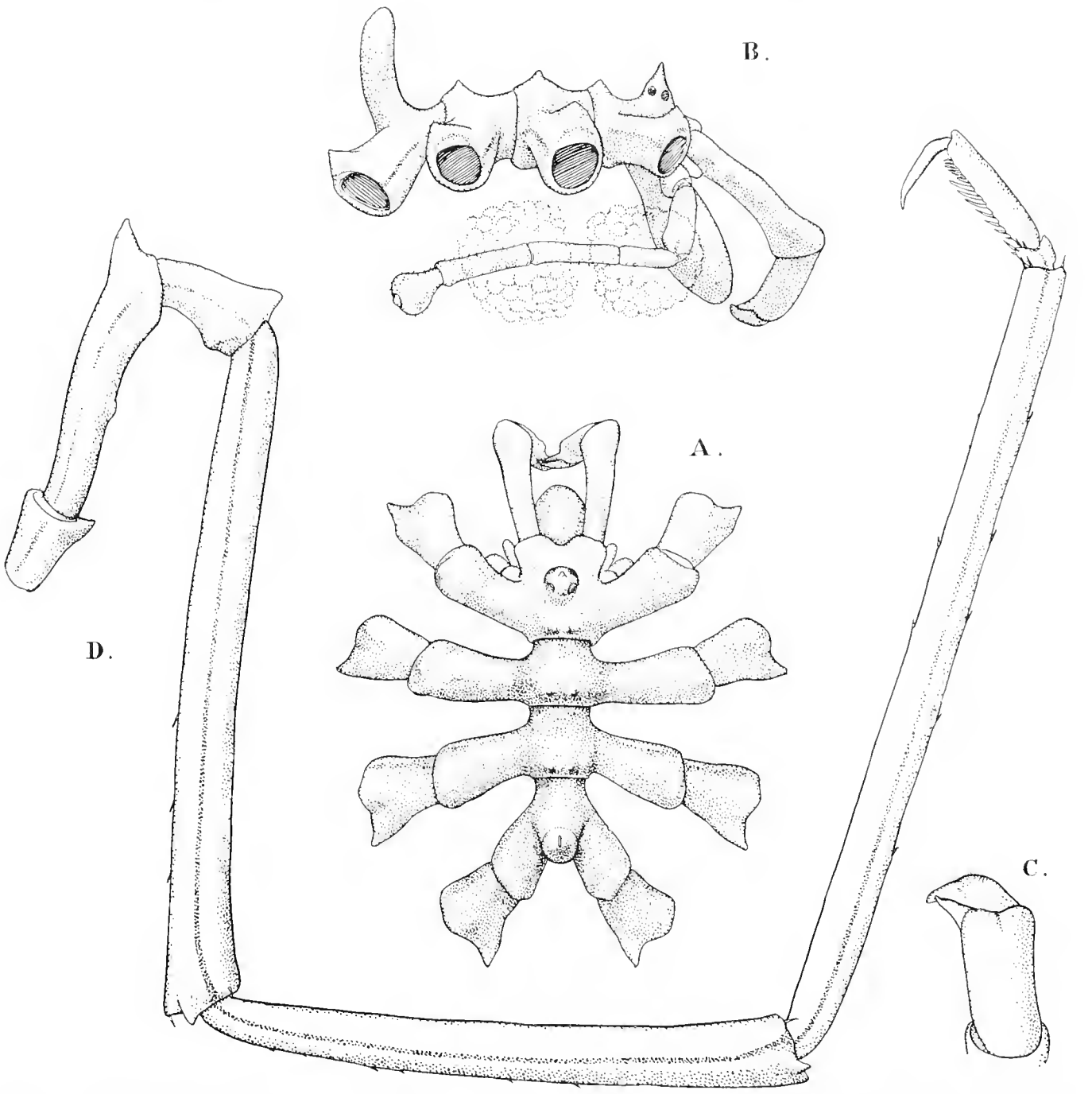

Fig. 9.—*Pallenopsis spicata*, Hodgson, Male. A. Dorsal view of body with chelophores, palps, and first coxæ. B. Lateral view of body with chelophore and oviger. Outlines of egg-masses dotted. C. Chela, further enlarged. D. Third leg of right side.

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.

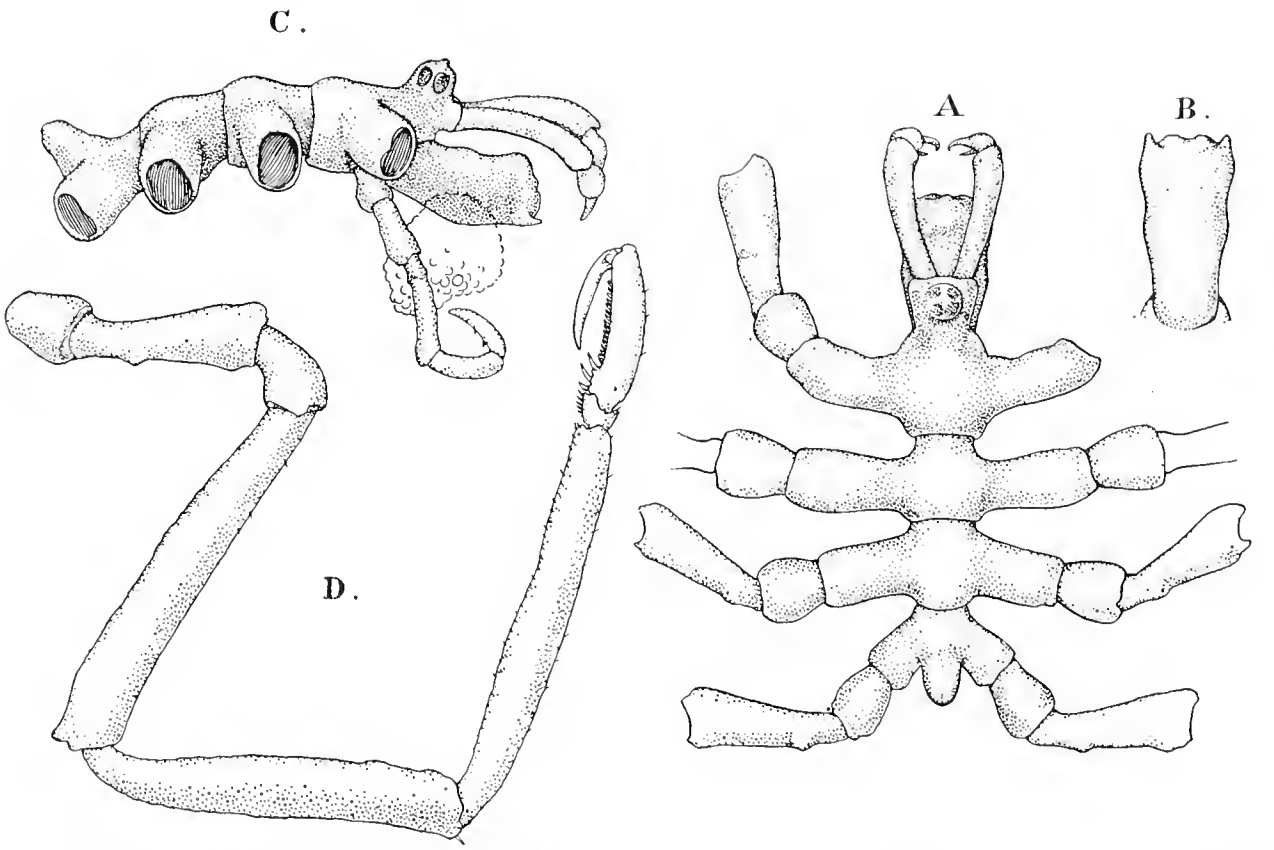

Fig. 10.—*Phoxichilidium australe*, Hodgson, Male. A. Dorsal view of body with chelophores and first and second coxæ. B. Ventral view of proboscis. C. Lateral view of body with chelophores and oviger. Outline of egg-mass dotted. D. Fourth leg of right side.

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.

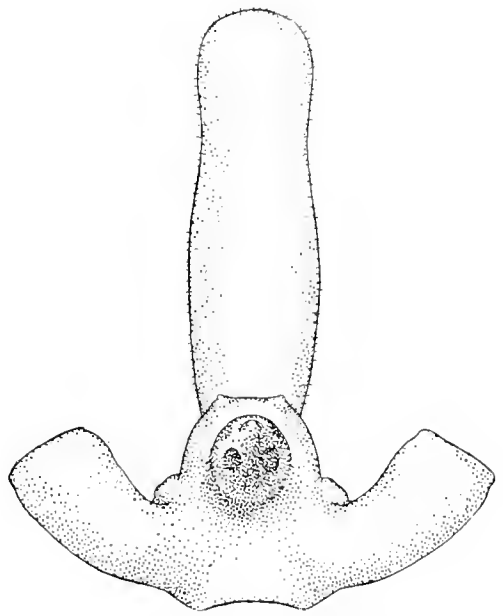

Fig. 11.—*Endeis australis* (Hodgson). Dorsal view of cephalic segment and proboscis of specimen showing well-developed cephalic tubercles.

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.

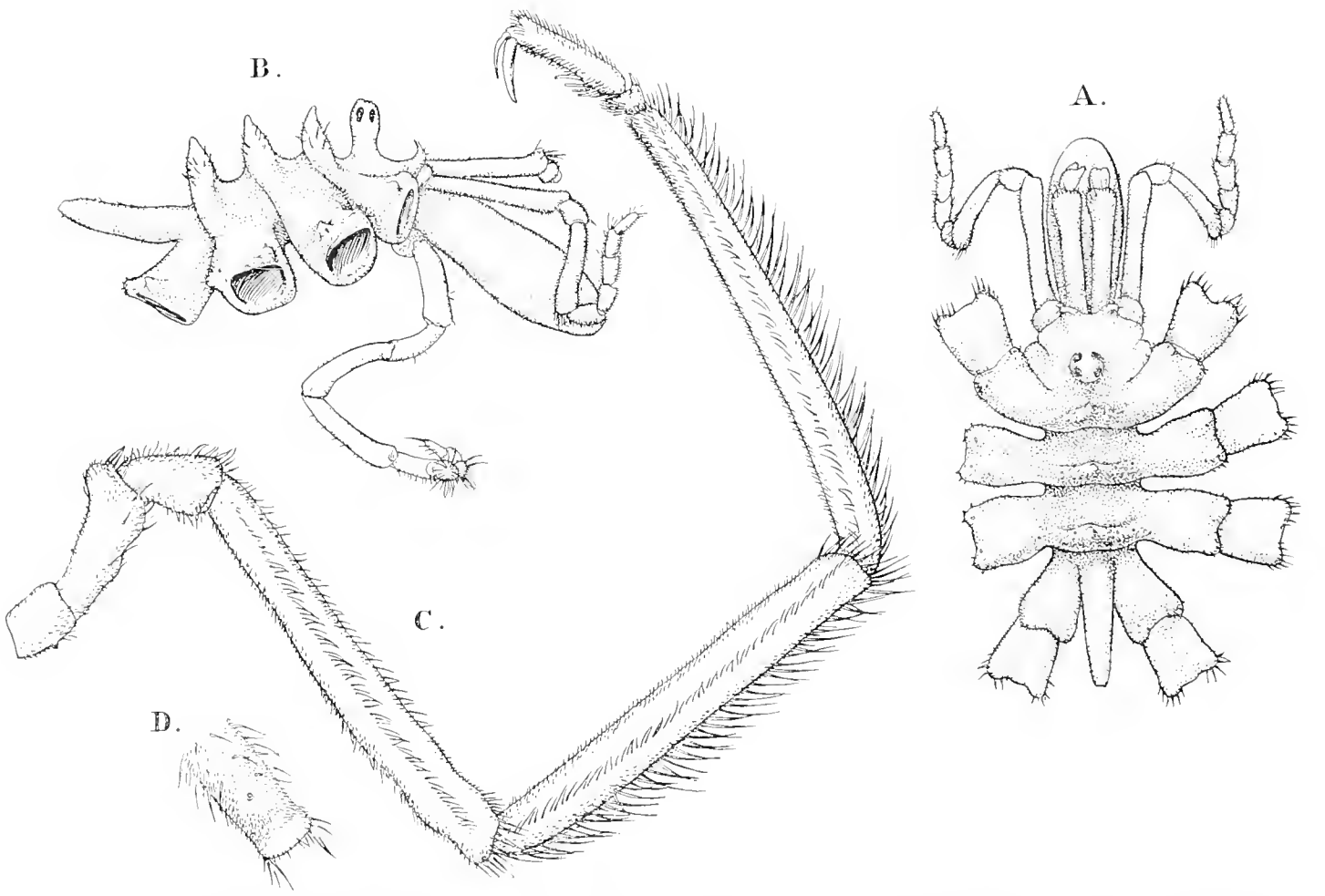

FIG. 12.—*Ammothea meridionalis*, Hodgson, Male. A. Dorsal view of body with chelophores, palps, and first coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Third leg of left side. D. Terminal part of femur from above to show opening of cement-gland.

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*."

⁂ holotype of A. calmani,
see Dr. T. Gordon in Discovery Reports. VI, p. 104, 1932

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 *Paribæa 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

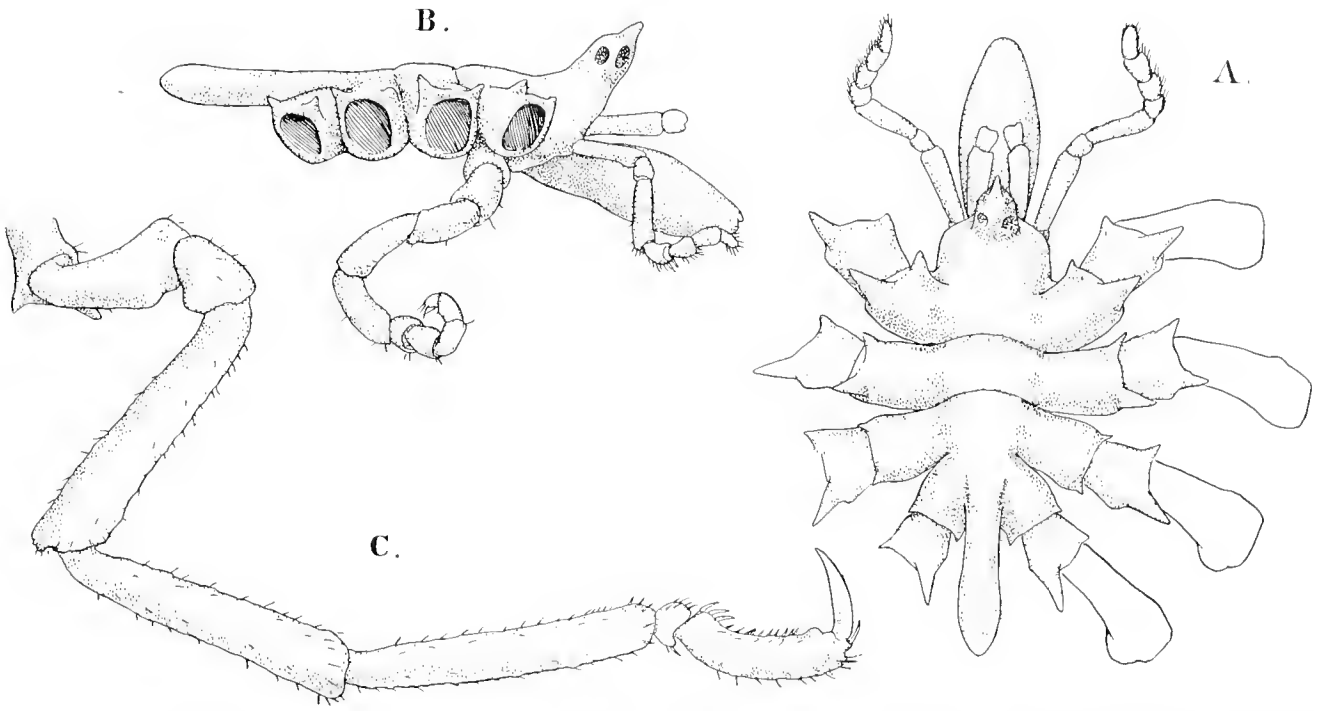

Fig. 13.—*Achelia spicata* (Hodgson), ovigerous Male of the more compact type. A. Dorsal view of body with chelophores, palps, and first and second coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Third leg of right side.

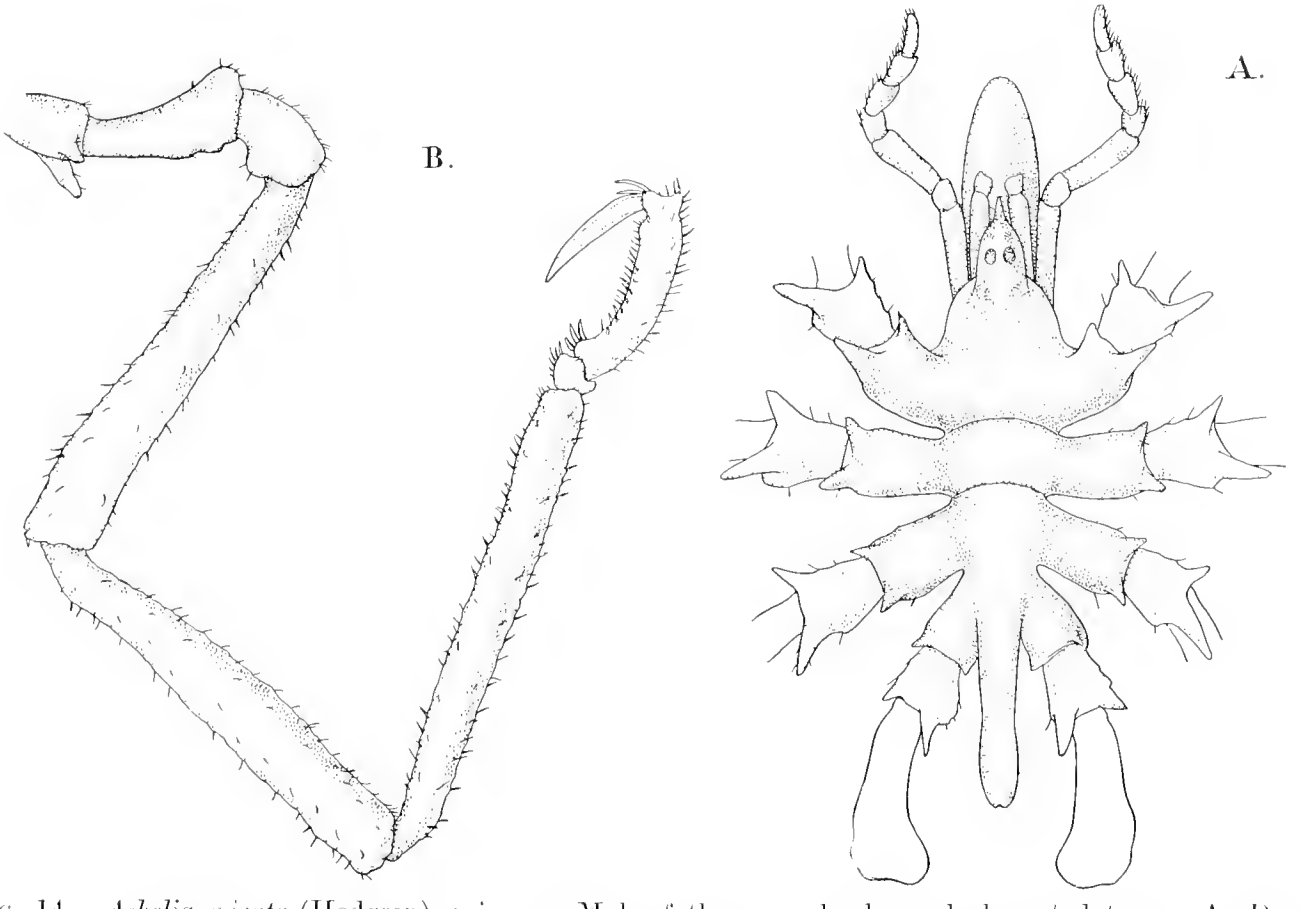

Fig. 14.—*Achelia spicata* (Hodgson), ovigerous Male of the more slender and elongated type. A. Dorsal view of body with chelophores, palps, and first and second coxæ. B. Third leg of right side.

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

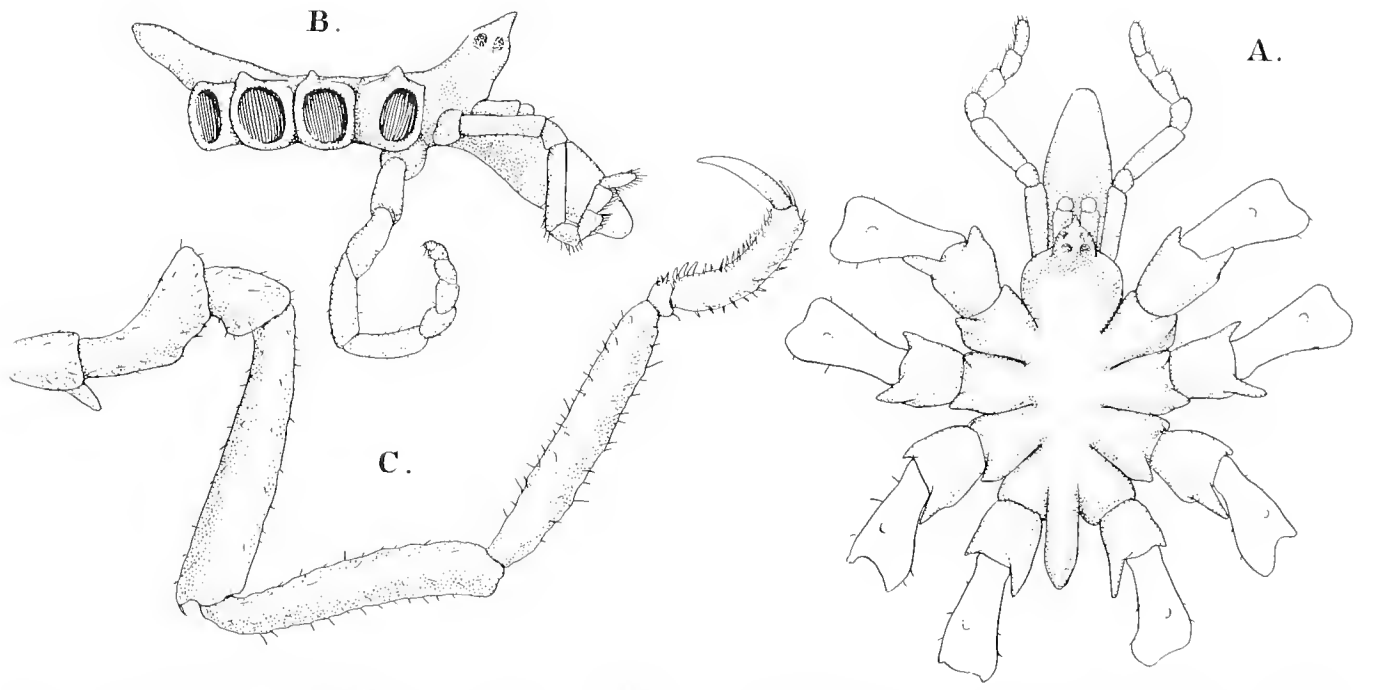

Fig. 15.—*Achelia intermedia*, sp. n., ovigerous Male. A. Dorsal view of body with chelophores, palps, and first and second coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Third leg of right side.

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*.

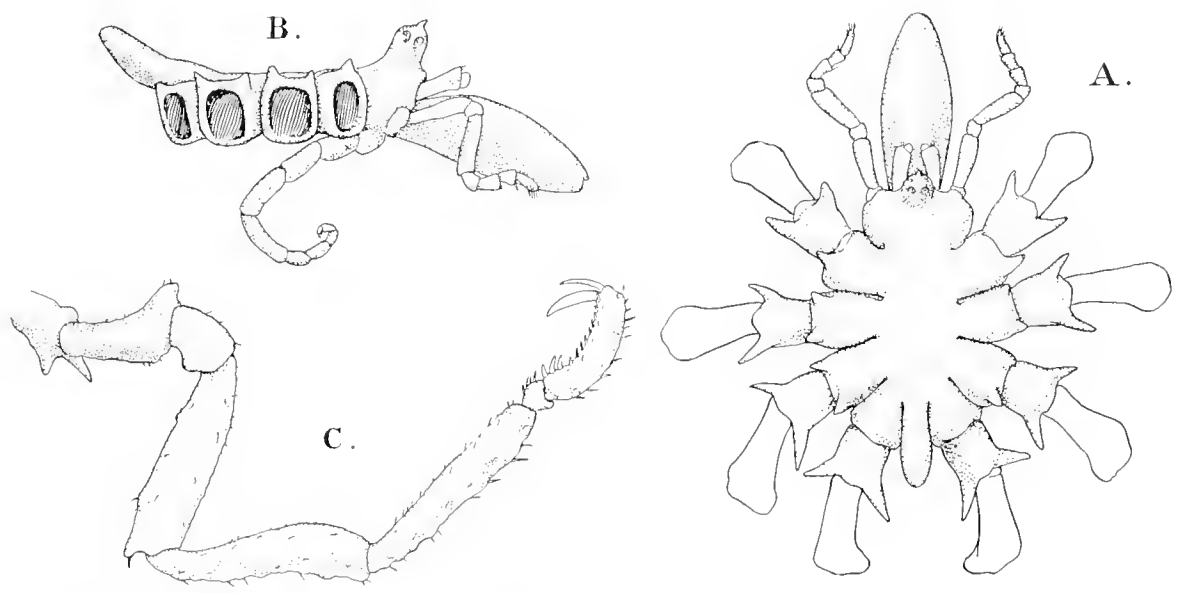

Fig. 16.—*Achelia brucei*, sp. n., ovigerous Male. A. Dorsal view of body with chelophores, palps, and first and second coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Third leg of right side.

(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.

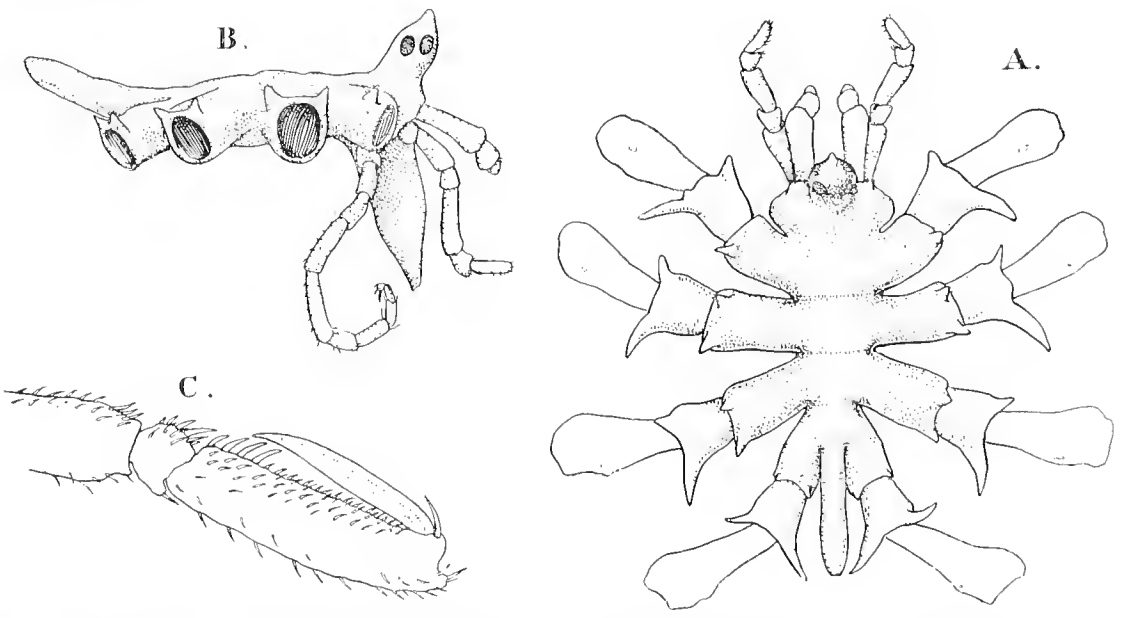

Fig. 17.—*Austroraptus polaris*, Hodgson, Female syntype from "Discovery" collection. A. Dorsal view of body with chelophores, palps, and first and second coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Terminal part of one of the legs.

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 ♀. [Cape Adare ?]

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

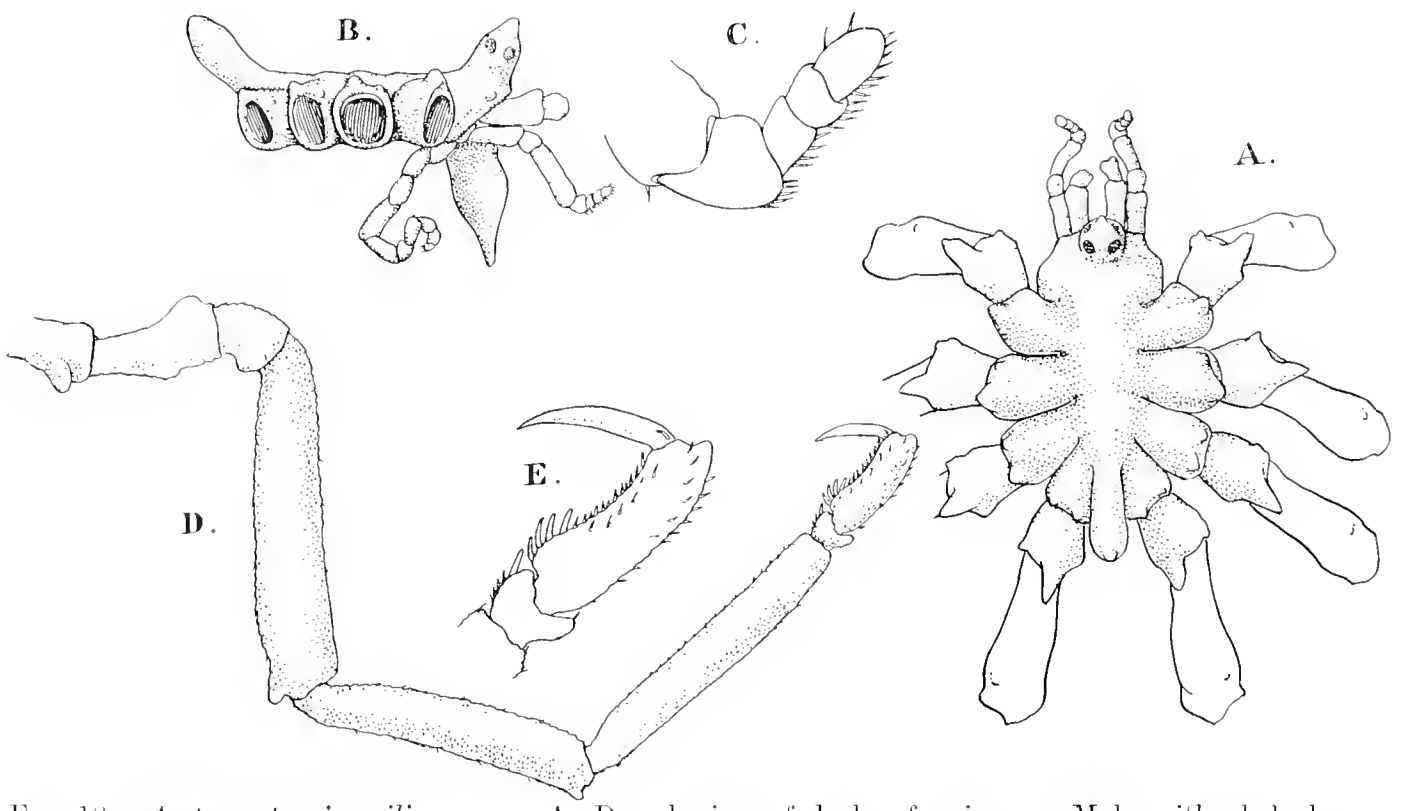

Fig. 18.—*Austroraptus juvenilis*, sp. n. A. Dorsal view of body of ovigerous Male with chelophores, palps, and first and second coxæ. B. Lateral view of body of Female with chelophore, palp, and oviger. C. Terminal part of palp of Female. D. Third leg of right side, Female. E. Terminal part of leg.

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

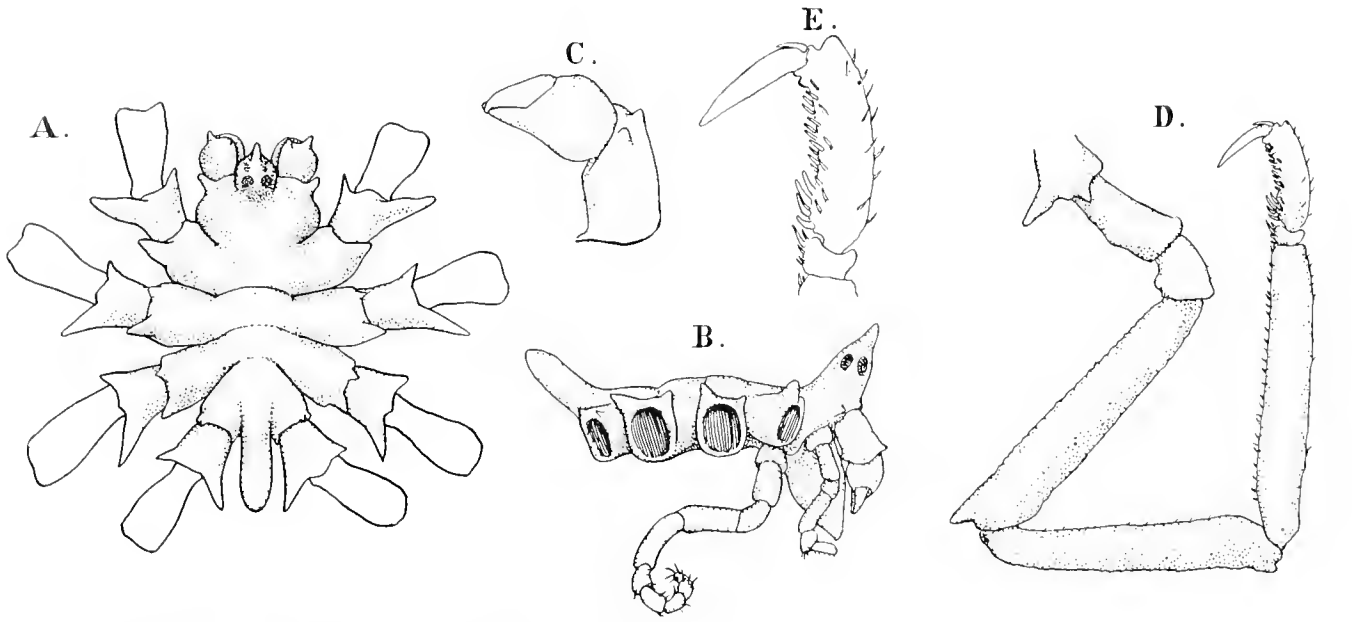

Fig. 19.—*Austroraptus præcox*, sp. n., Male. A. Dorsal view of body with chelophores and first and second coxæ. B. Lateral view of body with chelophore, palp, and oviger. C. Chelophore, further enlarged. D. Leg. E. Terminal part of leg.

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 *Origers* 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

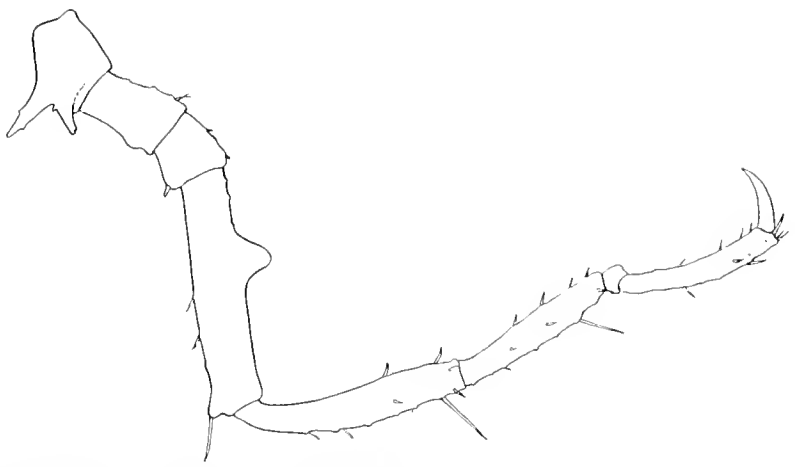

Fig. 20.—*Austrodecus glaciale*, Hodgson. Leg of Male showing prominence bearing opening of femoral cement-gland.

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*.

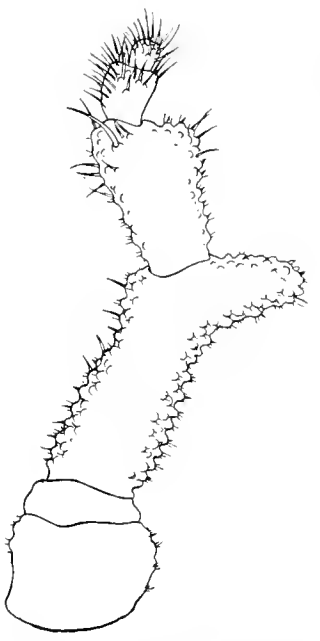

Fig. 21.—*Rhynchothorax australis*, Hodgson. Palp, from inner side.

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.

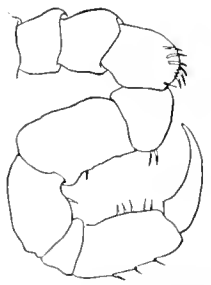

Fig. 22.—*Pycnogonum gaini*, Bouvier. Oviger of Male.

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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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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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.

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* In sending to the press this paper and that which follows it, I wish to aeknowledge very heartily the eourtesy 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" eolleetion has involved. In partieular I am indebted to Dr. W. T. Calman for the readiness with which he has placed at my disposal not only the eolleetions under his charge, but also his own time and knowledge. Miss G. M. Woodward's excellent illustrations owe much to the assistanee whieh she has reeeived 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.
,, *favoni*, 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,

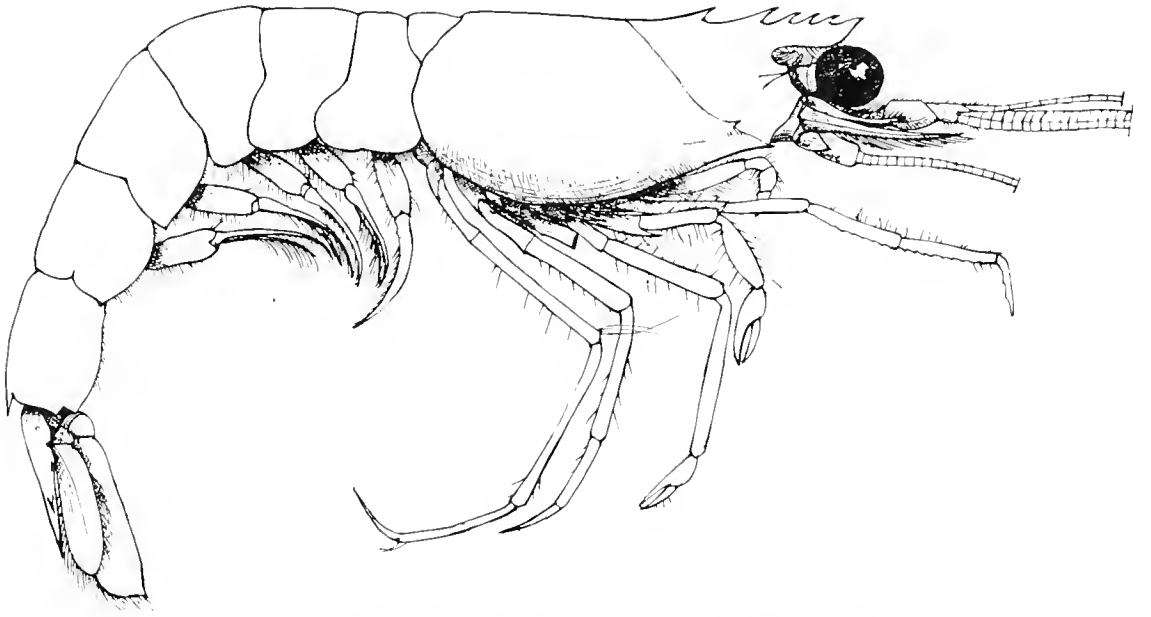


Fig. 1.—*Solenocera novae-zealandiae*, n. sp. Male, × 2.

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.

1917.1.29.1 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*.

1917.1.29.2-6 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.

1917.1.29.7-11 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. 1917.1.29.12-16

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. 1917.1.29.17-18

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. 1917.1.29.19-28

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. 1917.1.29.29-30

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. 1917.1.29.31

* 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

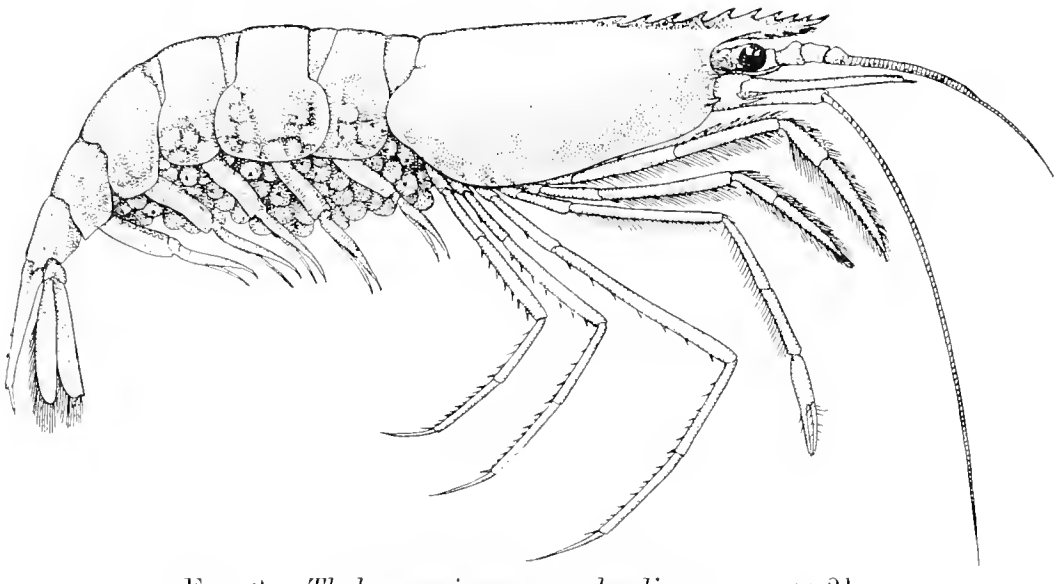


Fig. 2.—*Thalassocaris novae-zealandiae*, n. sp., × $2\frac{1}{2}$.

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. 1917.1.29.64-66

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 ~~11~~ 42. 1917.1.29.67-76

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. 1917.1.29.77

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,

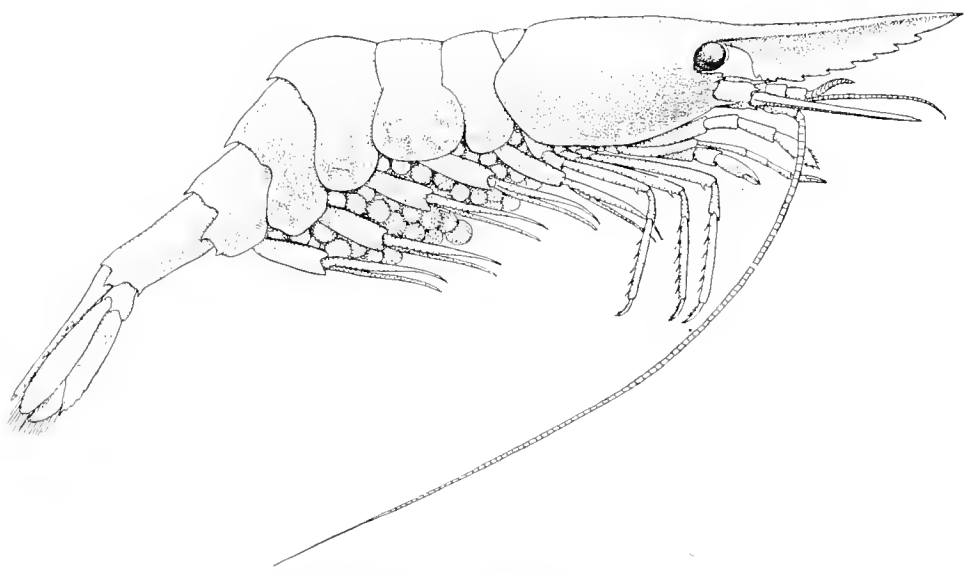


Fig. 3.—*Tozeuma novae-zealandiae*, n. sp. Female, × $2\frac{1}{2}$.

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.

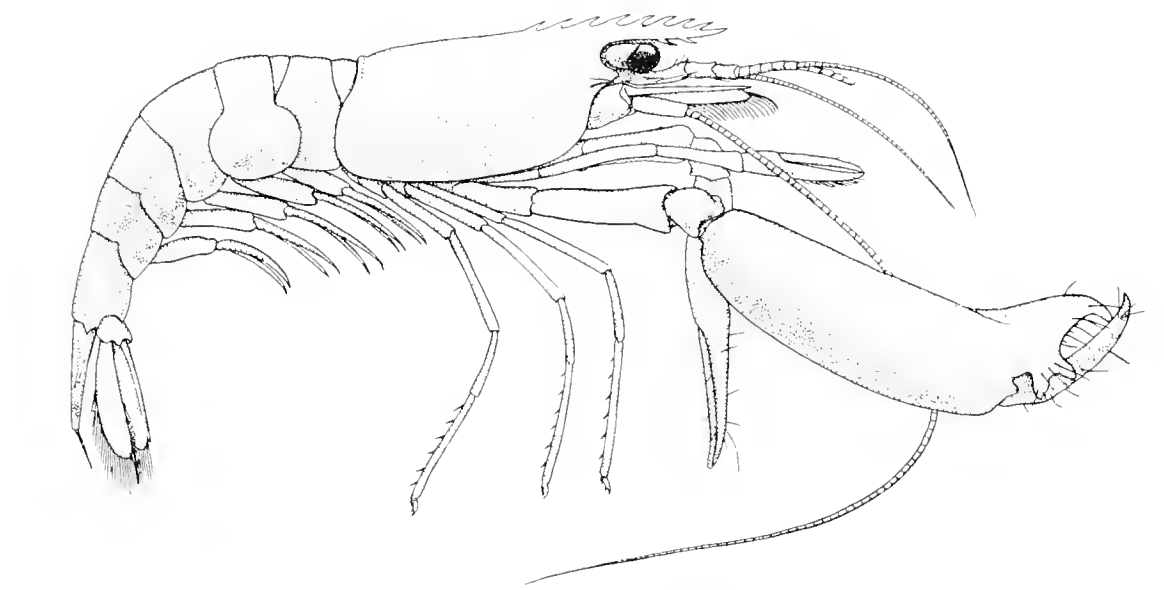
A new pontoniine prawn, of which two specimens were dredged in 70 fathoms off the North Cape of New Zealand, appears from most of its organization to be a *Periclimenes*, but shows certain features that are very rare in that genus, and others that are shared by none of its known species. In the circumstances 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. brevimaris*), 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



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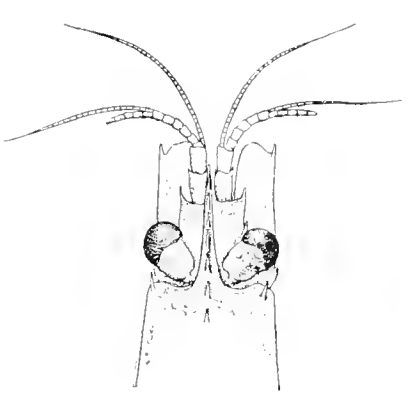

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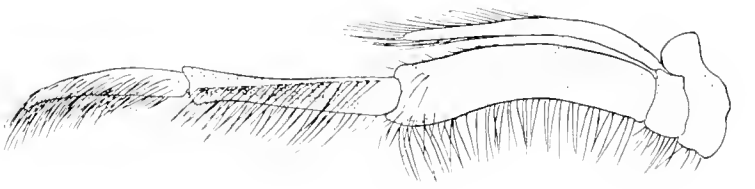

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FIG. 4.—*Periclimenes* (*Hamiger*) *novae-zealandiae*, n. sp. Male. (*a*) Side view, × 4; (*b*) dorsal view of head, × 4; (*c*) end of first leg, × 12; (*d*) third maxilliped, × 12½.

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.

1917.1.29.91-150

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.

1917.1.29.101-102

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.

1917.1.29.103

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

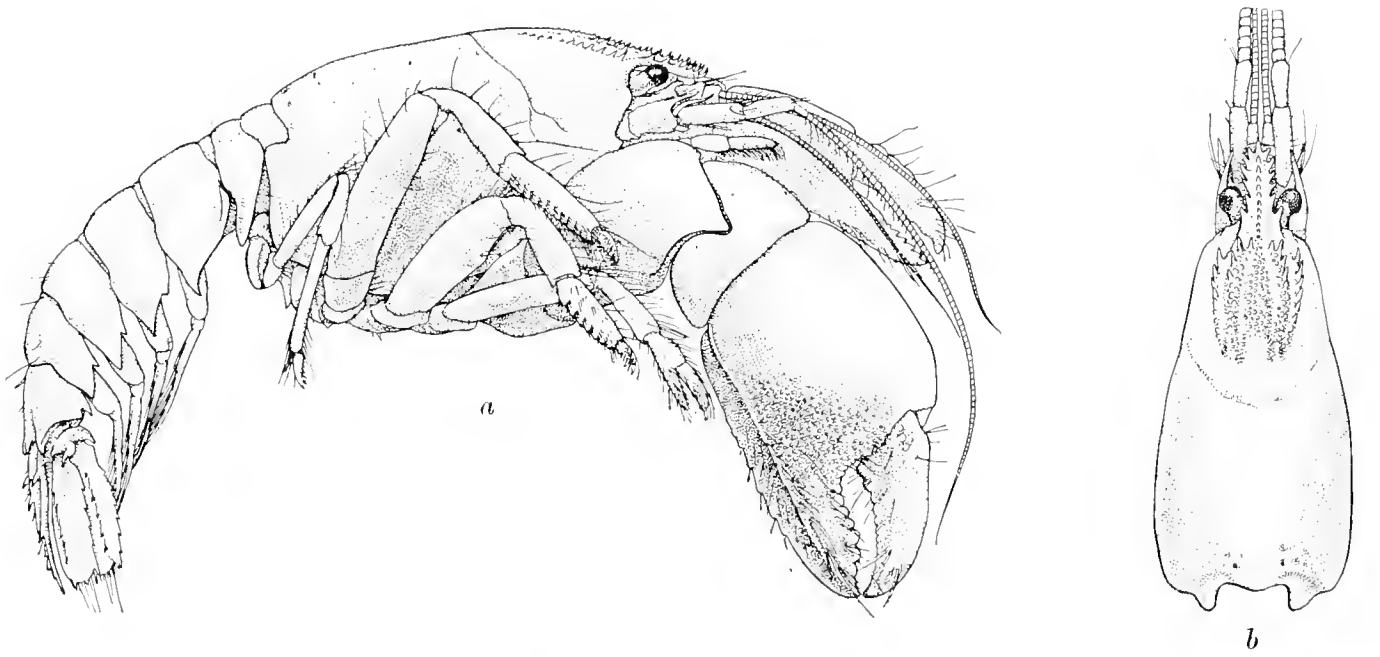

Fig. 5.—*Axius* (*Axius*) *novae-zealandiae*, n. sp. (*a*) Side view, × 2½; (*b*) dorsal view of cephalothorax, × 2½.

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.

1917.1.29.106-110 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).

1917.1.29.111-115 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.

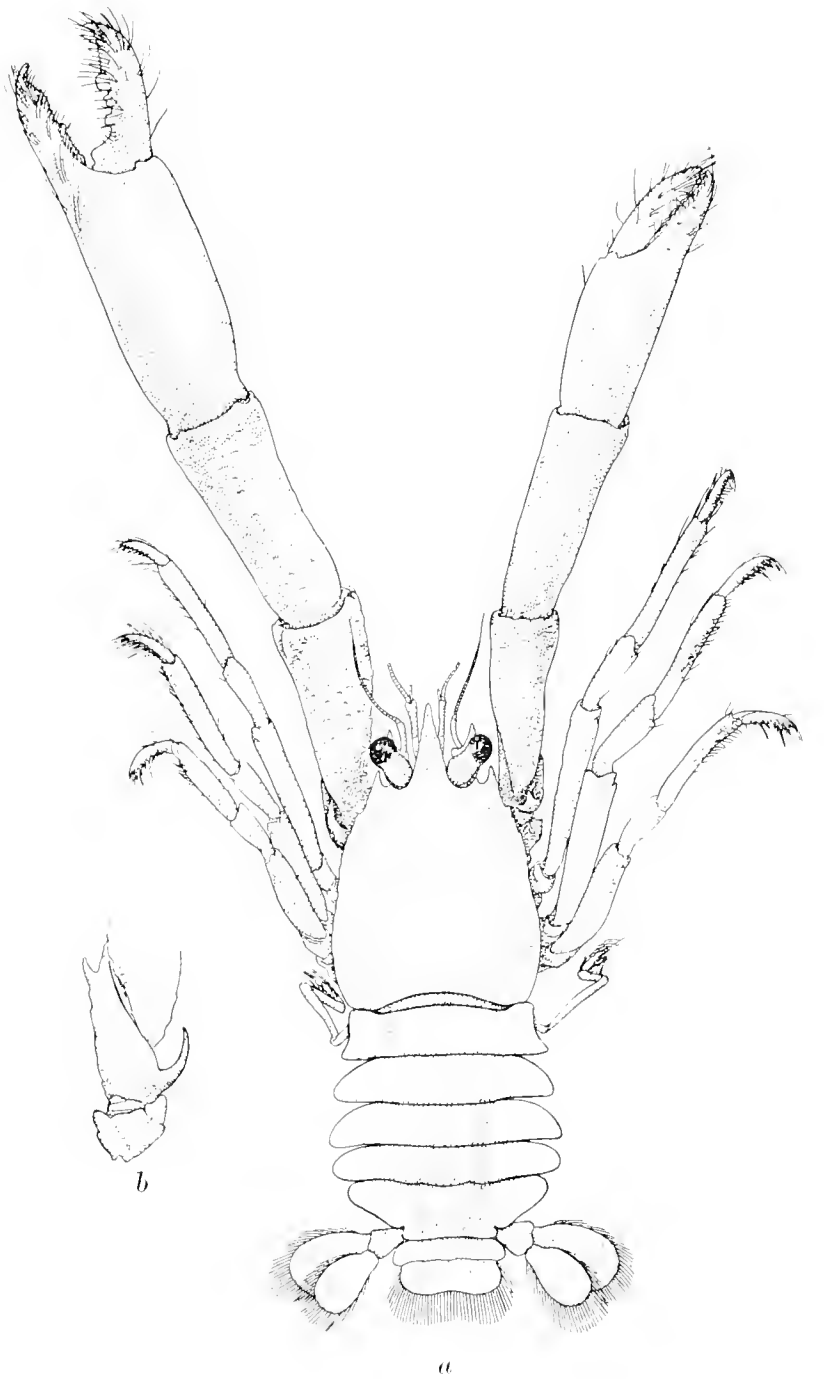

Fig. 6.—*Uroptychus maori*, n. sp. (*a*) Dorsal view, × 2½; (*b*) externoventral view of ischium of great cheliped, × 2½.

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,

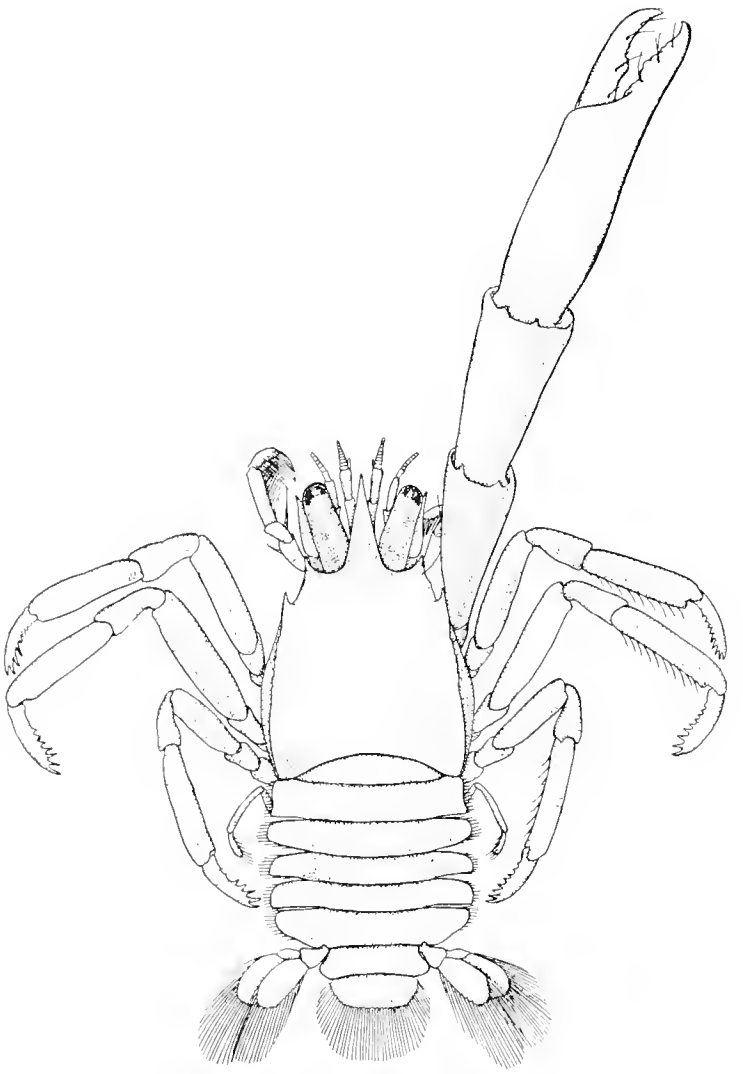

Fig. 7.—*Uroptychus novae-zealandiae*, n. sp., × 7.

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. 1917.1.29.118-120

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. 1917.1.29.121-130

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. 1917.1.29.131-133

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

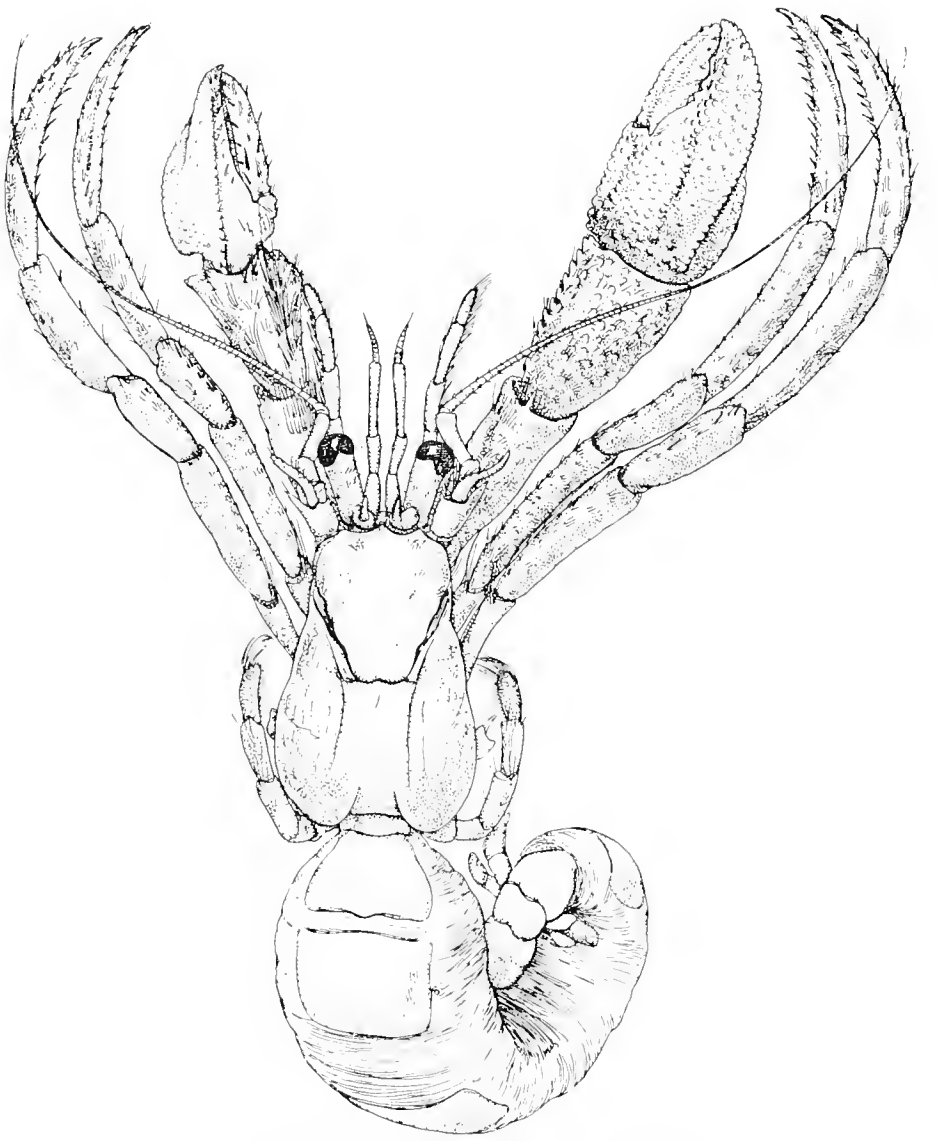

FIG. 8.—*Eupagurus crenatus*, n. sp. Male. × 3.

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).

1917.1.29.135

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.

1917.1.29.136

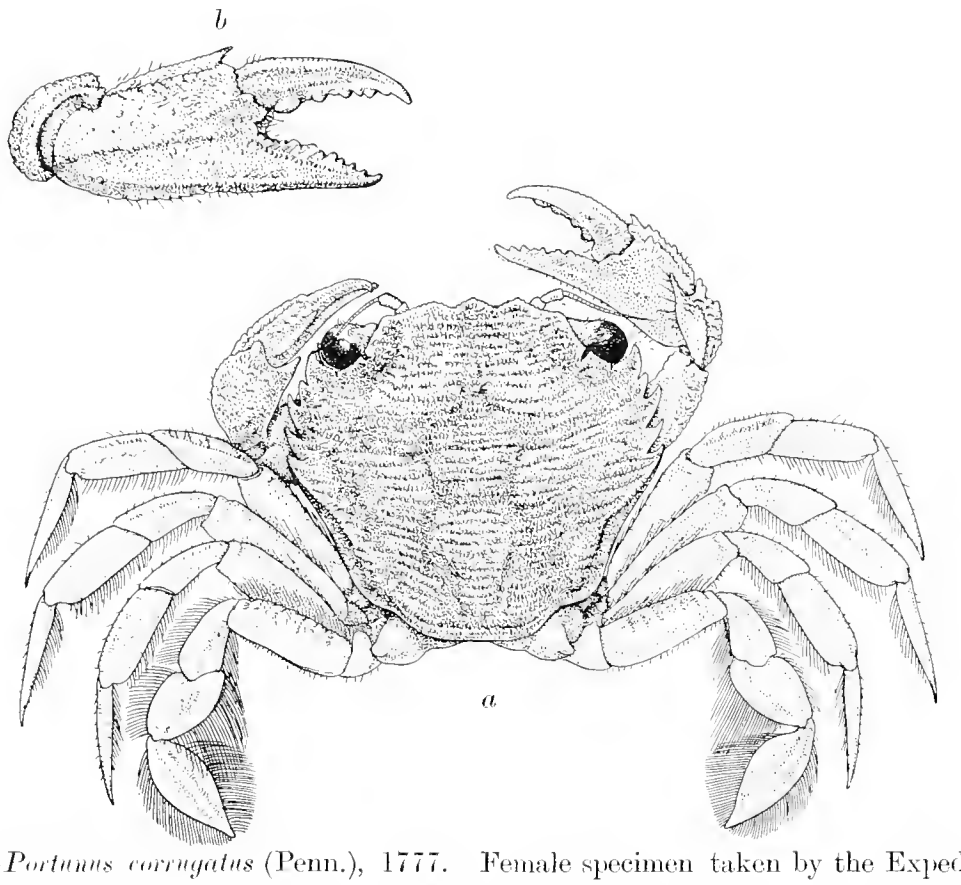

FIG. 9.—*Portunus corrugatus* (Penn.), 1777. Female specimen taken by the Expedition in New Zealand. (*a*) Dorsal view, × 5; (*b*) right cheliped from outer side, × $7\frac{1}{2}$.

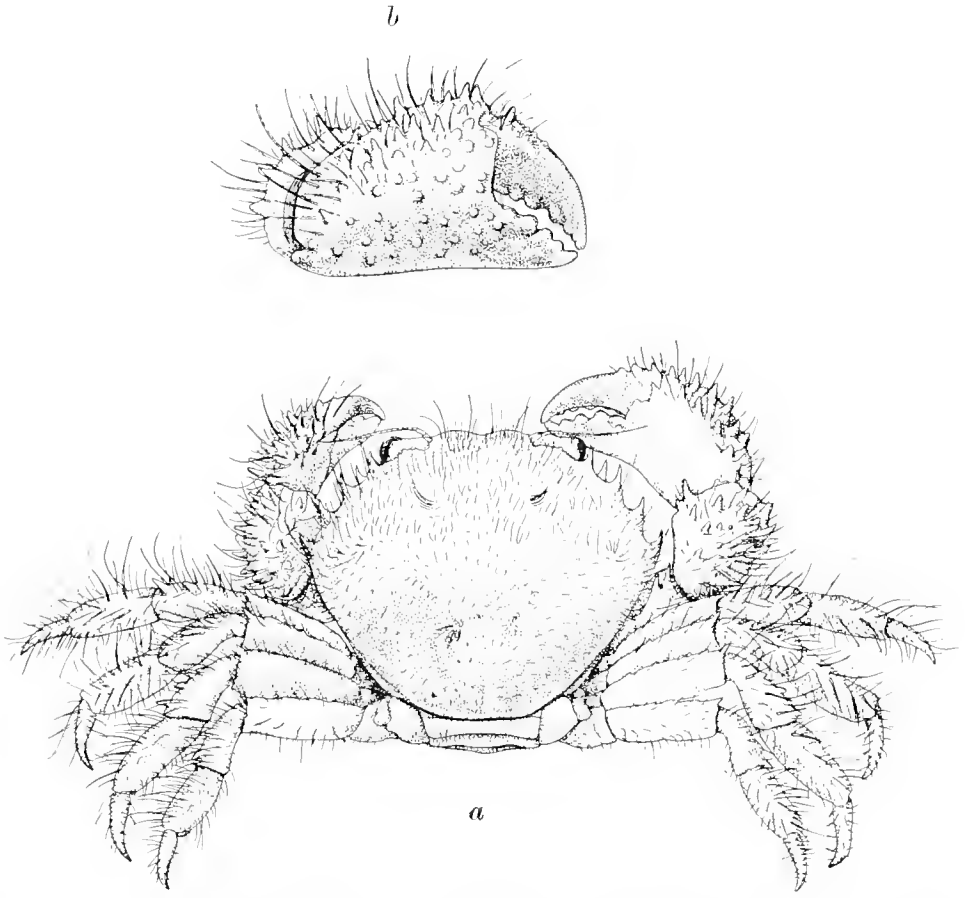

FIG. 10.—*Pilumnus maori*, n. sp. Male. (*a*) Dorsal view, × 5; (*b*) right cheliped from outer side, × 5.

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.

1917.1.29.137-176

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.

1917.1.29.147

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

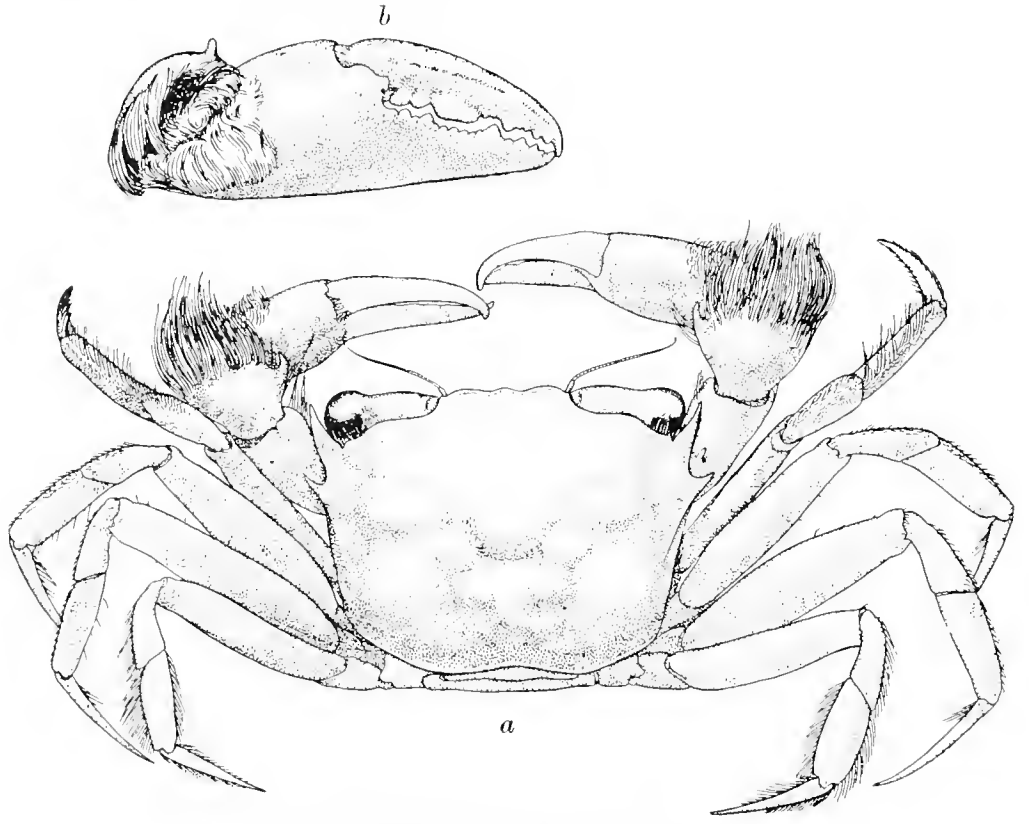

FIG. 11.—*Goneplax hirsutus*, n. sp. (*a*) Dorsal view, × $2\frac{1}{2}$; (*b*) right cheliped from outer side, × $2\frac{1}{2}$.

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.

1917.1.24.148-149 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.

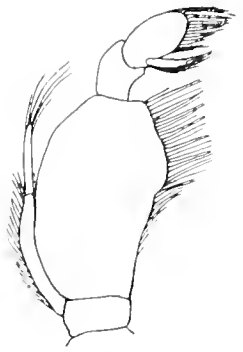

Fig. 12. *Pinnotheres pisum* (L.), 1766. Third maxilliped, × 9.

1917.1.24.103-104

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. 1917.1.24.150

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. 1917.1.24.154

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). 1917.1.24.155

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

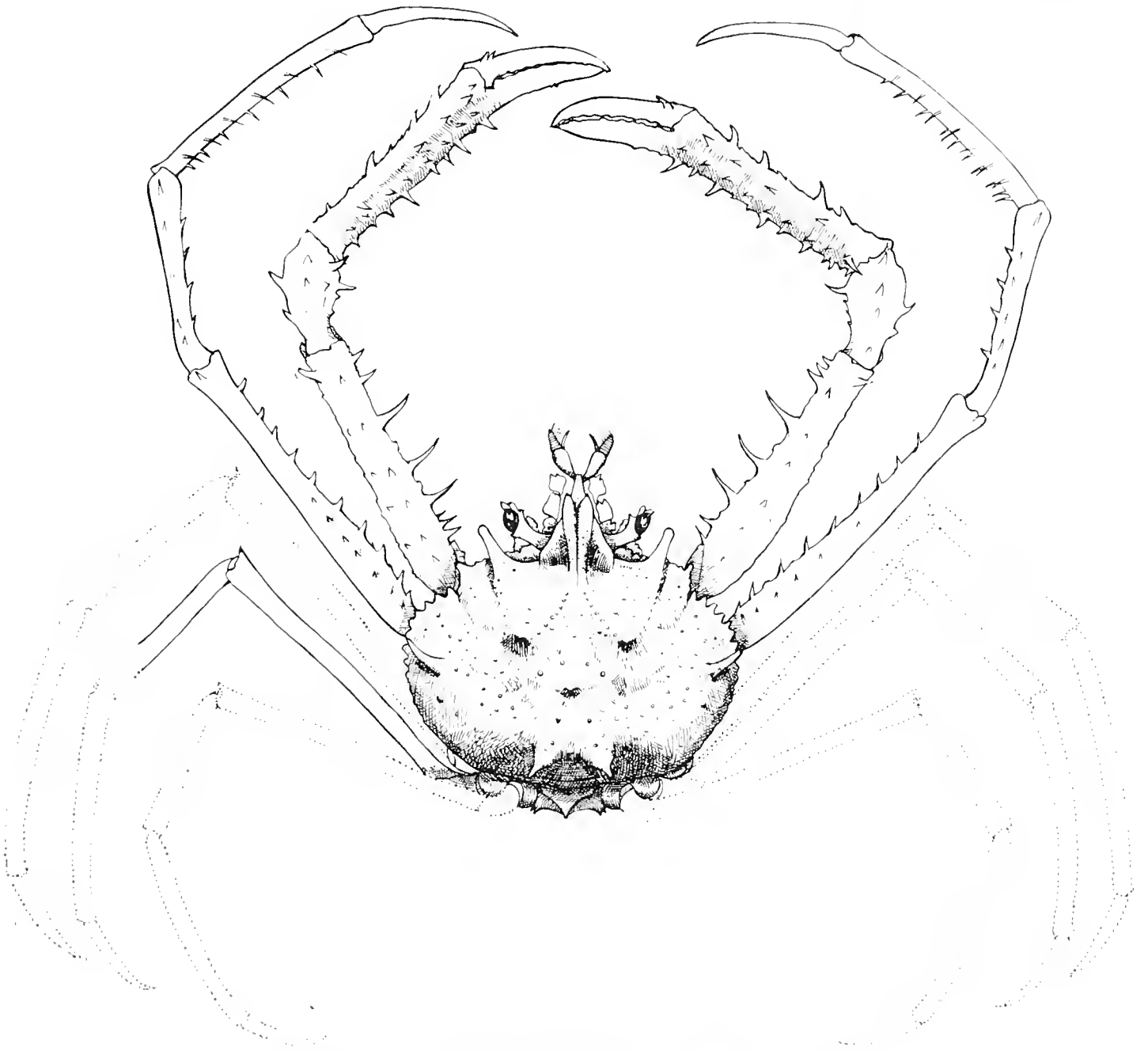

Fig. 13.—*Echinomaia hispida*, n. sp. Male, × 3.

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.

1917.1.29.157-158

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.

1917.1.29.154-161

Sub-family MAIINAE.

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

1♂ has nice growths & weed etc on its hairy legs & body.

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).

1917.1.29.162-163

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.

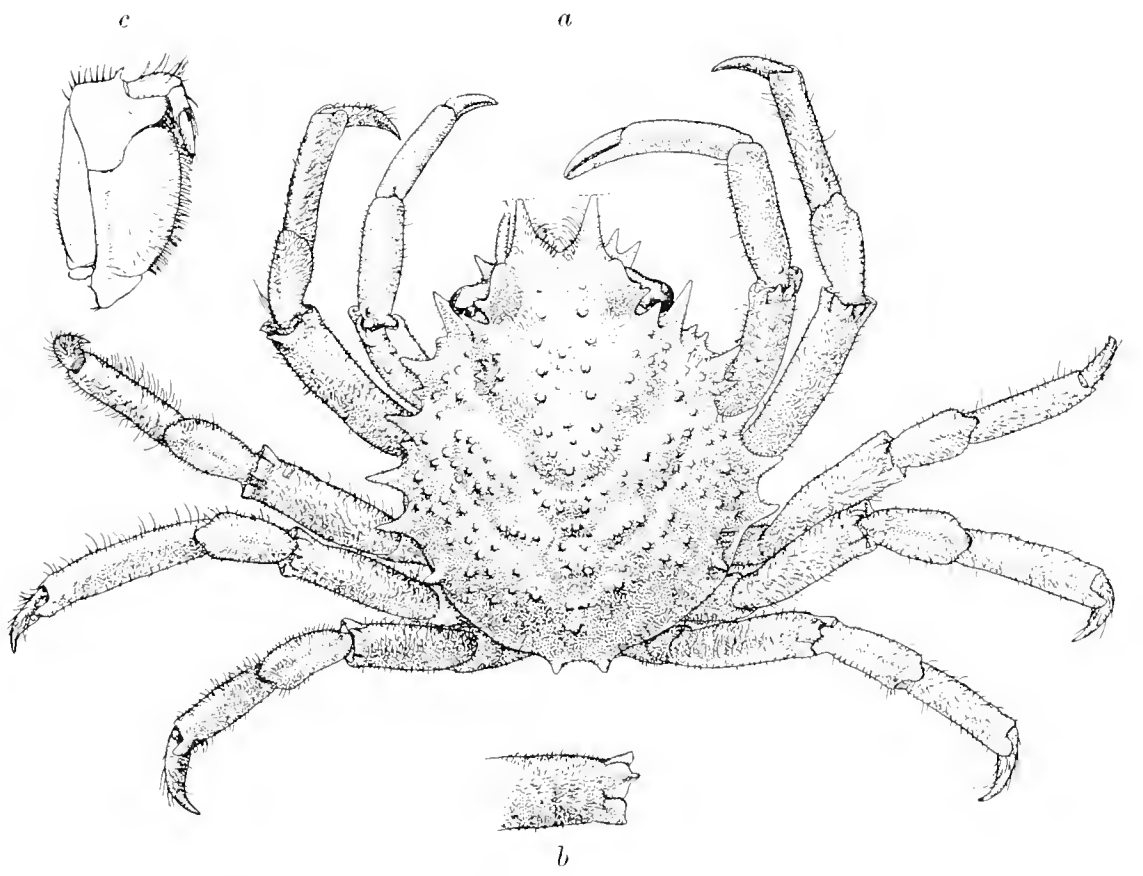

Fig. 14.—*Paramithrax* (*Leptomithrax*) *affinis*, n. sp. Female. (*a*) Dorsal view, × 1½; (*b*) end of meropodite of walking leg, × 2; (*c*) third maxilliped, × 3.

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.

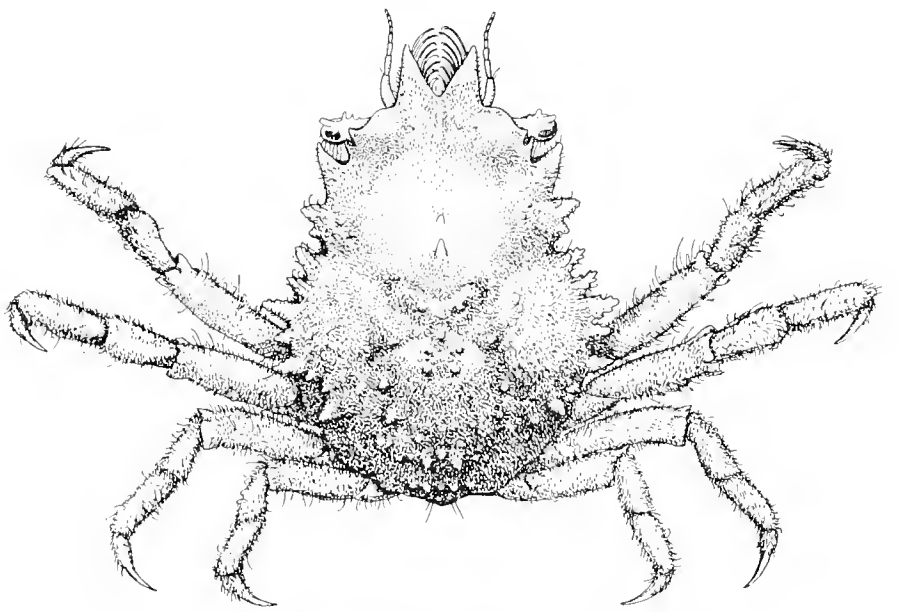

Fig. 15.—*Paramithrax parcus*, n. sp. Female, × 5.

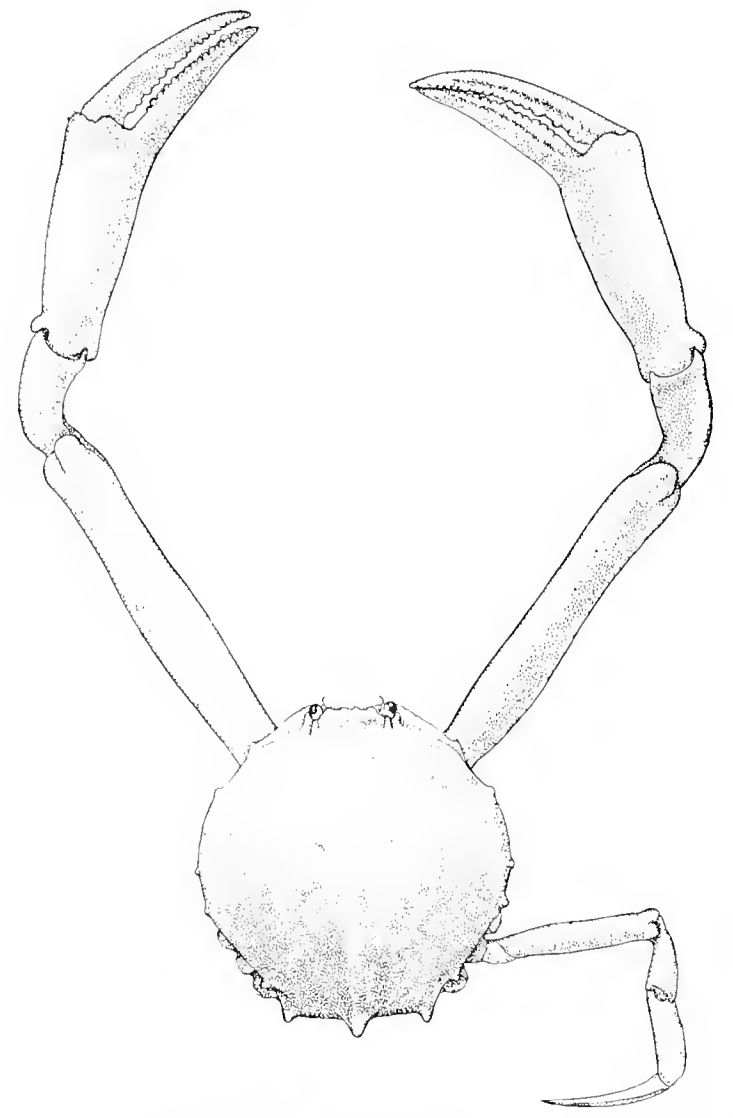

Fig. 16.—*Persephona* (*Myropsis*) *laevis*, n. sp. Male, × $1\frac{3}{4}$.

(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 90. 134.

1917.1.29.165

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.

1917.1.29.100

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CRUSTACEA.

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BY

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

WITH THIRTEEN FIGURES IN THE TEXT.

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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 sub-family 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

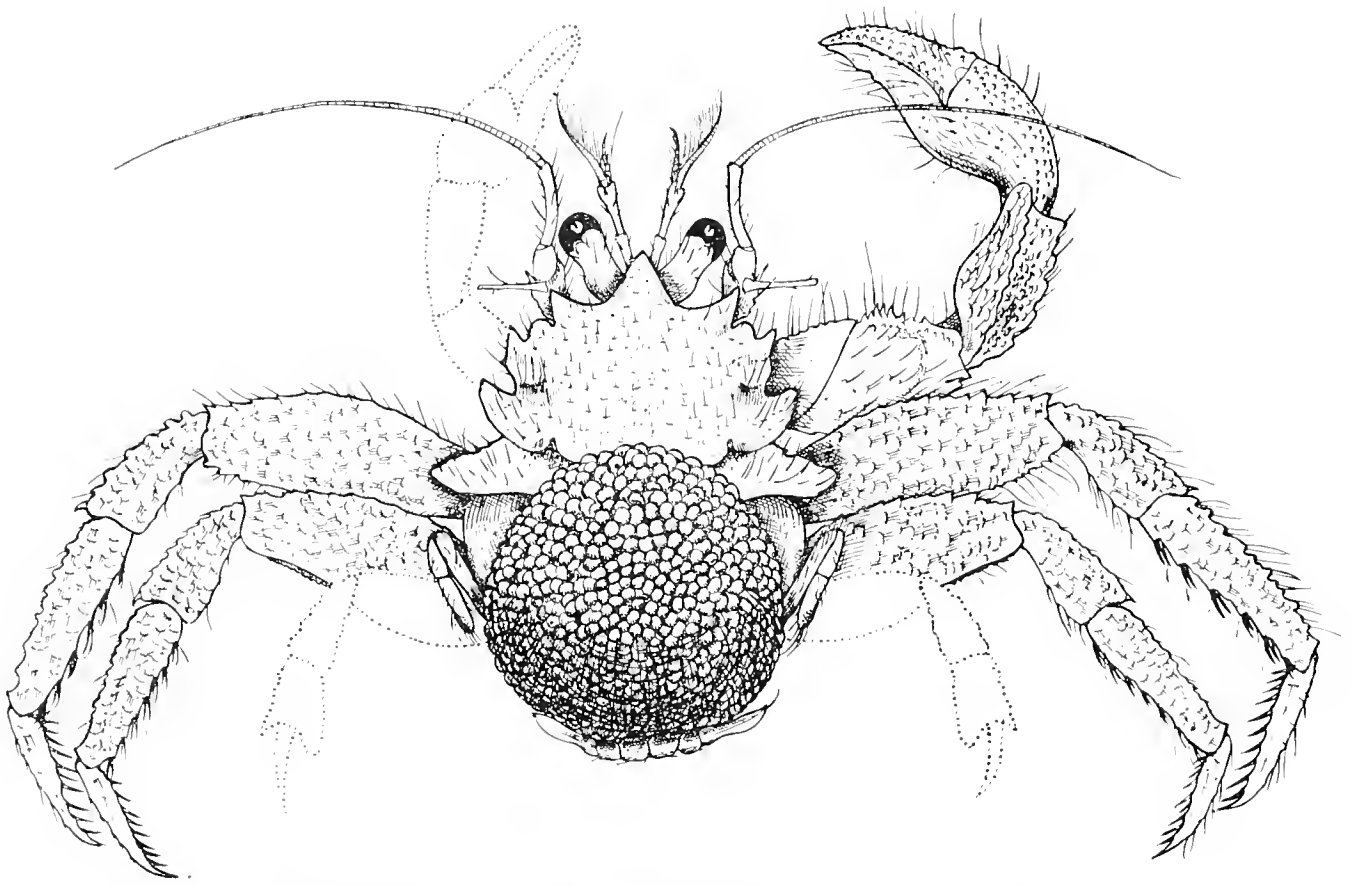

FIG. 1.—*Porcellanopagurus* sp., probably *P. edwardsi*, taken by the "Terra Nova" north of New Zealand: dorsal view of a berried female, × 3.

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.

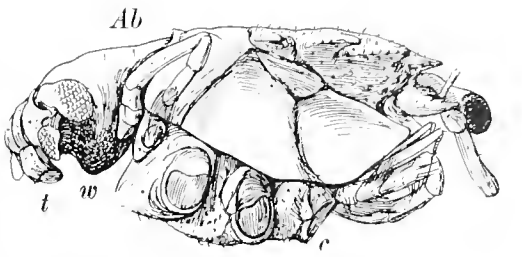

Fig. 2.—*Porcellanopagurus:* side view of the specimen shown in Fig. 1, × 3. *Ab*, Abdomen; *c*, base of cheliped; *s*, sixth abdominal tergum; *t*, telson; *w*, waist.

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

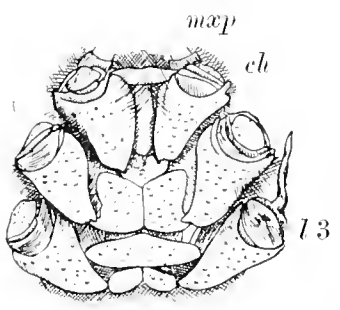

Fig. 3.—*Porcellanopagurus:* third to sixth thoracic sterna of the specimen shown in Fig. 1, × 3. *ch*, Cheliped; *l* 3, third leg; *mxp*, base of third maxilliped.

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

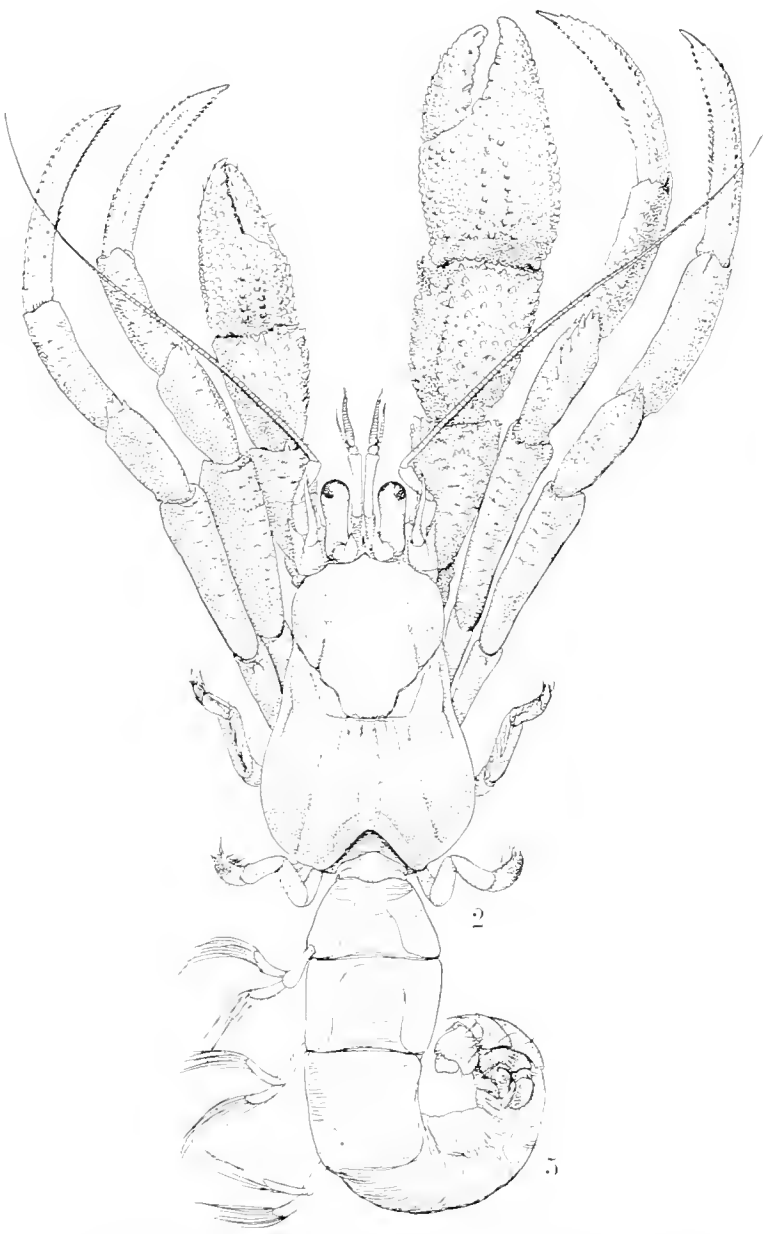

FIG. 4.—*Eupagurus bernhardus*: dorsal view of a female specimen, nat. size. 2, 5, Second and fifth terga.

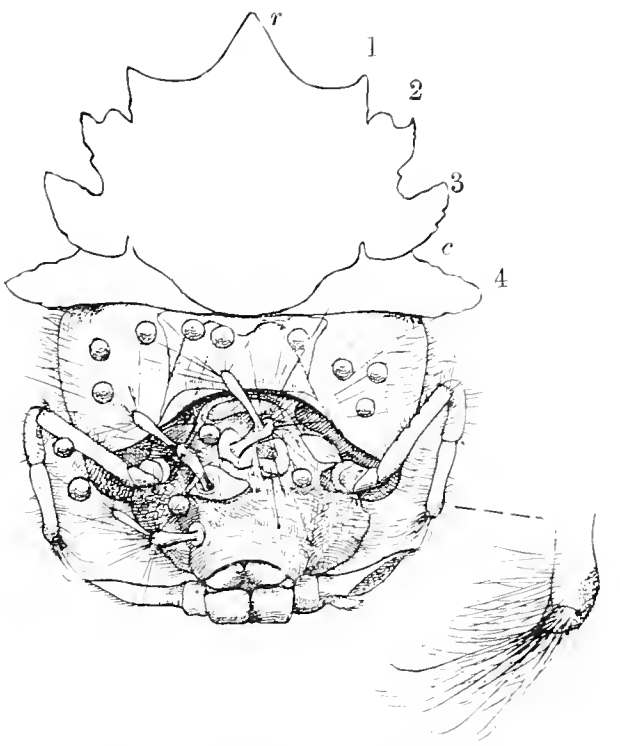

FIG. 5.—*Porcellanopagurus*: dorsal view of the specimen shown in Fig. 1, after removal of most of the eggs. × 4. The end of the fifth leg is also shown enlarged. The limbs of the second, third, and fourth abdominal segments are exposed by the removal of the eggs which they carried: a few of the eggs 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

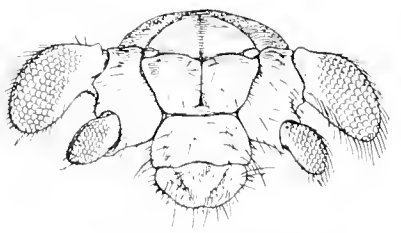

Fig. 6. — *Porcellanopagurus*: dorsal view of the end of the abdomen of the specimen shown in Fig. 1, × 5.

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

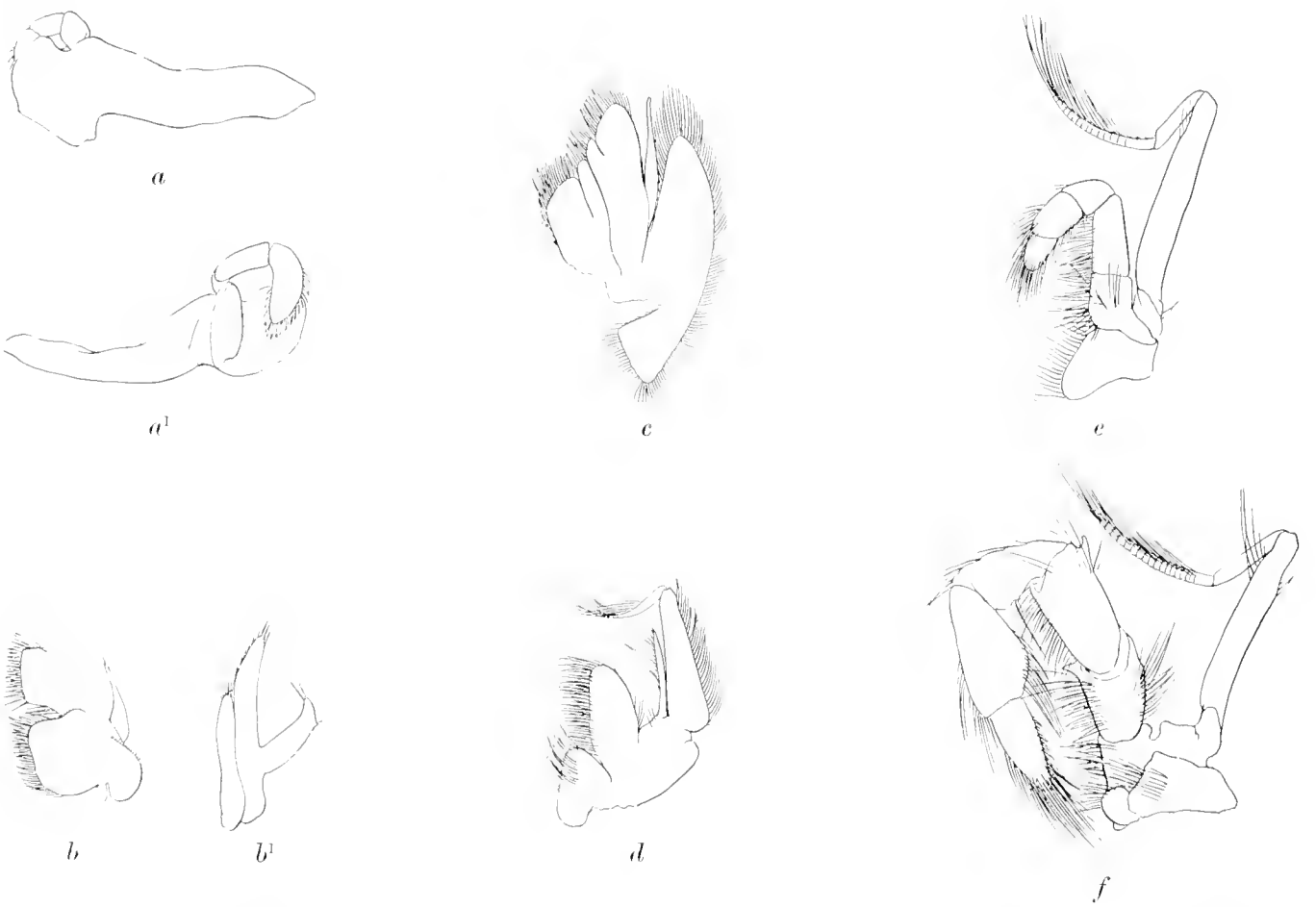

Fig. 7.—*Porcellanopagurus*: mouth-limbs of the left side of the specimen shown in Fig. 1.—*a*, Mandible, ventral view; a^1, the same, dorsal view; *b*, maxillule, ventral view; b^1, the same, lateral view; *c*, maxilla; *d*, first maxilliped; *e*, second maxilliped; *f*, third maxilliped.

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.

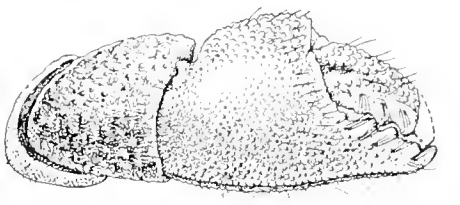

Fig. 8.—*Porcellanopagurus:* outer view of the great cheliped of the specimen shown in Fig. 1, × 3.

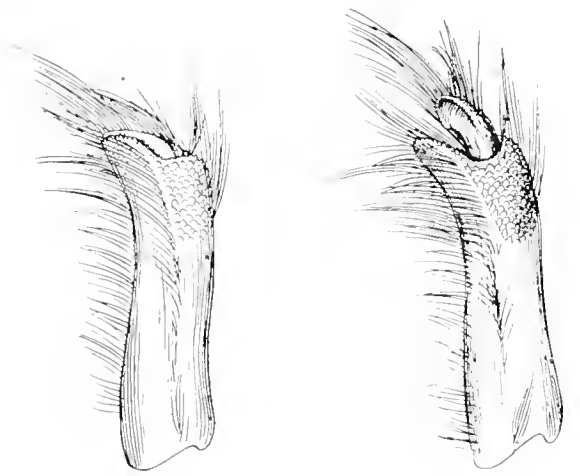

Fig. 9.—*Eupagurus bernhardus:* end of the last leg—*a*, from the inner side, with the chela closed; *b*, slightly different view, with the chela open, × $7\frac{1}{2}$.

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

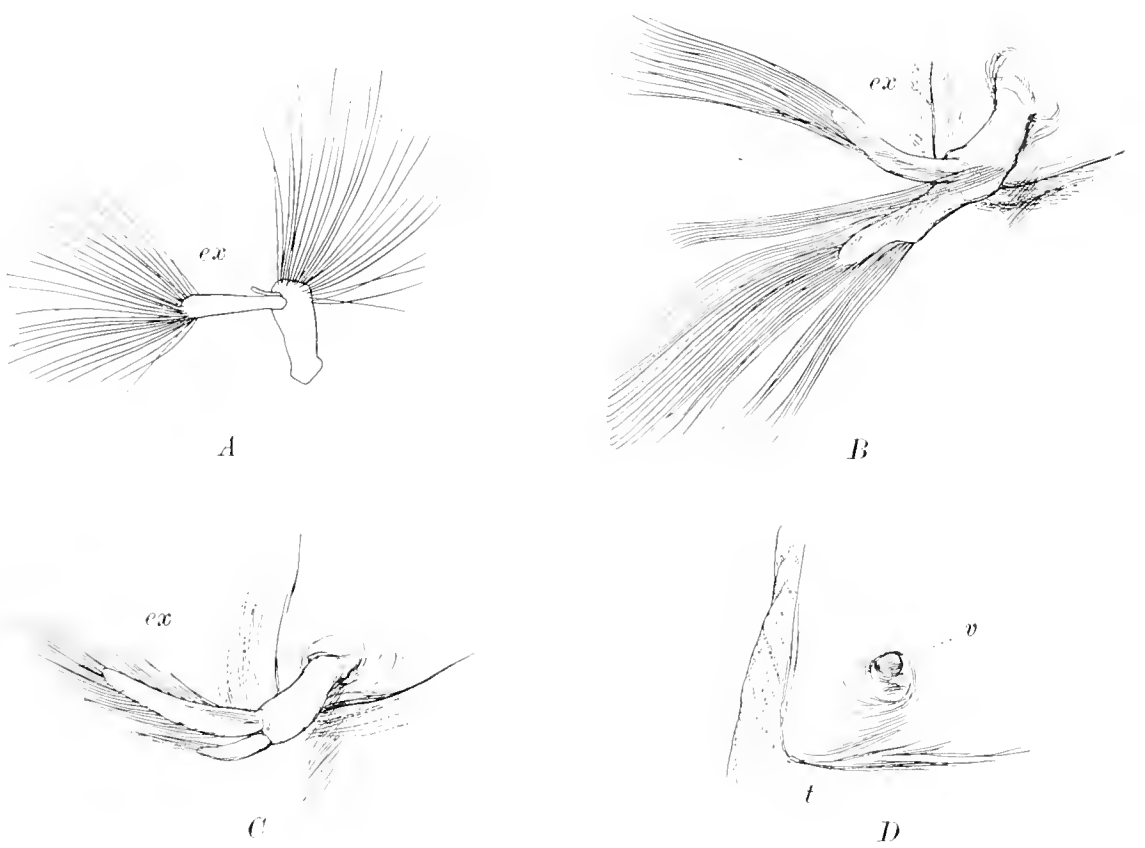

FIG. 10.—Dorsal views of the limb of the third abdominal segment in Eupagurinae—*A*, *Porcellanopagurus*, sp., ♀, × 6; *B*, *Eupagurus bernhardus*, ♀, × 5; *C*, the same, ♂, × 5; *D*, *Eupagurus prideauxi*, ♂, × 8. *ex*, Exopodite; *v*, vestige of pleopod; *t*, postero-external angle of tergum.

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

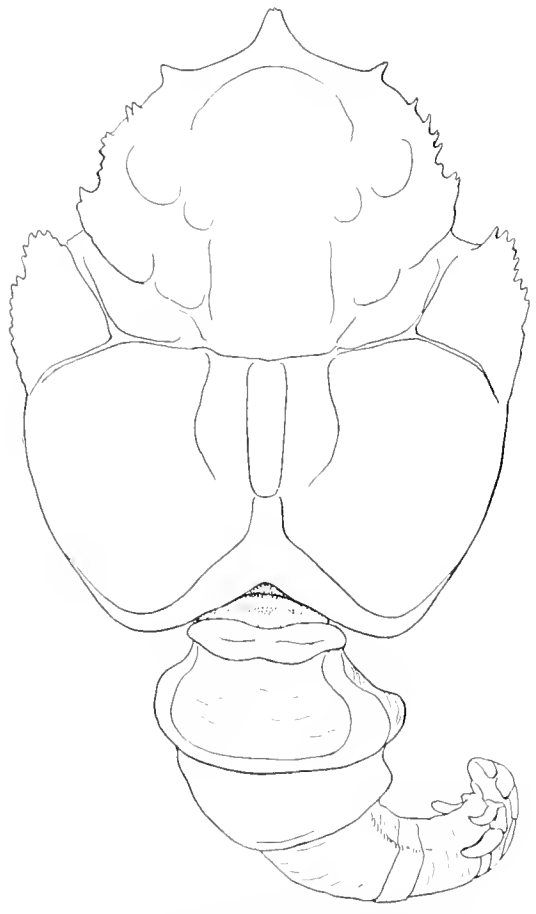

Fig. 11.—*Eupagurus splendescens*: outline dorsal view, × 2½.

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).

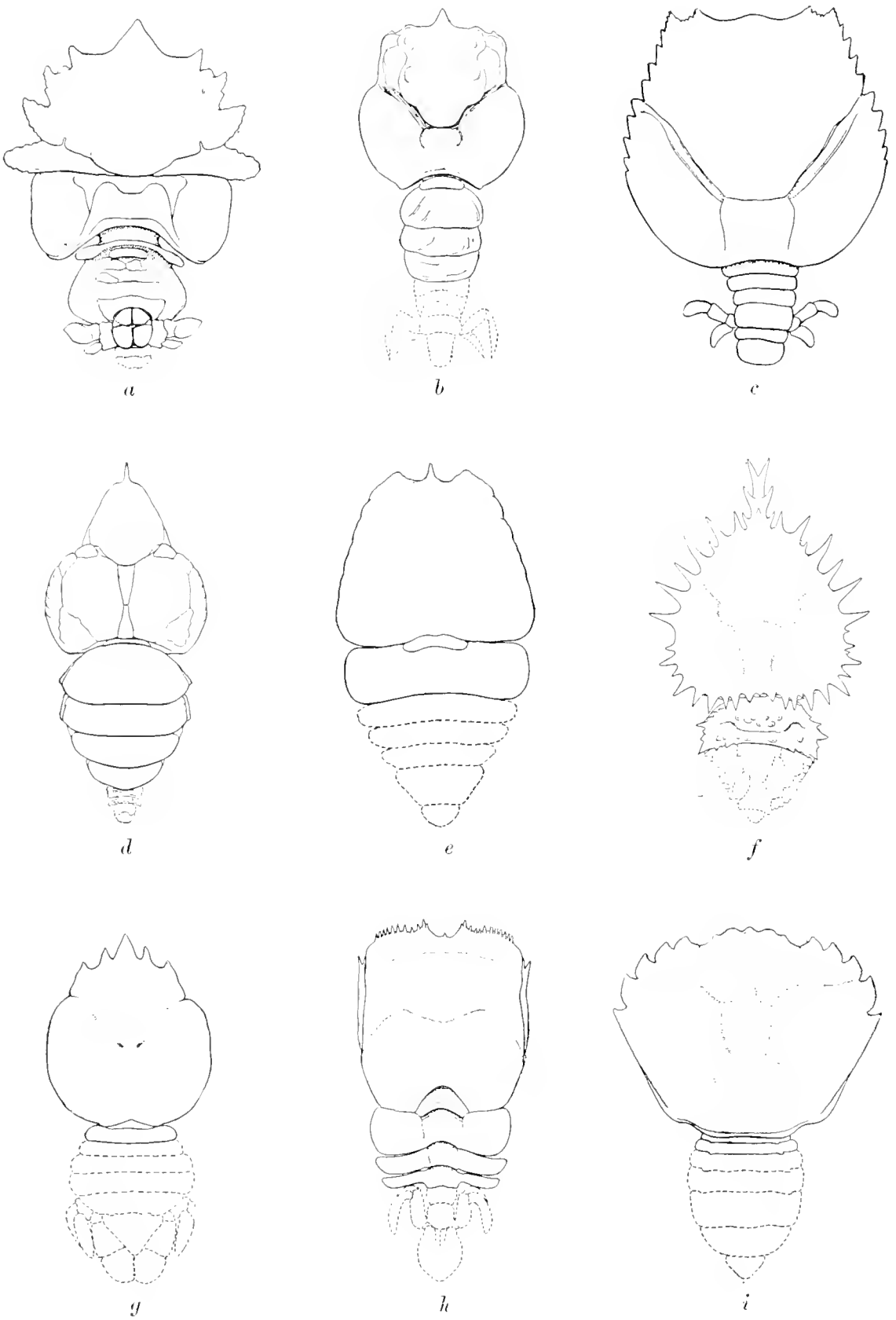

FIG. 13.—Outline dorsal views of the bodies of a series of "crabs"—*a*, *Porcellanopagurus*; *b*, *Tylaspis*; *c*, *Ostraconotus* (after Milne-Edwards); *d*, *Birgus*; *e*, *Lomis*; *f*, *Lithodes*; *g*, *Porcellana*; *h*, *Albunea*; *i*, *Carcinus*. Not drawn to scale. In each case the part indicated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

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* 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 Colleye, Cambridge; Lecturer in Zoology in the University).

WITH SEVEN FIGURES IN THE TEXT.

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(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.

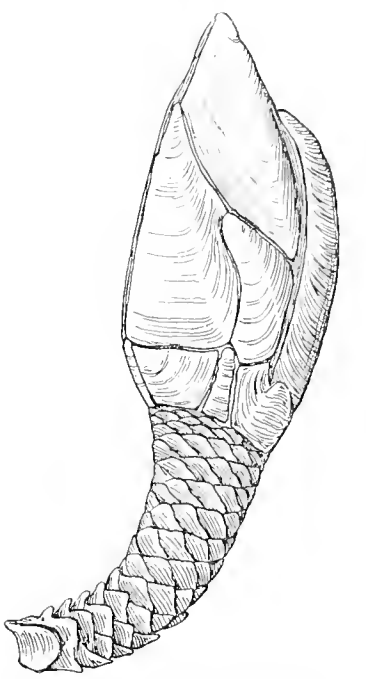

Fig. 1.—*Scalpellum* (*Arcoscalpellum*) *discoveryi*, juv. (?). × 8.

1917.2.9.11-15

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.

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;

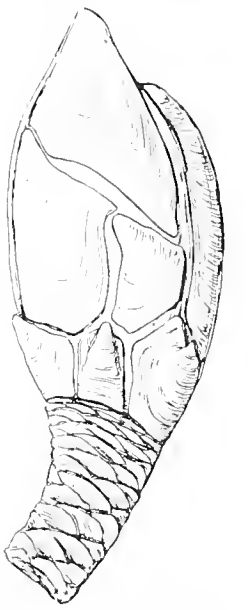

Fig. 2.—*Scalpellum* (*Arcoscalpellum*) *nymphonis*, n. sp. (?). × 10.

* 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*.

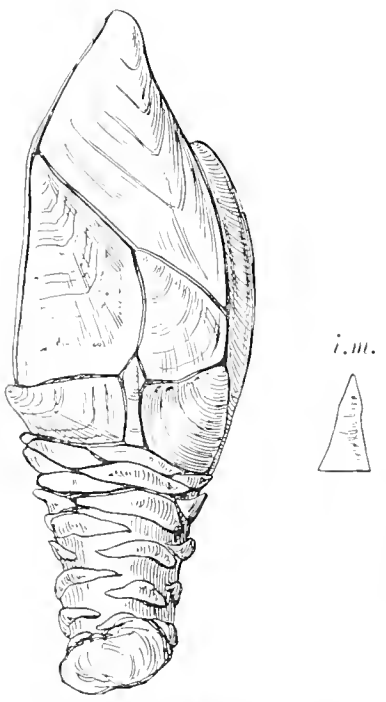

FIG. 3.—*Scalpellum* (*Arcoscalpellum*) *compactum*, n. sp. (?). × 9. *i.m.*, inframedian plate of opposite side.

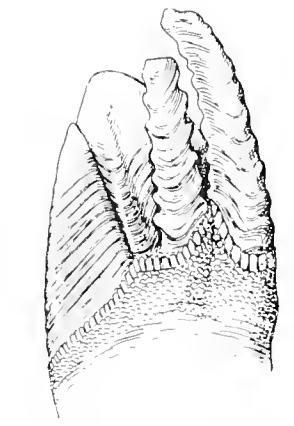

FIG. 4.— *Lithotrya atlantica*, n. sp. Capitulum. ×6.

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.

1917. 2.9.18-19
1917. 2.9.83

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).

1917.2.9.20-24

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).

1917.2.9.25
1917.2.9.84

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.

1917.2.9.25-30 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).

1917.2.9.30-45 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~~. decorus Darwin, fide Withers

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

1917.2.9.40-55 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).

1917.2.9.56-58 Several small specimens from rock-pools in South Trinidad Island.

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

1917.2.9.59-60 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. auckландicum*

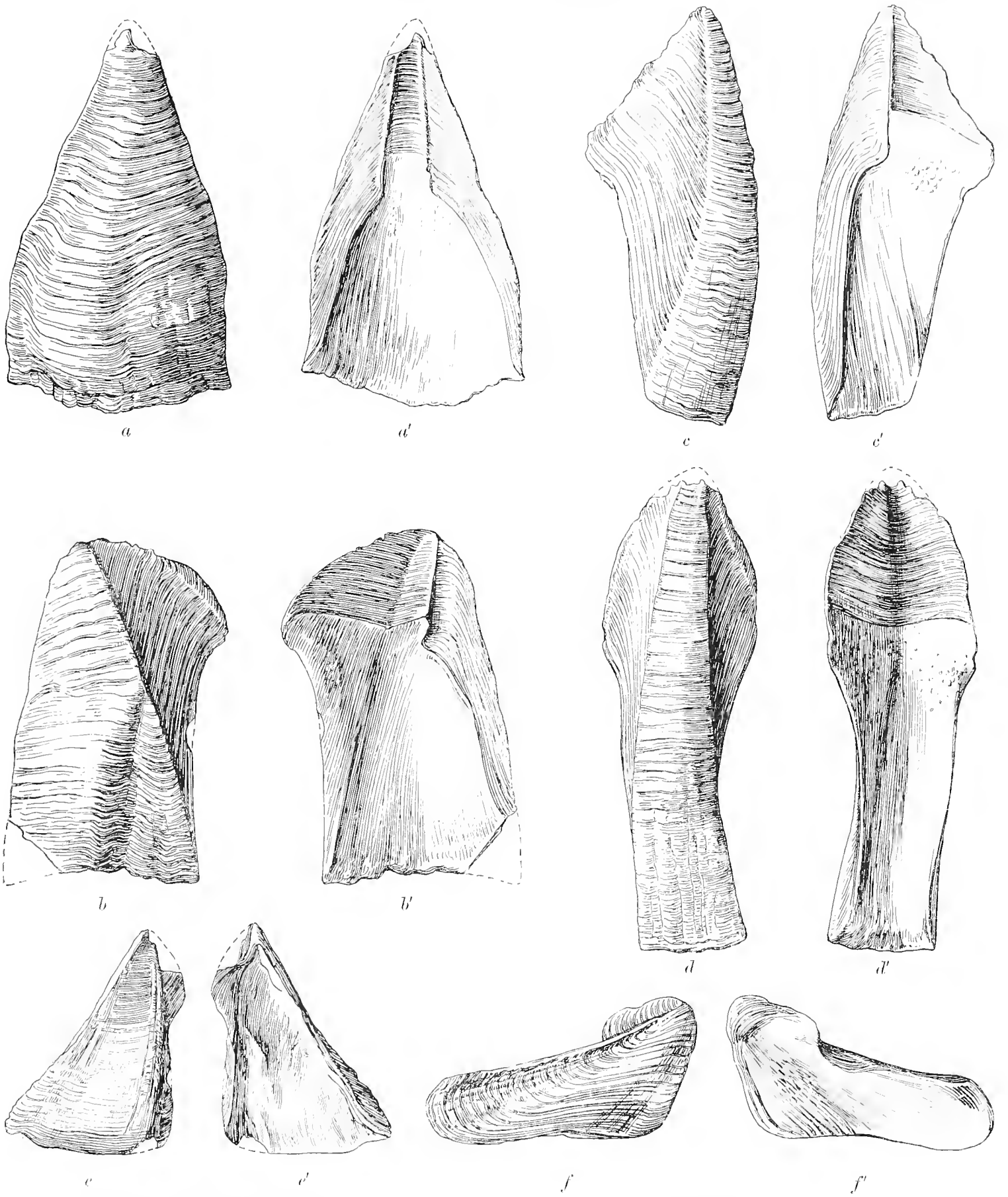

FIG. 7.—*Hexelasma antarcticum*, n. sp., nat. size. *a*, *a'*, external and internal views of rostrum; *b*, *b'*, the same of lateral; *c*, *c'*, the same of carino-lateral; *d*, *d'*, the same of carina; *e*, *e'*, the same of tergum; *f*, *f'*, the same of scutum. The valves figured are the most perfect 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.

1917.2.7.09-12

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*.

1917.2.7.73-82
1917.2.7.85-97

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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 NINE FIGURES IN THE TEXT.

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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° 1′ 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.

1917.3.1.1-7

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.

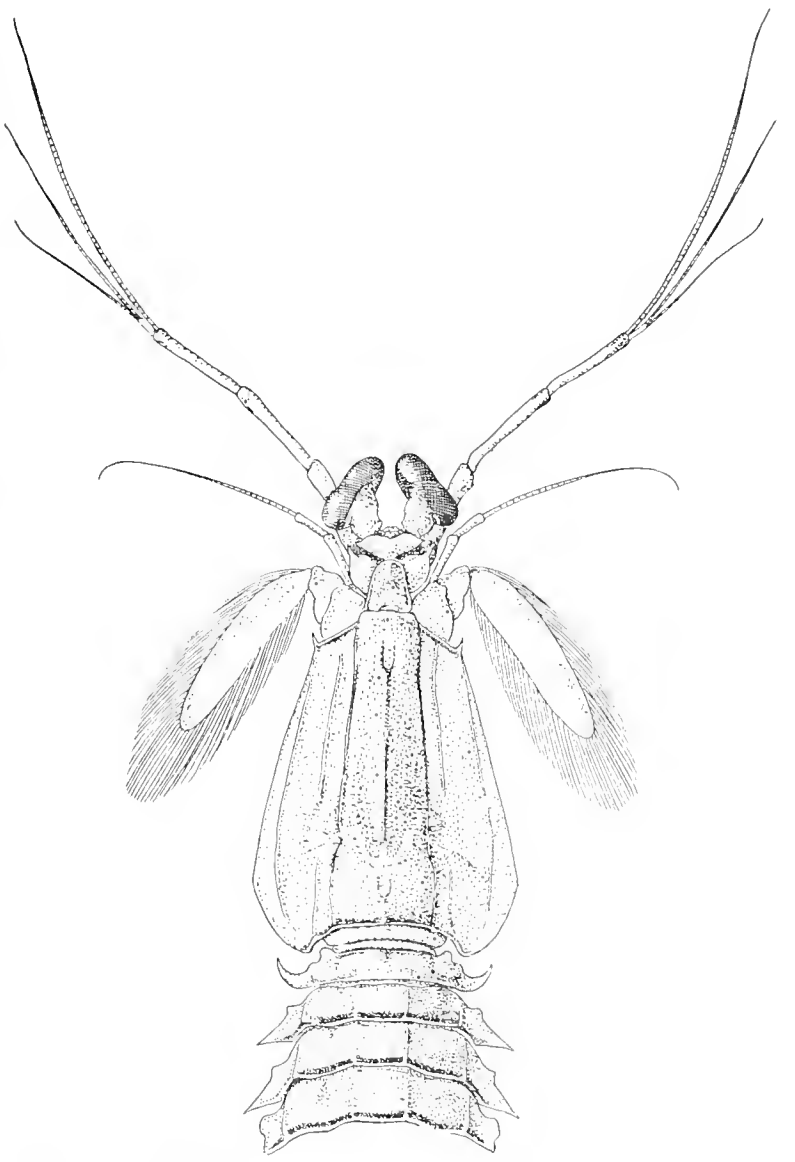

Fig. 1.—*Squilla brasiliensis*, n. sp. Female (holotype). Anterior portion of body from above. × 1½.

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

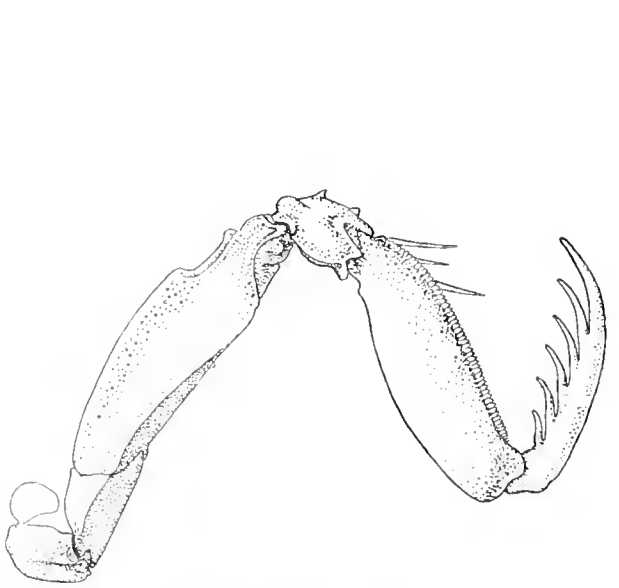

FIG. 2.—*Squilla brasiliensis*, n. sp. Female (holotype). Raptorial limb. × 1½.

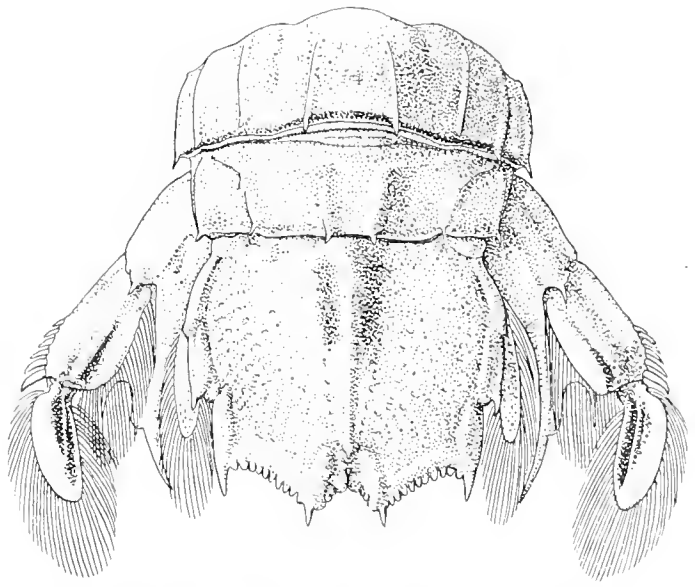

FIG. 3.—*Squilla brasiliensis*, n. sp. Female (holotype). Telson and uropods. × 1½.

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.

1917.3.1.9-18

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.

1917.3.1.19-20

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.

1917.3.1.21-29

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. 1917.3.1.30-38

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, 5–5e (with synonymy).

Occurrence.—Station 58. Equatorial Atlantic. Surface-plankton. One specimen (larva). 1917.3.1.39

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. } 1917.3.1.40-50

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).

1917.3.1.51-52

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. braziери*, 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) [*Coronideriehthus armatus* (Leach)].

Coronideriehthus armatus (Leach), Hansen, 1895, p. 81, pl. viii, figs. 3–3d (with synonymy).

1917.3.1.53-56

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. 1917.3.1.57-58

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. 1917.3.1.65

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. 1917.3.1.66-70 130

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

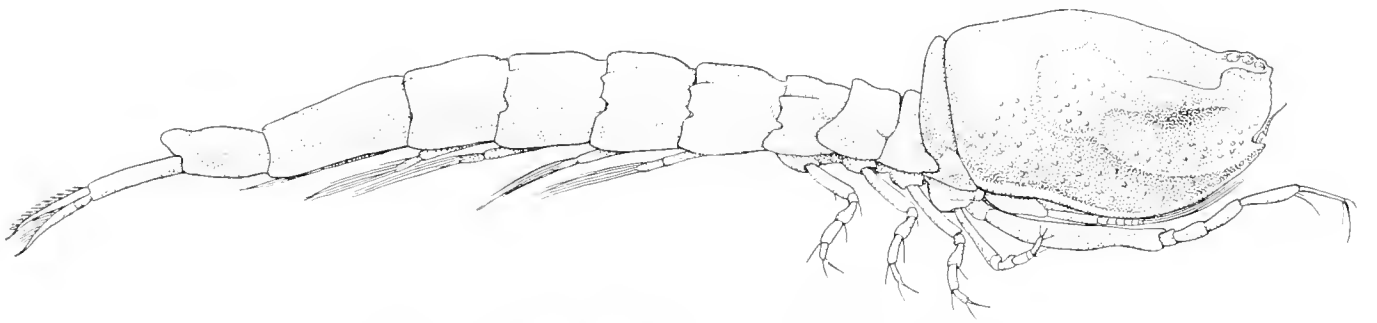

Fig. 4.—*Cyclaspis similis*, Calman. Male. × 22.

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. 1917.3.1.81-85 134

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. 1917.3.1.86-95 135

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).

1917.3.1.96-98
136-138

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.

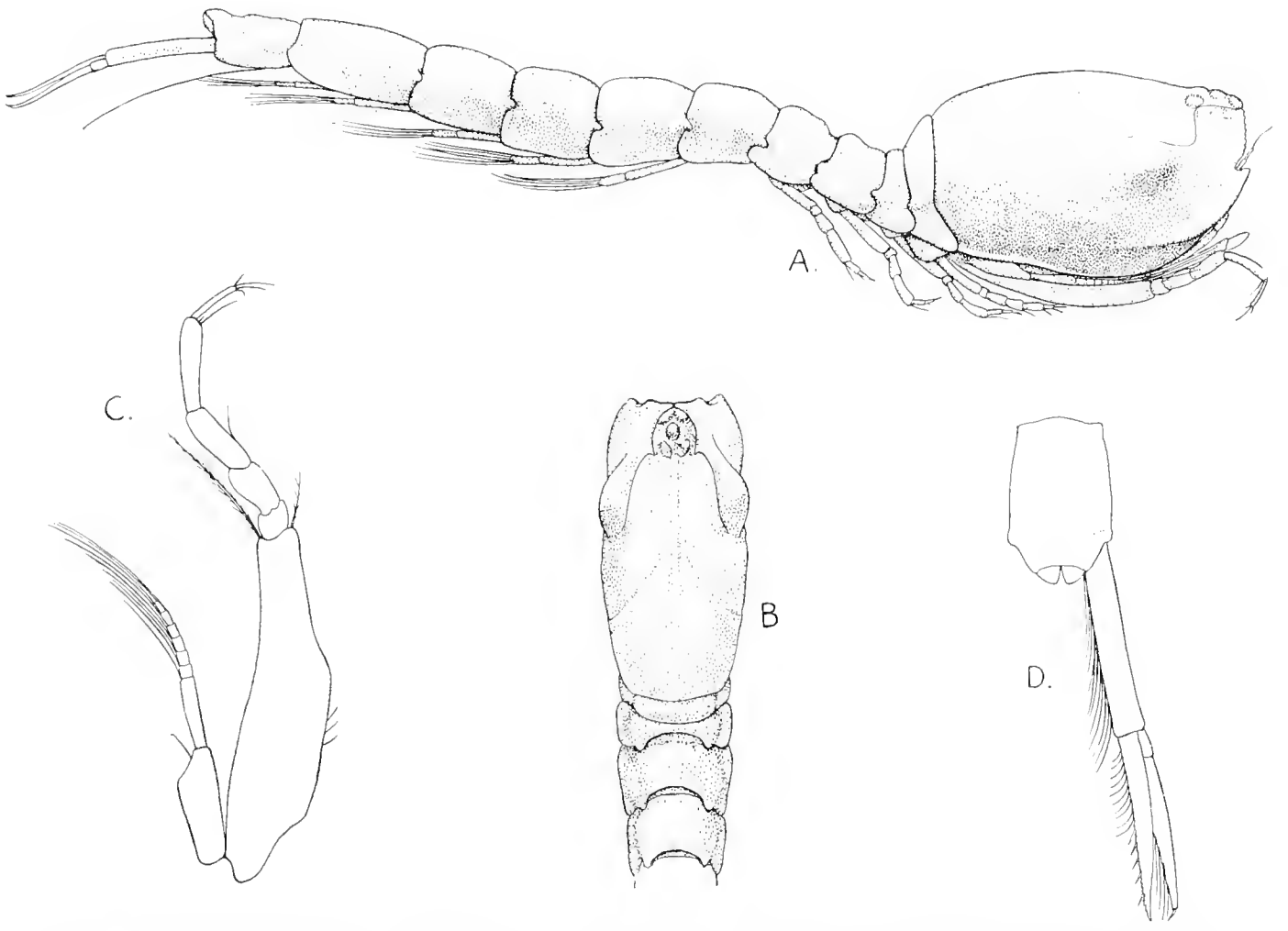

Fig. 5.—*Cyclaspis coelebs*, n. sp. Male. A. Side view. × 22. B. Anterior portion of body, from above. × 22. C. First leg. × 45. D. Last somite and uropod. ×45.

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 pseudorostrum, 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

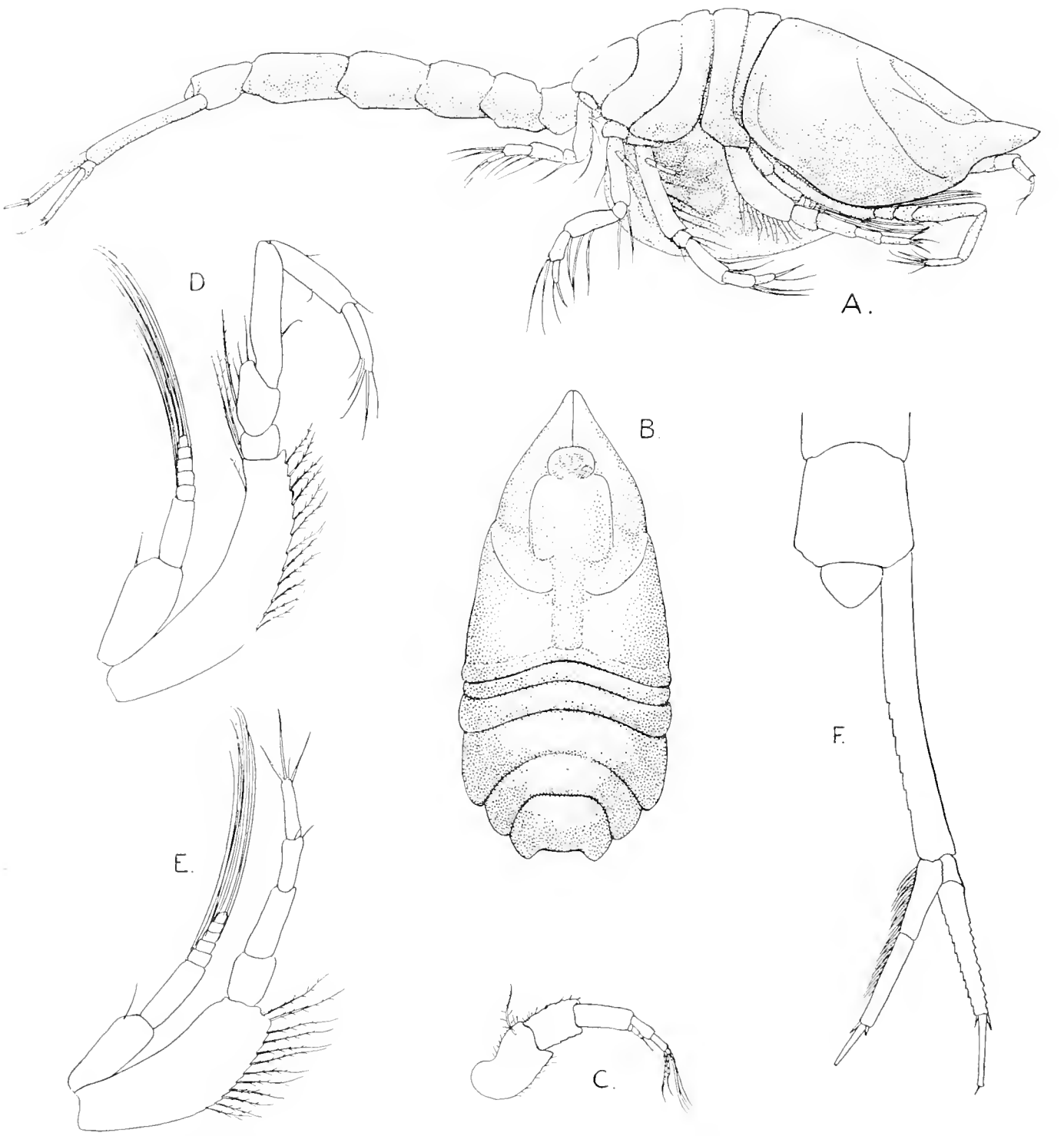

Fig. 7.—*Colurostylis lemurum*, n. sp. Female. A. Side view. × 30. B. Anterior portion of body from above. × 30. C. Antennule. × 75. D. First leg. × 75. E. Second leg. × 75. F. Last somite and uropod. × 75.

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

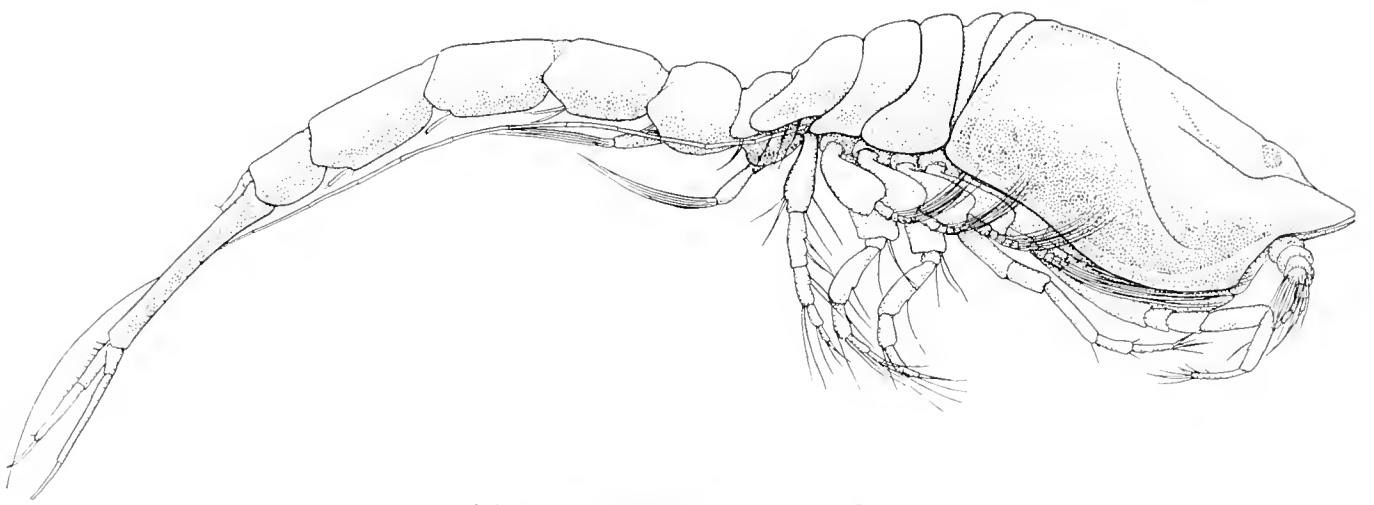

Fig. 8.—*Colurostylis lemurum*, n. sp. Male. × 30.

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.

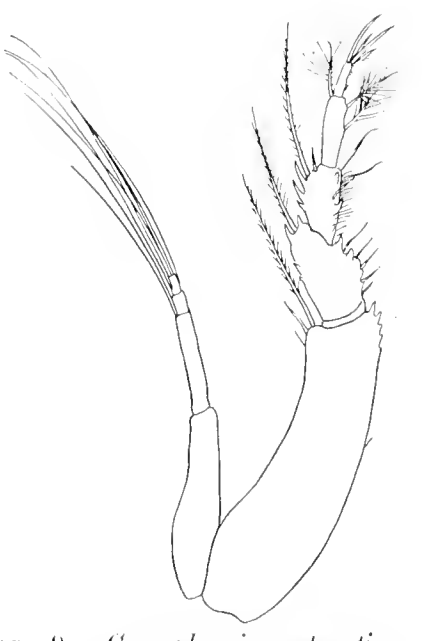

Fig. 9.—*Campylaspis antarctica*, Calman. Female. Third maxilliped. Syntype from "Discovery" collection. × 45.

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 ; Zernov, 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.

1917.3.1.144

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.

1917.3.1.120-129
- . - .. 145

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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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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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.

Cadonocera cruenta, Brady.
Philomedes assimilis, Brady.
Cylasterope 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.)

1924.5.2. 1-4.
(157-158 micro. prep.)

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.

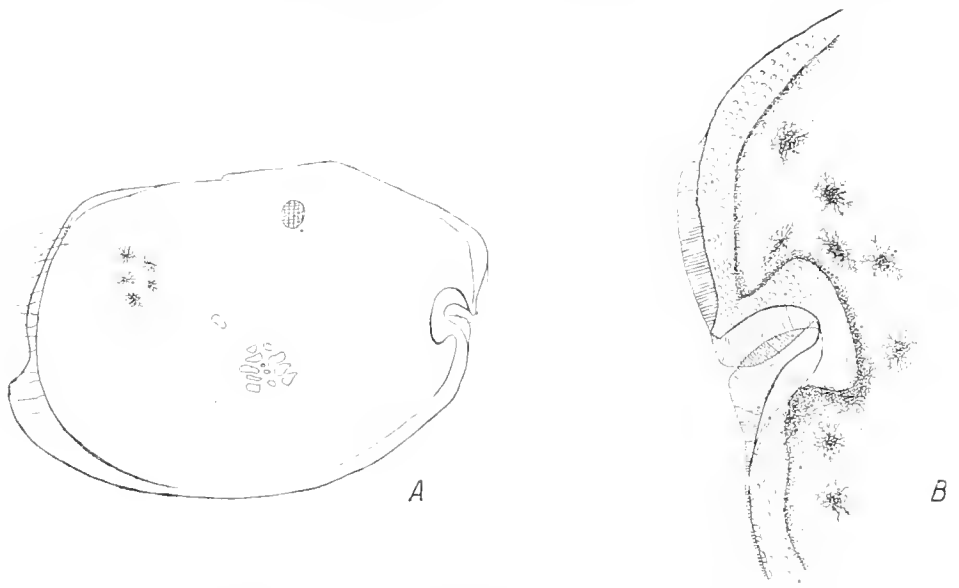

Fig. 1.—*Codonocera cruenta*. Male. *A*, Right valve, × 19; *B*, Anterior part of shell, × 48.

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.

1924.5.2. 159-160
micro prep.

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.

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* 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.)

1924.5.2.5-14.
(161-167 micro. prep.)

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.

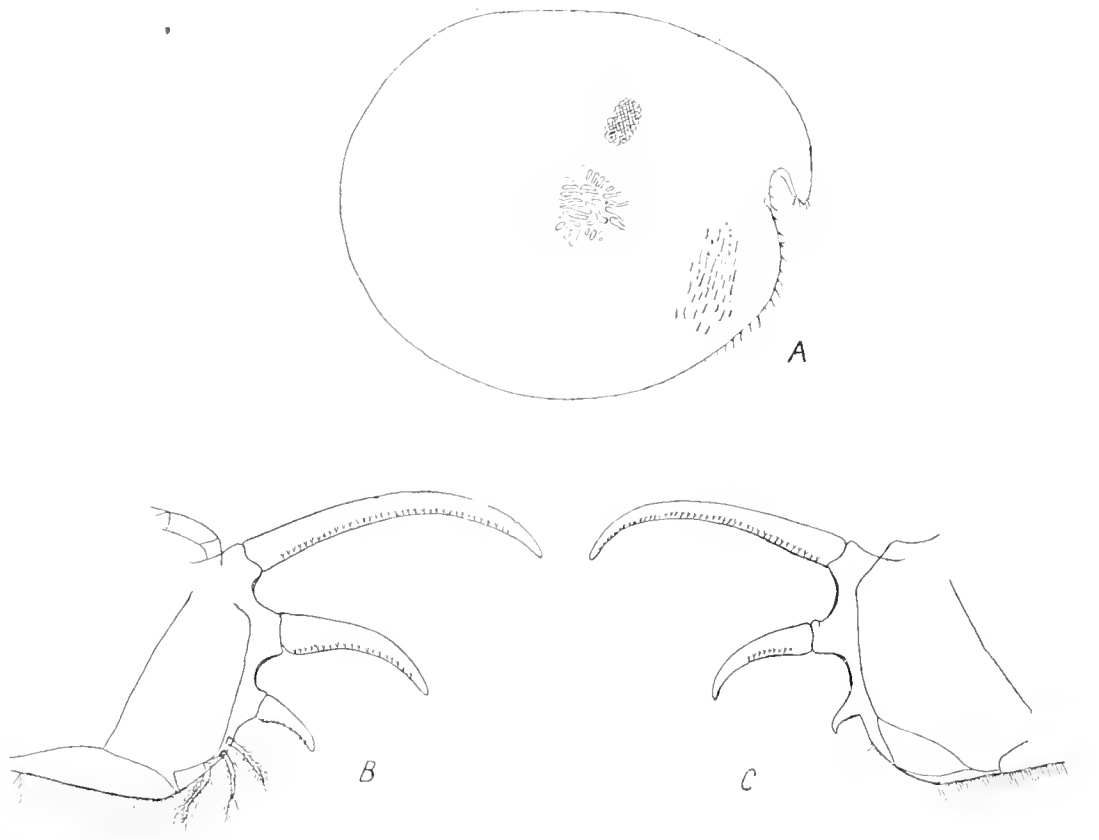

Fig. 2.—*Cyclasterope lobiancoi*. *A*, Female. Right valve, × 6; *B*, Female, Stage II. Furca, × 65; *C*, Female, Stage III. Furca, × 65.

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 II.	2·97 × 2·65 (right valve 2·60)	STAGE III.	1·89 × 1·66
	2·75 × 2·55 (right valve 2·45)		1·89 × 1·64
	2·50 × 2·09		1·89 × 1·63
	2·35 × 2·04		1·84 × 1·62
	2·30 × 2·04		1·84 × 1·62
	2·30 × 2·01		1·84 × 1·61
	2·30 × 2·09		1·84 × 1·61
	2·30 × 2·09		1·84 × 1·61
	2·24 × 1·99		1·79 × 1·60
			1·79 × 1·60
			1·79 × 1·60

Family HALOCYPRIDAE.

Sub-Family CONCHOECIINAE.

Genus HALOCYPRIS, Dana.

4. *Halocypris globosa* (Claus).

924.5.2.15-24. (168 micro. preps.)

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).

924.5.2.25-34. (169 micro. preps.)

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.

924.5.2.172 micro. preps.

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.)

1924.5.2.173 (micro. prep.)

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.

1924.5.2.35-54.
(174-177 micro. prep.)

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.

1924.5.2.55-114.
(178-181 micro. prep.)

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.

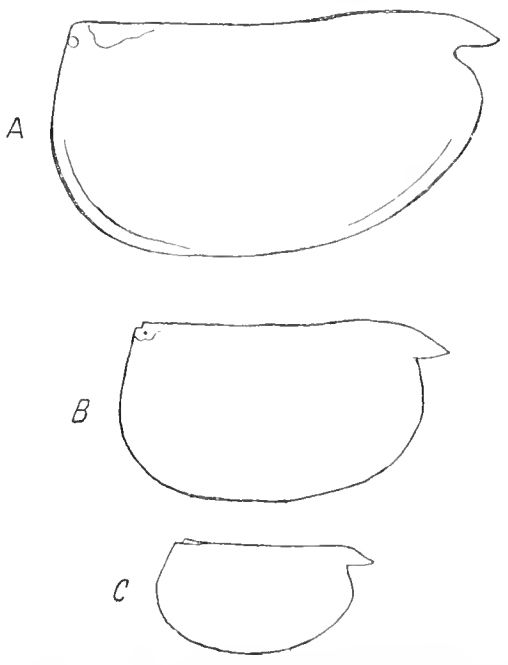

Fig. 4.—*Conchoecia belgicae*. *A*, Male ; *B*, Male, Stage II ; *C*, Male, Stage III ; Right valves, × 25.

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.

1924.5.2 115-116.
(182-183 micro prep.)

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.

* 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.

1924.5.2.184. micropreps.

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).

1924.5.2.185. micro. preps.

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.

1924.5.2.168 micro. preps.

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.)

1924.5.2.187–188. micro. preps.

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.

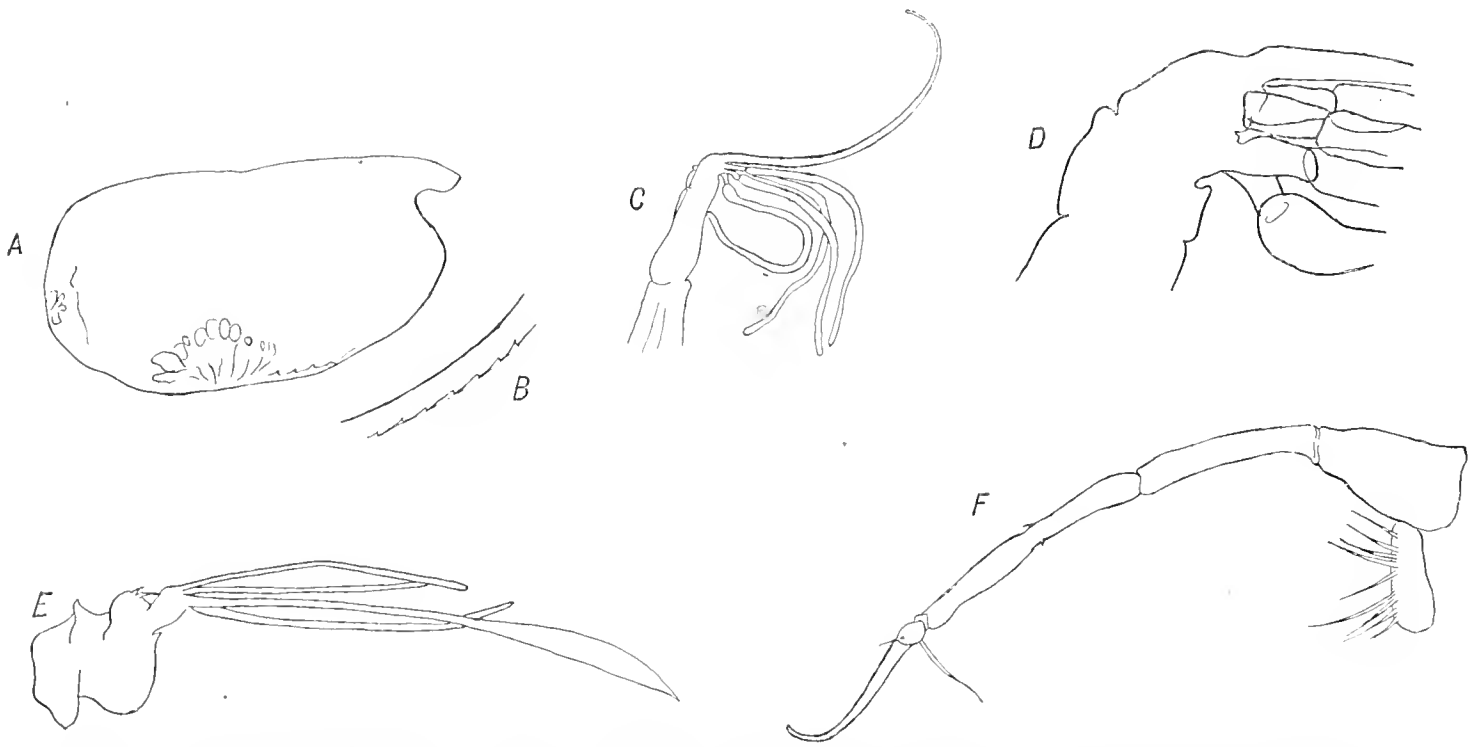

FIG. 5.—*Conchoecia edentata*. Female. *A*, Right valve, × 29 ; *B*, Part of margin of left valve from inside, × 87 ; *C*, First Antenna, × 87 ; *D*, Part of same, × 345 : *E*, Second Antenna, secondary branch, × 87 : *F*, First leg, × 87.

1924.5.2.117-136. (189-190 micro. prep.)

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).

1924.5.2.191 micro. prep.

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.)

1924.5.2.192 micro. prep.

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.

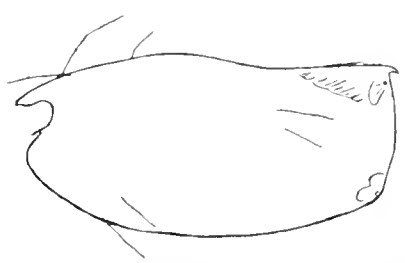

Fig. 6. — *Conchoecia oblonga*. Left valve, × 29.

18. *Conchoecia serrulata serrulata*, Claus.

1924.5.2.137-156.

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.

1924.5.2.193 micro. prep.

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.

1924.5.2.194. micro. prep.

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.

1924.5.2.195
micro. prep.

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.

1924.5.2.196.
micro. prep.

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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