

THE
VOYAGE OF H.M.S. CHALLENGER.

ZOOLOGY.

REPORT on the ANOMURA collected by H.M.S. Challenger during the Years
1873-76. By J. R. HENDERSON, M.B., F.L.S., Professor of Biology in
the Christian College, and Fellow of the University, Madras.

PREFACE.

SOME time after the return of the Challenger Expedition, the Anomura collected during the voyage were placed for examination and description in the hands of Dr. Jules Barrois, the well-known zoologist of Lille. It is to be regretted that this naturalist, finding insufficient time at his disposal, returned the collection to the Challenger Office. Towards the end of 1884, while engaged in zoological work at the Scottish Marine Station, Granton, I was asked by Mr. John Murray to undertake the work, and immediately after I commenced the identification of the species.

I have to express my regret that the completion of the Report has been so long delayed, but this result has been brought about by causes altogether unforeseen at the time when the work was commenced. In the autumn of 1885 I left Scotland to take up an appointment in India, and the whole of the Report has been written in the latter country. Other engagements prevented me from devoting much time to the collection for upwards of a year after my arrival in Madras, and it is with considerable difficulty that the Report has been completed within the specified time. It was originally my intention to have discussed at greater length some points which I have merely touched on in the following pages, and to have made the Report more comprehensive in its scope; but apart from the insufficient time at my disposal, the distance from any great library or museum has rendered this an impossibility. I am conscious that many of the species

merit a fuller illustration than I have been able to give them, but it is hoped that in all cases the figures will be at least sufficient for their identification.

To Mr. John Murray I would express my thanks for the kindness and consideration he has invariably shown me during the progress of the work. I am indebted to him for the opportunity of paying visits, in the early part of 1885, to the British Museum and the Museum of the Jardin des Plantes in Paris, without which the identification of many of the species would have been impossible. I have to thank my friend Mr. Hoyle, of the Challenger Office, for looking up many of the references which I had no opportunity of consulting in Madras.

I am also under deep obligation to Professor A. Milne-Edwards and Mr. E. J. Miers (late of the British Museum staff) for the kind manner in which they placed the collections under their charge at my disposal, no less than for the time which they spent in rendering me assistance. The former naturalist, in addition, allowed me to examine the Anomura taken by the "Blake," as well as the as yet undescribed species from the recent French deep-sea expeditions. My thanks are also due to my friend the Rev. Canon Norman, for affording me the privilege of examining his unrivalled collection of North Atlantic Crustacea, and for other assistance; to the Rev. R. Boog Watson for identifying the Gastropod shells in which many of the Pagurids occurred; and to my friend Mr. Edgar Thurston for allowing me at all times free access to the scientific library and collections under his charge in the Government Central Museum at Madras.

The Report is of necessity almost entirely systematic in its scope, for none of the specimens have been preserved with a view to ultimate anatomical investigation. The Anomura do not offer many features of special interest as regards their internal anatomy, and there is no reason to suppose that even the deep-water types differ to any great extent from their shallow-water relatives.

It is a matter of regret that in many cases the specimens are in an imperfect state of preservation, but there can be little doubt that this condition is due rather to the vicissitudes which the collection has undergone since the return of the Challenger, than to any want of care during the expedition.

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INTRODUCTION.

THE CLASSIFICATION OF THE ANOMURA.

In the following account I propose to discuss briefly the more important schemes of Classification which have been adopted for the group.

In the first volume of his classical *Histoire Naturelle des Crustacés*, published in 1834, Professor H. Milne-Edwards separated from the Brachyura and Maerura of older writers, under the designation of "Anomoures," those forms in which the thoracic sterna are linear, the penultimate abdominal segment is provided with appendages, the female genital openings are placed on the basal joints of the legs, and the abdomen is either loosely applied to the under surface of the thorax or semi-extended. In the earlier part of the century Latreille, who occupied a very prominent place among the older carcinologists, divided the Decapod Crustacea into its two branches, Brachyures and Macroures, the latter including a section Anomaux, in which many of the forms we now term Anomura were placed, the remainder being referred to the Brachyura.

In the second volume of his great work, Milne-Edwards subdivided the Anomoures into two families, termed respectively the "Apterures" and the "Pterygures," which were characterised by the absence or presence of terminal abdominal appendages. In the first of these families he included such forms as *Dromia*, *Homola*, *Lithodes*, and *Ranina*, while *Hippa*, *Pagurus*, and *Porcellana* were included in the second. The Galatheidæ were referred by the same naturalist to the Macroures, and the aberrant genus *Latreillia* was placed in the Brachyures.

De Haan, in his fine work on the Crustacea of Japan,¹ divides the Decapoda into five great sections, as follows :—(1) Brachygnatha, including the Dromiacea ; (2) Oxystomata ; (3) Astacina ; (4) Carides ; and (5) Anomala. As regards the Anomala he has followed Latreille, and he further subdivides the group into the following families :—(1) Galatheidea ; (2) Porcellanidea ; (3) Hippidea ; (4) Paguroidea ; (5) Lithodeacea. De Haan's classification is to a large extent founded on the structure of the mouth organs, and it has till quite recently scarcely received from carcinologists that attention which it deserves ; at the same time there can be little doubt that it is in many respects, as

¹ Crustacea in v. Siebold, *Fauna Japonica*, 1835-49.

regards the Anomura at least, a perfectly natural one. To him we are indebted for first correctly noting the affinities of the Galatheidæ, and since the publication of his work no naturalist has questioned the propriety of including this group in the Anomura.

As a result of his unrivalled opportunities of studying the Crustacea as a whole, enjoyed while naturalist to the United States Exploring Expedition under Captain Wilkes, Professor J. D. Dana paid special attention to the subject of classification, and the result of his investigations has been given to the world in the most elaborate work which has ever appeared on this group of animals.¹ This eminent authority includes under the term Anomura those groups admitted by Milne-Edwards, with in addition the Galatheidæ, and such doubtful forms as the Bellidea. Proceeding from the standpoint that the Anomura are to be regarded as degraded forms, intermediate between the Brachyura and the Maerura, he subdivides the group into the four following grades:—(1) Anomura superiora, including the Dromidea, Bellidea, and Raninidea; (2) Anomura media, including the Hippidea and the Porcellanidea; (3) Anomura submedia, including the Lithodea; and (4) Anomura inferiora, including the Paguridea, and the Galathæidea. At the same time he has indicated in each case the Brachyuran group of which he considers the subtribes of Anomura as degraded forms. Dana's classification, though subsequently adopted by many systematic writers, is admittedly cumbersome and inconvenient in many respects, his sections appear unnecessary, and in constituting them he has in several cases separated groups which are closely related.

A few years subsequent to the publication of Dana's great work, another American naturalist, Dr. William Stimpson, who had taken part in the exploring expedition to the North Pacific, published a Preliminary Report on the Crustacea, which includes a synopsis of all the species of Anomura known at that time.² In this paper, the value of which to any worker in the group can scarcely be over-estimated, he divides the Anomura into two sections, according to the nature of the last thoracic segment, whether united to the preceding, or free, and termed respectively Teleosomi and Schizosomi. The former includes the Dromidea, Latreillidea, Homolidea, and Raninidea, and the latter the Porcellanidea, Hippidea, Lithodidea, Paguridea, Aegleidea, and the Galatheidea. In the limitations of the group he has followed Professor Dana. It is greatly to be regretted that Stimpson's final Report has never been published. The Crustacea of the North Pacific Expedition were destroyed in the great fire at Chicago, but the complete MS. of the final Report, as far as the end of the Anomura, which it was at one time thought had perished, was afterwards discovered along with figures of the new species among papers left by Stimpson at the Smithsonian Institute. A special feature of this author's work is the large

¹ Crustacea, in United States Exploring Expedition, vols. xiii. and xiv., 1852.

² Prodomus descriptionis Animalium evertibratorum quae in Expeditione ad Oceanum Pacificum Septentrionalem a Republica Federali missa Cadevaladero Ringgohl et Johanne Rogers ducibus observavit et descripsit Gulielmus Stimpson, *Proc. Acad. Nat. Sci. Philad.*, December 1858.

number of new genera which he introduced into the Anomura, and most of these are, in my opinion, founded on sufficient grounds. I have in the following Report figured several of Stimpson's species which were retaken by the Challenger, and at the same time have made additions to his original descriptions.

Professor Alphonse Milne-Edwards, in the introduction to his History of the Fossil Stalk-Eyed Crustacea,¹ refers the Anomoures Apterures of his father to the Brachyura, under the designation of "Brachyures Anormaux," while he places the Pterygures in the Macrura, thus abolishing the Anomura as a distinct group.

A somewhat similar plan has been adopted by Professor C. Claus,² who places the Galatheidæ, Hippidæ, and Paguridæ in the Macrura, while he ranges the Porcellanidæ, Lithodidæ, and Dromidæ among the Brachyura in a family which he has designated Notopoda. An arrangement which separates such forms as *Porcellana* and *Galathea* cannot, however, be regarded as a natural one.

The most recent and in some respects one of the most important contributions to the subject is that of Dr. Boas.³ This writer, proceeding on somewhat similar lines to De Haan, restores the Anomala of the latter author to its original position, constituting it a distinct group, equivalent to such others as the Thalassinidæ or Brachyura, rather than a mere collection of heterogenous forms. He subdivides the Anomala into three branches, the Paguroidæ, Galatheidæ, and Hippidæ, while he divides the Brachyura into two sections, viz., the Dromiacea, and the genuine Brachyura. There is much to be said in favour of this view, and all carcinologists owe a debt of gratitude to Boas for his careful work; at the same time I cannot agree with him as to the propriety of reducing a number of previously constituted genera to the rank of subgenera.

The group which was placed in my hands by the Challenger authorities constituted the Anomura as defined by Dana. In the classification adopted in the Report I have followed to a certain extent the arrangement of Boas, but as the Dromidea and Raninidea appear to me groups of very doubtful position, I have retained them with some hesitation and reluctance in the Anomura.

I have adopted the hitherto almost universally accepted term of Milne-Edwards, in its more correctly spelt form Anomura. The Anormaux, as previously constituted by Latreille, formed a group of quite different proportions, and the term Anomala is therefore in my opinion not entitled to claims of priority.

¹ *Ann. d. Sci. Nat. (Zool.)*, sér. 4, t. xiv., 1860.

² *Grundzüge der Zoologie*, 4ter Auflage, Bd. i., 1880.

³ *Studier over Decapodernes Slaegtskabsforhold af J. E. V. Boas, Dansk. Vidensk. Selsk. Skrift.* (6te R.), Bd. i. pp. 26-210, pls. i.-vii., 1880.

TABLE OF CLASSIFICATION.

ANOMURA.

DROMIDEA.

Family I. DROMIDÆ, Dana.

Challenger Genera—

<i>Dromia</i> (Fabr.), Stimpson.	|	<i>Eudromia</i> , n. gen.
<i>Cryptodromia</i> , Stimpson.	|	<i>Pseudodromia</i> , Stimpson.
<i>Dromidia</i> , Stimpson.	|	<i>Hypoconcha</i> , Guérin-Méneville.

Family II. HOMOLIDÆ, nov.

Challenger Genera—

<i>Homola</i> , Leach.	|	<i>Latreillopsis</i> , n. gen.
<i>Homologenus</i> , A. Milne-Edwards.	|	<i>Latreillia</i> , Roux.

RANINIDEA.

Family RANINIDÆ, Dana.

Challenger Genera—

<i>Raninoides</i> , H. Milne-Edwards.	|	<i>Cosmonotus</i> , Adams and White.
<i>Notopoides</i> , n. gen.	|	<i>Lyreidus</i> , De Haan.
<i>Notopus</i> , De Haan.	|	<i>Zanclifer</i> , n. gen.

HIPPIDEA.

Family I. HIPPIDÆ, Dana.

Challenger Genera—

<i>Remipes</i> , Latreille.		<i>Mastigochirus</i> , Miers.
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Family II. ALBUNEIDÆ, Stimpson.

Challenger Genus—

Albunea, Fabricius.

PAGURIDEA.

Section A. LITHODEA, Dana.

Family LITHODIDÆ, Dana.

Challenger Genera—

Lithodes, Latreille.

|

Paralomis, White.

Section B. PAGURODEA, nov.

Branch 1. LAMINIBRANCHIATA, nov.

Family I. CÆNOBITIDÆ, Dana.

Challenger Genera—

Birgus, Leach.

|

Cænobita, Latreille.

Family II. PAGURIDÆ, Dana.

Challenger Genera—

Diogenes, Dana.*Pagurus* (Fabr.), Dana.*Clibanarius*, Dana.*Calcinus*, Dana.*Eupagurus*, Brandt.*Spiropagurus*, Stimpson.*Anapagurus*, Henderson.*Catapagurus*, A. Milne-Edwards.*Paguristes*, Dana.*Tylaspis*, n. gen.*Glaucothoë*, H. Milne-Edwards.

Branch 2. FIBRIBRANCHIATA, nov.

Family PARAPAGURIDÆ, S. I. Smith.

Challenger Genera—

<i>Parapagurus</i> , S. I. Smith.	|	<i>Paguroopsis</i> , n. gen.
<i>Pagurodes</i> , n. gen.	|	<i>Pylocheles</i> , A. Milne-Edwards.

GALATHEIDEA.

Section A. PORCELLANODEA, nov.

Family PORCELLANIDÆ, Dana.

Challenger Genera—

<i>Petrolisthes</i> , Stimpson.	|	<i>Raphidopus</i> , Stimpson.
<i>Porcellana</i> (Lamk.), Stimpson.	|	<i>Pachycheles</i> , Stimpson.
<i>Porcellanella</i> , White.	|	<i>Polyonyx</i> , Stimpson.

Section B. GALATHODEA, nov.

Family GALATHEIDÆ, Dana.

Challenger Genera—

<i>Galathea</i> , Fabricius.	|	<i>Galacantha</i> , A. Milne-Edwards.
<i>Munida</i> , Leach.	|	<i>Eumunida</i> , S. I. Smith.
<i>Munidopsis</i> , Whiteaves.	|	<i>Ptychogaster</i> , A. Milne-Edwards.
<i>Elasmonotus</i> , A. Milne-Edwards.	|	<i>Uroptychus</i> , n. gen.

DESCRIPTION OF GENERA AND SPECIES.

ANOMURA.

- Anomoures*, Milne-Edwards, Ann. d. Sci. Nat., sér. 1, t. xxv. p. 298, 1832.
,, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 163, 1837.
Anomala, De Haan, Crust. Japonica, p. 195, 1850 (*part*).
Anomoura, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 398, 1852.
,, Bell, Brit. Crust., p. 163, 1853.
,, Stimpson, Proc. Acad. Nat. Sci. Philad. p. 63, 1858.
,, Miers, Catal. New Zealand Crust., p. 56, 1876.
,, Haswell, Catal. Austral. Crust., p. 138, 1882.
Anomura, Heller, Crust. südlichen Europa, p. 142, 1863.

Cephalothorax always more strongly developed than the abdomen. Carapace broad or elongate; frontal region with in most cases a projecting rostrum which unites below with the antennular sternum; orbits and antennular fossæ seldom present. Antennules and antennæ well developed, the latter usually situated externally to the eyes and with long flagella. Outer maxillipedes elongated and pediform, more slender than in the Brachyura. Last thoracic segment often free and not fused with the preceding segments. Thoracic sterna usually broad in front, narrowed posteriorly, without a median apodeme. The three anterior pairs of legs well developed, the fifth pair (frequently also the fourth) slender and of small size, prehensile, or folded in the branchial chambers. Abdomen bent under the carapace or extended. Genital openings of the females placed on the basal joints of the third pair of legs. Branchiæ nine or more in number on each side.

The Anomura are found in all seas, but much more abundantly in those of tropical or temperate climates; a few forms are terrestrial or fluviatile (*Birgus*, *Cenobita*). The majority inhabit shallow water or moderate depths; two groups, however—the Pagurids and the Galatheids—are numerously represented in the abysses of the ocean; all are true bottom-living forms.

Our knowledge of the existence of Anomura in former geological ages is very
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imperfect. Their first undoubted appearance is in the Cretaceous rocks, where they are represented by *Homolopsis*, Carter, from the English Gault and Greensand; and an allied form, *Dromilites*, Bell, occurs in the Eocene. Certain fossils are referable to the Raninidea, and even to the existing genus *Ranina*.

DROMIDEA.

Dromiacea, De Haan, Crust. Japon., p. 102, 1850.

Dromidea, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 400, 1852.

„ Miers, Catal. New Zealand Crust., p. 57, 1876.

„ Haswell, Catal. Austral. Crust., p. 138, 1882.

Carapace subglobose or subquadrate, the frontal region narrow. Last pair of legs and frequently also the penultimate pair subdorsal in position and of small size. Abdomen folded under the thorax, the penultimate segment usually without appendages; five pairs of appendages in the female, the first pair rudimentary. Lateral thoracic apodemata united in a common centre, forming a sternal canal. External maxillipedes with the merus and ischium subquadrangular.

To De Haan belongs the credit of having first characterised this group; but the family Dromiacea was referred by this author to his section Brachygnatha. It contains the most highly organised Anomura, *i.e.*, forms which have assumed for the most part Brachyuran characteristics, so much so that by many competent authorities they are placed in the Brachyura; they are, however, separated from the latter by the position of the female openings and the rudimentary condition of the posterior legs.

Family I. DROMIDÆ.

Dromiens, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 168, 1837.

Dromidæ, Dana, U.S. Explor. Exped., vol. xiv., Crust., part ii. p. 1428, 1852.

Carapace subglobular, rarely flattened. Legs of moderate size, cylindrical, the fourth and fifth pairs (fifth pair only in *Dynomene*) short and subdorsal in position, usually prehensile. Eyes capable of retraction into well-defined orbits; the antennules folded in special fossæ. Males of many species (perhaps of all) with the vasa deferentia protruded from the coxal joints of the fifth pair of legs and forming tubular prolongations. Species inhabiting shallow water and moderate depths; the majority protecting the body by an Ascidian, Sponge, or valve of a Lamellibranch.

Previous to 1858 the majority of the species were included in the genus *Dromia* of Fabricius; in that year Stimpson rearranged this heterogeneous collection into six genera (five being new), relying chiefly for generic characters on the disposition of the sternal

sulci in the females. Though some doubt may be entertained as to whether this classification is a natural one, it must be admitted that a subdivision of some kind is necessary and certainly of use to the systematist. Altogether the group at present stands very much in need of revision. In the account which follows I have adopted the arrangement laid down by Stimpson.

Genus *Dromia*, Fabricius (*restrictum*), Stimpson.

- Dromia*, Fabricius, Suppl. Ent. Syst., p. 359, 1798 (*part*).
 ,, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 170, 1837 (*part*).
 ,, De Haan, Crust. Japon., p. 104, 1850 (*part*).
 ,, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 402, 1852 (*part*).
 ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 64, 1858.

Carapace subglobose, usually pilose. Palate smooth. Sternal sulci in the female not approximated, only produced as far as the segment which bears the second pair of legs. Feet of moderate size, the meri not dilated. Chelipedes with their apices calcareous. Last two pairs of legs subchelate, the penultimate joint terminating in a spiniform process. Some of the species reach a length of several inches.

Dromia ciliata, n. sp. (Pl. I. fig. 1).

Characters.—Carapace subglobose, surface minutely punctate, polished, with a dense fringe of hairs extending transversely between the antero-lateral angle of either side; the breadth exceeding the length. Front strongly deflexed, with three subacute teeth, of which the two lateral are more prominent and placed almost horizontally, the mesial tooth channelled superiorly, deflexed, barely visible when the carapace is looked at from above. Gastric region convex, crossed in front by the fringe of hairs previously mentioned, the latter placed on an ill-defined ridge which forms a false anterior boundary to the carapace; the space between this ridge and the frontal border is densely pubescent and directed forwards, a shallow groove, however, exists in the middle line and is continued on to the mesial frontal tooth. The remainder of the gastric region is smooth, with the exception of two small pits towards the posterior limit. Cardiac region moderately circumscribed, smooth. Antero-lateral border of the carapace not defined (unless we consider part of the ciliated ridge to represent this). Lateral border divided into two subequal halves by the well-marked cervical groove, the anterior part is slightly convex (viewed from above) and directed forwards and downwards, the posterior and longer part almost straight, directed backwards and downwards. The cervical groove passes obliquely backwards, and ends by dividing into two branches which embrace the cardiac area; the anterior of these is somewhat curved, and ends in a well-marked pitted depression on the gastric area. The posterior border is slightly curved forwards.

The hepatic area is comparatively smooth and very convex, while the subhepatic region is somewhat excavated, densely pubescent, and armed with two rounded tubercles on its outer border. The pterygostomial area is pubescent, the inner part almost membranous in consistence. The orbital border is furnished with a single prominent tooth above, placed external to the lateral spine of the rostrum, and the inferior border ends in a somewhat larger and more conical process. The eyes are small, and when retracted almost completely hidden in the deep orbits; the basal joints of both pairs of antennæ are robust, and the terminal joints of the internal pair are folded in the orbital cavity; the flagellum of the external antenna is short. The external maxillipedes have the ischial and meral joints subequal, the exognath is moderately stout and reaches almost to the end of the merus; the ischium is crossed by an oblique elevation which passes on to the exognath and then becomes continuous with the outer border of the subhepatic region. These lines on either side form the sides of a triangle which is completed by the ciliated line stretching across the front of the carapace, and includes within its boundaries the eyes; the antennular, and antennal segments, the subhepatic regions, and the upper part of the buccal cavity; the whole being densely ciliated.

The chelipedes are moderately long and furnished with a thick clothing of hairs, the tips of the fingers alone being naked; when these hairs are removed, the joints are found to be smooth. The propodus is longer than the carpus and smooth, with its finger strongly toothed and slightly excavated; the dactylus is also toothed, and its free end fits into the space between the two terminal teeth on the finger below. The carpus has a prominent conical tooth on its upper border, and a similar yet larger projection towards the upper part of the antero-external border; towards the posterior border of the carpus there exists a well-marked fringe of hairs which (when the chelipedes are folded in) is directly continuous with that on the carapace. The merus is somewhat trigonal, and more sparingly pubescent. The first and second pairs of ambulatory limbs are equal in length to the chelipedes, and have the penultimate and antepenultimate joints clothed with long hairs as well as the lower borders of the meri; the latter joints are trigonal, with the anterior and posterior surfaces smooth and polished. The dactyli are long, and each ends in a sharp curved claw which is yellowish in colour. The third pair of ambulatory limbs are shorter than usual, with the merus and carpus subequal, and the short, curved, horny dactylus is opposed to a similar process of the propodus; two small spines are noticeable on the latter joint immediately over the attachment of the dactylus. The fourth pair of ambulatory limbs are more than half as long again as the preceding pair, they are subdorsal in position, and flattened against the sides of the carapace; the merus is nearly twice the length of the carpus, and the terminal claws, though resembling those of the third pair, are slightly less curved.

The abdominal segments are seven in number, the fourth, fifth, and sixth with a well-marked depression on either side of a rounded median elevation; the last four

segments have a dense matting of hairs. The male sexual organs are well developed, the first pair robust, the second ending in a long and delicate horny filament; in addition a membranous tubular process (length 5·3 mm.) arises from the coxa of each fourth ambulatory limb. These processes are directed forwards, and lie to the outside of the first pair of genital appendages; they gradually narrow towards the free end.

Breadth of carapace 27·5 mm., length of carapace 25 mm., of chelipede 28 mm., of third ambulatory leg 16 mm.

The fringe of hairs on the carapace, and the position of the cervical groove, are the chief characteristics of this species. *Dromidia excavata*, Stimpson (from Port Jackson), has the subhepatic regions deeply concave, is a much smaller species, and various other points of difference exist. *Dromia globosa*, Lamarek, possesses a tooth on the lateral border in front of the cervical groove, and a prominent tooth divides each antero-lateral border into two parts.

Habitat.—Station 162, off East Monocœur Island, Bass Strait; depth, 38 fathoms; bottom, sand and shells.

The single specimen taken is an adult male, found living with and firmly attached to a large Simple Ascidian.

Genus *Cryptodromia*, Stimpson.

Cryptodromia, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 63, 1858.

„ Miers, Catal. New Zealand Crust., p. 57, 1876.

„ Haswell, Catal. Austral. Crust., p. 138, 1882.

Carapace convex, pubescent, scarcely pilose. Palate furnished with a slight elevation on each side. The sternal sulci in the female remote, terminating in tubercles, produced as far as the segment bearing the second pair of legs. Legs nodose, otherwise similar to those of *Dromia*. Species of small size.

The members of this genus are apparently confined to the Indo-Pacific region. They occur between tide-marks and in shallow water; some, however, including the best known species—*Cryptodromia lateralis*—appear to venture occasionally into greater depths.

Cryptodromia lateralis (Gray).

? *Dromia lateralis*, Gray, Zool. Miscell., p. 40, 1831.

„ *verrucosipes*, White, List. Crust. Brit. Mus., p. 55, 1847.

Cryptodromia lateralis, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 77, 1858.

„ „ Heller, Reise der Novara, Crust., p. 71, 1865.

„ „ Miers, Catal. New Zealand Crust., p. 57, 1876.

„ „ Haswell, Catal. Austral. Crust., p. 139, 1882.

„ „ Miers, Crust. in Zool. H.M.S. "Alert," p. 259, 1884.

Habitat.—Station 162, off East Monocœur Island, Bass Strait; depth, 38 fathoms; bottom, sand and shells. An adult male and a female, the latter with ova.

“ April 1874, 2 to 10 fathoms ;” on the Australian coast. Two small males, one enveloped by an Aseidian.

Station 163A, off Twofold Bay, Australia ; depth, 150 fathoms ; bottom, green mud. A single specimen of small size.

This common species extends from Australia and New Zealand to the Japanese coasts. White applied the name *Dromia verrucosipes* to it, without furnishing a description ; his examples were from the Philippines.

Cryptodromia japonica, n. sp. (Pl. I. fig. 2).

Characters.—Carapace somewhat pentagonal in outline, the breadth slightly exceeding the length ; upper surface moderately convex, smooth, minutely punctate, with the exception of the lateral surfaces which exhibit traces of a densely matted pubescence. Front deflexed, composed of three teeth, the two lateral of which are obtusely rounded and directed forwards, the median is considerably smaller, more conical in shape, and strongly deflexed. Gastric region smooth, convex, bounded posteriorly by a curved shallow groove which is placed slightly nearer the posterior than the anterior end of the carapace. An indistinct furrow bounded on either side by an irregular elevation, and terminating posteriorly in a small ill-defined tubercle, leads to the depression between the lateral rostral teeth. The cardiac area is smooth, with the exception of two minute tubercles placed immediately behind the gastro-cardiac groove. The hepatic and branchial areas are covered by a thick matting of short brownish hairs, the former in addition having its surface somewhat irregular in outline. Antero-lateral border almost straight, with a rounded tubercle above the central portion of the subhepatic area. Lateral border divided into two subequal parts by a well-marked groove which curves back on the carapace and ends by passing directly forwards along the outer border of the cardiac area. This border commences in a prominent tooth which is placed slightly below the level of the tubercle on the antero-lateral margin, a second tooth is placed immediately behind the first, and a third in front of the groove, the three being subequal in size. That portion of the lateral border placed posteriorly to the above-mentioned groove is regular in outline.

The subhepatic area is of small size and slightly excavated. It is bounded above by the elevations already mentioned in connection with the borders of the carapace, but towards the inferior limit two prominent teeth are met with. The larger of these teeth is somewhat oblong in shape and placed beneath the outer border of the orbit. The pterygostomial area bears two small tubercles near its junction with the subhepatic area, and a third is placed on the buccal margin directly over the meral joint of the external maxilliped. The orbital border is sinuous and furnished above with a small rounded lobe which projects forwards, thus rendering the orbit somewhat deficient

superiorly. The internal antennæ are partially concealed by the external; the basal joint of the latter is of considerable size, and its outer and distal border ends in a rounded dentiform process, a somewhat longer spine existing on the corresponding inner border. The external maxillipedes have the meral and ischial joints quadrate and subequal, the outer surface of the merus is convex, while the ischium shows a slight hollowing out inferiorly; the exognath extends to the outer angle of the merus. All the parts met with on the under surface are in this species covered with the short matted hairs already referred to.

The chelipedes are of moderate length, and, with the exception of the finger tips, clothed everywhere by a brown velvety pubescence. The merus is trigonal, and about one-half longer than the carpus; the latter joint presents a rounded lobe on its upper border and two conical tubercles on the outer surface near the distal border; an ill-defined projection also exists towards the proximal part of the outer surface. The propodus is nearly twice as long as the carpus, with two tubercles on the upper border near the attachment of the dactylus, and a much smaller one placed opposite the upper of the two tubercles on the outer surface of the carpus. The fingers are excavated internally and furnished with about four teeth each. The ambulatory limbs have a similar clothing to the chelipedes; the first and second pairs are robust though slightly shorter than the latter. The carpal and propodal joints each end in two rounded tubercles, a fringe of long hairs extends along the anterior borders of the meral joints, and each dactylus ends in a curved, yellowish, horny claw, which is beset by a tuft of hairs. The third ambulatory limb is shorter than the fourth, though proportionately stouter, with the carpal and meral joints subequal, in the fourth leg the merus is more than one half longer than the carpus. The two last pairs of ambulatory limbs possess but a single claw each.

The abdomen of the single specimen taken (a female carrying ova) is covered by a velvety pubescence, and the borders are fringed with long hairs, a broad median elevation runs from the second segment almost to the end of the seventh; the lateral margins are slightly convex. The sternal tubercles are strongly developed.

Breadth of carapace 15 mm., length of carapace 14 mm., of chelipede 17 mm., of first ambulatory limb 15 mm.

This species is allied to *Cryptodromia lateralis* (Gray); the latter, however, has the carapace more circular, the lateral rostral teeth triangular, and fewer tubercles on the subhepatic and pterygostomial regions.

Habitat.—Off Yokoska, Japan; 5 to 20 fathoms.

Cryptodromia nodulifera, n. sp. (Pl. I. fig. 3).

Characters.—Carapace somewhat pentagonal in outline, less convex than is usual among the members of this genus, the breadth very slightly exceeding the length; the surface covered with a short bristling pubescence, and furnished with a series of well-marked tubercles on the anterior half. As the regions are but ill-defined in this small species, it is convenient to treat of the carapace as a whole, rather than attempt a description of each division. The frontal region is composed of three subacute teeth, the central of which is strongly deflexed, while the lateral are directed forwards, and each bears a small tubercle on its inner border. The whole anterior half of the carapace is covered by a series of tubercles, the majority of these being roughened by small secondary projections, those on the gastric area are somewhat larger than the others. A single tubercle of small size and smooth surface is present on the cardiac area, but the carapace posterior to this shows only a few slight inequalities. The antero-lateral border is slightly concave in outline, and posterior to the orbital border is ill-defined; the lateral border is marked in front by two prominent tubercles, with a series of smaller ones behind.

The orbit is ill-defined in front, its upper border partly composed of two irregular lobes which are attached to the side of the lateral frontal tooth; the eye is not, however, in actual contact with these. A single tubercle exists at the external angle of the orbit, and this is separated from the supraorbital tubercles by a shallow groove; the lower orbital border also terminates in a prominent tubercle. The antennular peduncle is remarkably stout, the basal joint ending in a blunt process which projects on the outer and distal border; the flagella are partly hidden by the antennal peduncles. The joints of the antennal peduncle are also somewhat swollen, especially the second, and the flagellum is ciliated. The external maxillipedes have the merus and ischium subequal, each of these joints is likewise furnished with a rounded tubercle on its internal border, that of the latter being situated near its junction with the merus. The exognath extends almost to the external angle of the merus. The subhepatic region bears two irregular tubercles placed in a line with those at the commencement of the lateral border of the carapace; a similar protuberance occurs also on the pterygostomial region, immediately over the external angle of the meral joint of the third maxillipede.

The chelipedes are of considerable size. The merus is trigonal and sparingly tuberculate, the carpus presents a series of well-marked tubercles on its outer surface, the largest of these being situated near the junction with the propodus; the latter joint is about one and a half times the length of the carpus, and its outer surface bears three or four rows of small rounded projections, as well as two large processes on the upper border situated near the insertion of the dactylus. The fingers are armed each with about five

interlocking teeth, but even when fully closed a slight hiatus is left. The first and second pairs of ambulatory limbs are of moderate size, and the propodal and carpal joints have their outer and posterior surfaces strongly tuberculate, the dactyli end in curved horny processes of a yellowish colour; and a small tuft of hairs projects from the lower surface of each. The third and fourth pairs of ambulatory limbs are comparatively of small size, and the proportions of their various joints agree with those of the last species; each limb terminates in two opposed horny claws. The third pair are slightly tuberculate, while the fourth pair are smooth. The hairs met with on this species—especially those of the ambulatory limbs—are club-shaped.

The abdomen is strongly tuberculate externally, each segment, except the last, with a median series of three tubercles, two of these being placed near the posterior border of the segment, and a lateral series of two on either side of the median pair. The lateral tubercles are, however, fused on the penultimate and antepenultimate segments, so as to form a single projection. The sexual appendages of the male are well developed, more particularly those of the first pair, and the vasa deferentia are protruded as two membranous processes which project forwards under cover of these. In the male also, two rounded tubercles exist on the sterna of the fourth and fifth thoracic segments respectively. The sternal tubercles in the female have the normal arrangement met with in species of *Cryptodromia*.

Breadth of carapace 8.5 mm., length of carapace 7.5 mm., of chelipede 12.5 mm., of first ambulatory leg 9 mm. These measurements are taken from the larger (male) specimen.

It is with considerable hesitation that I venture to describe this species under a new name. Mr. Haswell has furnished the description of an Australian species, *Dromia sculpta*, with which it may subsequently prove to be identical, but not having seen the latter, it is impossible to decide from the short diagnosis in the Catalogue of Australian Stalk and Sessile-Eyed Crustacea. The Challenger specimens at the same time undoubtedly belong to the genus *Cryptodromia*. The British Museum collection contains examples erroneously named *Dromia nodipes*, Lamarek. I have, however, had the opportunity of examining an authentic specimen of the latter in the Paris Museum of Natural History, and of comparing the Challenger specimens with it. *Dromia nodipes* is a much larger species, the carapace is more rotund, its surface glabrous, and the tubercles are small and rounded; moreover the abdominal segments are smooth. *Cryptodromia tuberculata*, Stimpson, has the carapace smooth, and the second and third pairs of feet have the carpal joint armed superiorly with from four to five teeth.

Habitat.—Off the Australian coast; “April 1874, 2–10 fathoms.”

Two specimens were taken. The larger of these is a male, apparently fully developed, the other is a female, probably immature. The latter has a small sponge fixed to one of its ambulatory limbs.

Cryptodromia incisa, n. sp. (Pl. I. fig. 4).

Characters.—Carapace subglobose, the length and breadth almost equal, covered by a short pubescence, which is more strongly developed on the anterior portion. Front tridentate, the median tooth of considerable length, nearly vertical in direction and acuminate, the lateral teeth project forwards, and are also acute though to a lesser extent than the median process. The gastric region is convex, its surface glabrous and minutely punctate (after removal of the hairs); on the anterior part, and immediately behind the frontal region, are two slight rounded elevations, separated from one another by a mesial groove, which is continued on to the central rostral tooth. A well-marked depression exists between the orbital border and the gastric elevation on either side. No distinct line of demarcation separates the gastric and cardiac areas, but the latter is bounded laterally by an ill-defined groove, and posteriorly by a depression which lies between it and the posterior border of the carapace; no inequalities are present on the surface of this region. The hepatic area presents a small depression near the antero-lateral angle of the carapace, but is otherwise smooth; the branchial area is of very limited extent. The antero-lateral border is short, and presents no other spines than those met with on the lateral frontal and orbital regions. The lateral border is convex in front of the cervical groove and unarmed, with the exception of a tooth immediately behind the groove; it is fringed by hairs, which are clubbed and of considerable length. The cervical groove is ill-defined, and ends on the surface of the carapace by splitting into two shallow furrows which embrace the cardiac area. The posterior border presents a slight mesial concavity.

The subhepatic area is smooth and slightly hollowed out posteriorly for the inner surface of the meral joint of the chelipede. The pterygostomial area is smooth, but a well-defined border bounds the buccal cavity on either side, and a bilobed tubercle marks its junction with the epistome. The eyes when retracted are almost completely hidden in the deep orbits; the superior border of the latter is armed with an acute spine, the outer angle is marked by a narrow fissure, and the inferior border is produced into a triangular and pointed tooth. The antennules are of small size, and partly hidden by the antennæ; the latter possess a large basal tubercle with an opening of considerable size for the duct of the green gland; the second joint of the antennal peduncle is large, and bears on its outer and distal end a well-marked spine, with a secondary process near its base. The external maxillipedes have the meral joint slightly shorter than the ischial, and the latter is hollowed out inferiorly, the exognath extends to the end of the merus.

The chelipedes are pubescent and of moderate length, the propodal joint (including its finger) is not twice the length of the carpus. The meral joint is trigonal, and the lower edge ends in a rounded tubercle. The carpus is armed with two obtuse teeth on its anterior edge (of which the superior is larger), and a somewhat conical process on the upper border. The propodus bears two rounded tubercles on its outer surface, near the attachment of the dactylus, and the upper border is produced into a lobe-like process which is directed inwards. The opposed fingers have their edges smooth, and the dactylus is remarkably broad and compressed, its outer surface being slightly concave, the inner convex; both fingers are dentate, the upper fitting into the lower, and a few stiff yellow hairs are also present. The first two pairs of ambulatory limbs are of considerable length, and in addition to the usual short pubescence they are sparingly clothed with long club-shaped hairs; the dactyli exceed the propodi and carpi in length, and terminate in a curved yellow claw. The third pair have the merus slightly longer than the carpus, and the propodus bears a short horny claw which is opposed to the dactylus. The fourth pair are of considerable length and folded over the carapace, the basal joint is large, and its attachment to the second joint is strengthened by a small calcareous process which passes between the two; the merus is about one and a half times as long as the carpus, and the propodus bears a horny claw on either side of the dactylus, the latter, however, exceeding these in length. Both the third and fourth pairs possess club-shaped hairs on their borders.

The abdominal segments in the female are broad and pubescent, with a median rounded elevation on the outer surface, and the edges fringed with long hairs. The abdominal appendages are well developed (except the first pair, which are rudimentary), each terminating in a lamellar outer portion and a cylindrical and shorter internal branch. The openings of the oviducts are remarkably large. The sternal sulci pass forwards as far as the segment which bears the second pair of legs (first pair of ambulatory legs), but they do not end in tubercles, their terminations are, however, separated by a slight median elevation.

Breadth of carapace (of the larger specimen), 12 mm.; length of carapace 11.5 mm., of chelipede 15 mm., of first ambulatory limb 16.5 mm.

The orbital fissure, the form of the dactylus of the chelipedes, and of the last pair of legs, are the distinguishing characters of this species. The arrangement of the sternal sulci in the female is particularly noteworthy, showing in this respect an apparent connecting link between Stimpson's genera *Cryptodromia* and *Dromidia*.

Habitat.—Station 163A, off Twofold Bay, Australia; depth, 120 fathoms; bottom, green mud. Two female specimens were obtained; one of these is protected by an Ascidian.

Genus *Dromidia*, Stimpson.

Dromidia, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 63, 1858.

Carapace convex, pilose. Palate furnished with a slight elevation on each side. The sternal sulci in the female produced as far as the segment bearing the chelipedes, approximated towards their termination, and passing into a single tubercle. Appendages of the penultimate abdominal segment minute, concealed. Legs similar to those of *Dromia*.

The characters which distinguish this genus from *Cryptodromia* are few in number, and the most important of these, viz., the arrangement of the sternal sulci in the female, is liable to variation in different species. It is thus a matter of opinion whether the two should not be united; the Challenger material is not, however, sufficient to determine the point. Haswell has united *Dromidia* with *Dromia*.

Dromidia antillensis, Stimpson (Pl. I. fig. 5).

Dromidia antillensis, Stimpson, Notes on North American Crust., Ann. Lye. Nat. Hist., vol. vii. p. 71, 1859.

„ „ A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 31, 1880.

Habitat.—Off Bahia; 7 to 20 fathoms.

I refer to this species, not without some hesitation, several specimens from the above locality. These agree well with the original description, but the following points are to be noted in addition to those enumerated by Stimpson. The carapace presents a few slight inequalities on the posterior branchial and cardiac areas, and the outer angle of the orbit is fissured. The specimens are, with a single exception, females, and of small size, the carapace of the largest measuring 13.5 mm. in length by 13.8 mm. in breadth, whereas Stimpson gives the same measurements as 1.30 inch by 1.28 inch, so it is possible that some of these apparent differences may be due to immaturity.

In many of its characters this species resembles *Cryptodromia incisa*. Five pairs of abdominal appendages are present in the female, the penultimate segment apparently showing no trace of these; the first pair are rudimentary, the second long and slender. The sternal tubercle is placed far forwards so as to lie immediately behind the basal joints of the external maxillipedes, it projects considerably from the segment, and shows a slight trace of bifurcation in front.

Dromidia spongiosa, Stimpson (Pl. I. fig. 6).

Dromidia spongiosa, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 76, 1858.

? „ „ Heller, Reise der Novara, Crust., p. 72, 1865.

Habitat.—Simon's Bay, Cape of Good Hope; 10 to 20 fathoms.

The trunk and limbs of this species are everywhere covered by a spongy pubescence, and the dorsal surface of the carapace is marked by a series of depressions chiefly on the gastric area. The cervical and gastro-cardiac grooves of the carapace are well marked. The median rostral tooth is of large size and partially overhangs the basal joints of the antennæ and antennules. A small fissure is present on the lower orbital border, near the external angle. The chelipedes are proportionately of large size.

The original specimens came from the Cape of Good Hope. The Dromiid from St. Paul referred by Heller to this species is stated to have no orbital fissure, and a small tooth present near the posterior part of the lateral border, so it is perhaps a distinct species. *Dromia fulvo-hispida*, Miers, from Senegambia, is closely allied, but the carapace shows no inequalities; it is possible, however, that the characters of this last species have been drawn up from a young individual, and it may yet have to be united with *Dromidia spongiosa*.

The single specimen taken by the Challenger is a male which gives the following measurements: breadth of carapace 13.5 mm., length of carapace 10.7 mm., of chelipede 18 mm., of first ambulatory limb 14 mm.

Dromidia bicornis, Studer.

Dromidia bicornis, Studer, "Gazelle" Crust., Abhandl. d. k. Akad. d. Wiss. Berlin, p. 20, Taf. i. fig. 9 a-b, 1883.

Habitat.—Station 142, off the Agulhas Bank; depth, 150 fathoms; bottom, green sand. Four specimens, two of either sex.

Examples were dredged by the "Gazelle" in or near the same locality (south of the Cape of Good Hope), at a depth of 117 fathoms, on a sandy and stony bottom.

Genus *Eudromia*, n. gen.

Carapace convex, scarcely pilose, ovate, the length exceeding the breadth. Palate with an elevation on each side as in *Cryptodromia* and *Dromidia*. Frontal region strongly developed, antennules large. Chelipedes narrow, the carpal and propodal joints but slightly dilated, the last two pairs of legs subequal and of very small size. Sternal sulci in the female passing forwards to the posterior border of the segment which bears the chelipedes, where they meet in a tubercle. The penultimate abdominal segment of the female furnished with appendages.

In many of its characters this genus resembles *Dromidia*, but it is sufficiently distinguished from the latter by the shape of the carapace, the prominent frontal region, and the small size of the ultimate and penultimate pairs of legs.

Eudromia frontalis, n. sp. (Pl. I. fig. 7).

Characters.—Carapace convex, somewhat oval in shape, the length considerably greater than the breadth, covered by a brownish film which is composed of short, densely arranged hairs. Front bilobed, with a whitish margin, the median portion horizontal and hollowed out superiorly, the lobe on either side extending from the anterior end of the carapace to the outer orbital angle and directed almost vertically upwards. The gastric region is smooth and convex, the anterior part is slightly excavated between the two frontal lobes, posteriorly a slight transverse depression separates it from the cardiac area. This latter region presents a median swelling which in the female is composed of three rounded elevations. The branchial and hepatic areas are also smooth, and the cervical groove is but faintly indicated on the sides of the carapace. The anterolateral border is made up in great part of the lateral frontal lobe of each side, which, as previously noted, rises to a considerable height above the level of the adjacent portion of the carapace, the remaining part is short and curves backwards and outwards to the anterolateral angle. The lateral border is armed in front by a prominent blunt spine, and immediately behind this come one or two smaller processes; a tooth of considerable size is placed directly behind the cervical groove, and in one of the specimens a tubercular elevation lies half-way between this last and the posterior border. The posterior border shows a mesial concavity.

The subhepatic area presents a rounded tuberosity, which lies between the anterolateral angle of the carapace and the anterior end of the pterygostomial area; in front it is slightly concave. The pterygostomial area is smooth. The eyes are of moderate size, and lie in orbits which, though tolerably deep, are yet imperfect above; the orbital cavity is overhung by the lateral rostral lobe on each side, a short and wide fissure occurs on the lower border, and internal to this a prominent tooth. The antennules and antennæ are both placed on the anterior surface of the frontal lobes, the former are of large size, their peduncles exceeding those of the antennæ. The antennal peduncles are four-jointed, the basal joint with a prominent tubercle for the opening of the green gland, the second joint is elongate and furnished with a process at its outer and distal end, the flagellum is sparingly ciliated. The epistome is smooth and triangular, directly continuous with the median frontal prolongation; its buccal margin shows a central notch, and a bilobed process exists on either side. The external maxillipedes have the merus shorter than the ischium and its upper border oblique; the inner border of the ischium is raised and fringed by long hairs.

The chelipedes are slender and of moderate length, the joints being almost uniform in thickness. The merus is trigonal, and twice the length of the carpus, its lower border ending in a rounded prolongation. The carpus has its superior border prolonged into an obtuse tooth, and two well-marked and somewhat blunt spines project outwards from the

anterior end. The propodus presents a sinuous outline, and is about twice the length of the carpus; a small tubercle exists on its distal end opposite the upper of the two carpal spines, the superior surface is slightly hollowed out, and two tubercular elevations are placed over the insertion of the dactylus. The dactylus is acute, and both it and the immobile finger are sparingly toothed, and possess smooth polished tips. The first and second pairs of ambulatory limbs are subequal, and in addition to the ordinary brownish pubescence possess stiff hairs on their margins. The carpal joints are dilated, and the upper surface is divided by a longitudinal ridge into anterior and posterior parts; the dactyli are long, and each ends in a yellow claw, a few short yellowish spines also exist on the inferior border. The third and fourth ambulatory limbs are remarkably small and subequal in size, the proportions of the joints being somewhat similar in both. The dactylus is short and curved, and in each case lies between two claw-like prolongations of the propodus; one of these is, however, poorly developed in the third pair. The coxæ of all the ambulatory legs are fringed with long hairs.

The abdomen in the female is broad and rounded, each segment (except the first) possessing a median elevation, and on either side of this a small projection on the anterior edge which overlaps the preceding segment. In the male the seventh segment ends in a pointed spine. The sternal sulci of the female are deeply furrowed, each commences opposite the third pair of ambulatory limbs, and, passing forwards as far as the posterior border of the chelipedal segment, ends by joining its fellow in a raised tubercle which passes some short distance backwards in the middle line. Six pairs of abdominal appendages are present in the female, the ultimate pair being of small size. The male sexual appendages are well developed, especially those of the first pair.

The larger (female) specimen gives the following measurements: breadth of carapace 11.7 mm., length of carapace 15 mm., of chelipede 20 mm., and of first ambulatory leg 19.5 mm.

The peculiarly bilobed frontal region, and the small size of the two last pairs of legs (characters which I regard as of generic importance), at once distinguish this species from all other known Dromiids.

Habitat.—Station 142, off the Agulhas Bank; depth, 150 fathoms; bottom, green sand. Two specimens (male and female). The female has several Foraminifera attached to its carapace and limbs. *Dromidia bicornis*, Studer, was taken in the same locality.

Genus *Pseudodromia*, Stimpson.

Pseudodromia, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 64, 1858.

Carapace elongated, convex, pubescent. Facial region considerably broader than half the width of the carapace. Epistome not joined to the front; palate with an

elevation on each side. Feet presenting a general similarity to those of *Dromia*, but the fifth pair exceeding the others in length, much longer even than those of the second pair. Sternal sulci in the female approximate, scarcely produced as far as the segment which bears the chelipedes, ending in a double tubercle.¹

Stimpson also states as a generic character that the abdomen is but slightly indurated posteriorly. There can be, however, little doubt that this is a misconception founded on the examination of a single young specimen.

Pseudodromia latens, Stimpson (Pl. I. fig. 8).

Pseudodromia latens, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 78, 1858.

Habitat.—Simon's Bay, Cape of Good Hope; 10 to 12 fathoms. A single male specimen protected by an Ascidian.

The carapace of this species is less convex than usual, the gastric and cardiac regions are smooth and polished, while the lateral surfaces are clothed with silky hairs. The cervical groove is particularly well marked and situated far back on the carapace; it receives the carpus of the fifth pair of legs. The posterior border of the carapace is raised. The frontal region is remarkably narrow, and the rostrum is tridentate, all three teeth being directed forwards. A ridge passes from the epistome to the under surface of the mesial rostral tooth, and separates the two antennules; the flagellum of the antennæ is sparingly ciliated. The subhepatic regions are hollowed out. The ischial joint of the external maxillipedes is slightly excavated inferiorly, and its inner border is fringed with long hairs. The chelipedes and first two pairs of ambulatory legs present a denser pubescence than the ultimate and penultimate pairs, though the hairs found on the latter are longer and more silky. The dactyli of the first two pairs of ambulatory legs also present two yellow spines on the under surface of their proximal half. The propodus of the last pair gives rise to two minute curved spines which oppose the dactylus. The abdomen is narrow, and the segments have a comparatively smooth exterior. The single specimen taken is an apparently adult male, and gives the following measurements: breadth of carapace 12 mm., length of carapace 16 mm., of chelipede 17 mm., of first ambulatory leg 16 mm., of fourth ambulatory leg 20 mm.

Stimpson's specimen was of much smaller size and probably immature; it is interesting to note that it was also taken in Simon's Bay, at a depth of 12 fathoms.

¹ I am enabled to make this addition to Stimpson's original description by the examination of a specimen from the Tuticorin Pearl Banks, in the collection of the Government Central Museum, Madras (belonging to a new species which I propose to designate *Pseudodromia integrifrons*).

Genus *Hypoconcha*, Guérin-Méneville.

Hypoconcha, Guérin-Méneville, Rev. et Mag. Zool., sér. 2, No. 6, p. 333, 1854.
 „ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 64, 1858.

Carapace flattened, membranous above; the anterior border arcuate and sharply defined, overhanging a triangular frontal region the apex of which is directed downwards. External maxillipedes with the meral joints large, and the external-lateral angles of the latter somewhat produced; the exognath robust. The ultimate and penultimate pairs of ambulatory limbs furnished with Y-shaped dactyli. Sternal sulci in the female widely separate, each terminating in a tubercle opposite the basal joint of the second ambulatory leg.

The members of this genus are, so far as is known at present, confined to the West Indies and the neighbouring shores of America. The protection which so many Dromiids obtain from an Ascidian or Sponge, is in the present case afforded by the detached valve of a Lamellibranch, and the *Hypoconcha* is able to closely adjust the chelipedes and ambulatory legs to the under surface of its body. The genus *Conchoecetes*, established by Stimpson for the *Cancer artificiosa* of Herbst—a native of the Chinese seas,—also possesses this peculiar habit, as well as an Australian species, *Dromia conchifera*, Haswell.

Hypoconcha sabulosa (Herbst).

Faux Bernard l'Hermite, Nicholson, Essai sur l'Hist. Nat. de Saint-Domingue, p. 338, pl. vi. figs. 3, 4, 1776.

Cancer sabulosus, Herbst, Naturg. Krabben u. Krebse, tab. xlvi. figs. 2, 3, 1796.

Faux Bernard l'Hermite de Nicholson, Lamarck, Hist. anim. sans vert., t. v. p. 264, 1818.

Hypoconcha sabulosa, Guérin-Méneville, Rev. et Mag. Zool., sér. 2, No. 6, pl. v. p. 333, 1854.

„ „ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 64, 1858.

Habitat.—St. Thomas, West Indies; shallow water.

Two adult specimens in the collection—a male and a female, the latter bearing ova—agree with Guérin-Méneville's description and figure.¹ The last two abdominal segments in the female are, however, slightly granulated, a character which Stimpson assigns to his species *Hypoconcha arcuata*, originally taken at St. Thomas.

¹ It is to be noted that in this author's plate, figures 1 and 5 represent two very different configurations of the anterior border of the carapace. The Challenger specimens agree with the first of these, in which the border is well rounded off and only a very slight concavity exists on either side.

Family II. HOMOLIDÆ.

Homoliens, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 180, 1837 (*part.*).

Carapace quadrangular or subtriangular. Legs flattened (*Homola*), or remarkably long, slender, and cylindrical (*Latreillia*, *Latreillopsis*); the last pair of small size, prehensile and subdorsal in position. Ocular peduncles usually slender and of great length; orbits scarcely represented. Antennules not capable of retraction into special fossæ. Species extending to moderate depths.

The genus *Latreillopsis* forms an interesting link between *Homola* and *Latreillia*, and emphasises the necessity (previously pointed out by De Haan) of grouping the two together. *Dicranodromia*, A. Milne-Edwards, apparently occupies an intermediate position between the Dromidæ and the Homolidæ; it agrees with the former in the arrangement of the last two pairs of legs, and with the latter in the absence of orbits and antennular fossæ. The features of this genus appear, however, on the whole to warrant its position in the family now under consideration.

Genus *Homola*, Leach.

- Homola*, Leach, Trans. Linn. Soc. Lond., vol. xi. p. 324, 1815; Zool. Miscell., vol. ii. tab. lxxxviii., 1815.
 „ Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 181, 1837.
 „ De Haan, Crust. Japon., p. 105, 1850.
 „ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 403, 1852.
 „ Heller, Crust. südlichen Europa, p. 148, 1863.

Carapace quadrilateral, of greater length than breadth, terminating anteriorly in a bi- or unidentate rostrum, the sides vertical. Orbits incomplete, only affording protection to the basal portion of the eye-stalks. Ocular peduncles composed of a long, slender, basal part, and a shorter but dilated corneal portion. Antennules not placed in special fossæ, the proximal joint of the peduncle swollen, the second and third joints slender. Antennal peduncle slender. Chelipedes of moderate size, with slender dactyli; ambulatory limbs long and compressed, the ultimate pair subdorsal in position, and subcheliform. Abdomen composed of seven segments, of which the first five bear appendages in the female.

The previously known species of *Homola* are three in number, viz., *Homola barbata* (Herbst) and *Homola cuvieri*, Risso, from the Mediterranean and adjacent part of the Atlantic (the former also occurring off the east coast of the United States and in the West Indies), and *Homola vigil*, A. Milne-Edwards, from the West Indies. To these the Challenger collection has added a fourth species from the Eastern seas. All of these live in moderately deep water, and both *Homola barbata* and *Homola vigil* have been obtained from considerable depths.

Homola orientalis, n. sp. (Pl. II. fig. 1).

Characters.—Carapace submembranous, somewhat flattened, the length about one-third greater than the breadth, the sides parallel and the regions not well marked. Frontal region deflexed, the rostrum terminating in two subacute spines which are directed forwards. Gastric area slightly convex, armed with nine rounded tubercular processes arranged after the manner of the spines in *Homola barbata* (Herbst), and somewhat hollowed out mesially, the shallow groove thus formed continued on to the rostral process. Hepatic area armed with two blunt spines as in *Homola barbata*, and of these the larger and more external marks the commencement of the lateral border of the carapace, the second is situated in a line between the former and the outer gastric tubercle. A line continued along the outer border of the carapace passes between the two hepatic spines, so that the antero-lateral spine is perhaps more correctly referred to the subhepatic region of the carapace. The antero-lateral border presents a slight concavity; it is marked by a prominent spine over the basal portion of the ocular peduncle, and external to this a rounded groove into which the ocular peduncle fits. This border ends in two or three insignificant tubercles in front of the subhepatic region. The lateral border is armed in front by the prominent spine already alluded to, posterior to this are two subacute tubercular spines of no great size, and a series of minute rounded tubercles continued almost to the posterior end. The posterior border is slightly raised, and has a mesial curve directed forwards, the first abdominal segment fitting into a well-marked depression. The cervical groove is ill-defined; it passes to the margin of the carapace between the first two spines of the lateral border, and there becomes lost, its position being marked on the surface of the carapace by an oblique elevation which runs in towards the cardiac area.

The ocular peduncles are remarkably long, the basal portion slender and cylindrical, the terminal part slightly constricted near the middle, and bearing a dilated cornea. The basal joint of the antennular peduncle is short and of irregular shape, the second joint is considerably longer than the terminal one; the flagella are of small size. The antennal peduncle is about equal in length to the eye-stalk, and composed of four joints, the first of which has a well-marked auditory tubercle, the second is armed superiorly with a spine which projects over the next joint, the penultimate is long and cylindrical, and about three times the length of the terminal one; the flagellum is about twice the length of the carapace. The epistome bears a well-marked blunt spine, from which a ridge is continued to the under surface of the rostrum. The subhepatic region is divided into two parts by a groove which is directed obliquely forwards; a few small tubercles are present on the posterior division, while the anterior possesses many short and stout subacute spines; several minute tubercles are present also on the pterygostomial area. The external maxillipedes bear a close resemblance to those of *Homola barbata* as figured by

Milne-Edwards and Heller, the chief characteristic being the rounded lobe on the outer border of the meral joint.

The chelipedes are of moderate length, and pubescent towards their termination; the meral joint is trigonal, and each of the three borders is armed with a row of acute spinules, those on the inner border being of very small size; the carpus is about half the length of the propodus, and bears several spinules on its outer surface and upper border. The propodus is without spines, the fingers also are unarmed, each presents a thin cutting edge, and is slightly bent inwards. The three anterior pairs of ambulatory limbs are moderately long, compressed, and pubescent, the second and third pairs subequal in length, the merus is longitudinally canaliculate above, and its anterior border is armed with from three to five acute curved spinules, a few of smaller size existing on the posterior border; the propodus is canaliculate both above and below, and its posterior border, as well as that of the dactylus, is armed with a series of horny spines which are more numerous and shorter on the latter joint; the dactylus is also grooved on both surfaces, and its tip is acute and slightly recurved. The ultimate pair of legs are subdorsal and have the dactyli and propodi greatly reduced in size; the merus bears a single spine on its anterior and distal border, while the posterior border possesses three of larger size; the short curved dactylus is opposed to the propodus, which is likewise bent, and the latter is armed with several long and delicate spines.

The seven abdominal segments in the female are, with the exception of the first three, broad and unarmed, but slightly pubescent; the second bears a pointed tubercle, and a rounded elevation is present on the third; the seventh has the apex acuminate. Five pairs of abdominal appendages are present, the first pair rudimentary.

Breadth of carapace 13.5 mm., length of carapace 17 mm., of second ambulatory leg 41 mm., of fourth ambulatory leg 23 mm., of chelipede 24.3 mm.

The above description and measurements are taken from the Zebu specimen (a female). The Ki specimen (a male) is in a very imperfect condition, only the proximal joints of the limbs being present; it differs, moreover, in having no pubescence on the carapace or abdomen.

Habitat.—Station 192, off Little Ki Island; depth, 140 fathoms; bottom, blue mud.
Station 209, off Zebu, Philippine Islands; depth, 95 fathoms; bottom, blue mud.

Genus *Homologenus*, A. Milne-Edwards.

Homolopsis,¹ A. Milne-Edwards, Bull. Mus. Comp. Zool., vol. viii. No. 1, p. 34, 1880.

“This genus differs from *Homola* in the more rounded and more ovoid form of the carapace, in the great development of the rostrum, in the form of the eyes, which are very small and not narrowed at their base, and in the feebleness of the legs.”

¹ The name *Homolopsis* being preoccupied in Zoology, Professor Milne-Edwards has suggested, in a letter to the writer, that given above.

Homologenus sp. (?), *juv.* (Pl. II. fig. 2).

To this but slightly characterised genus I refer with considerable hesitation a small and apparently immature specimen (Pl. II. fig. 2). I have not, however, ventured to assign a name to this, but merely indicate its more important features.

Carapace ovoid, submembranous, with the regions fairly marked, terminating anteriorly in three spines, the median being the rostrum, the lateral slightly longer and more slender, situated one over the insertion of each eye. The gastric region bears a few spinules, and a small spine is present on each branchial area. Eyes of moderate size, the corneæ dilated; ocular peduncles short and moderately stout. The second segment of the antennal peduncle is armed with a spine on its outer border. The external maxillipedes are slender, the merus is shorter than the ischium and without the dilatation present in the species of *Homola*.

Chelipedes long and slender, all the joints furnished with a series of spinules on the upper and lower borders, and a few scattered hairs; the fingers are incurved and bent over one another at the tips. Ambulatory limbs long and slender, the dactyli but slightly curved; the last pair of small size and subdorsal in position.

Abdomen narrow, composed of seven segments (including the telson); the second to the sixth segment each with a pair of biramous appendages, all well developed with the exception of the last pair, which form with the telson a small swimming fan.

The single example differs from specimens of *Homologenus* taken by the "Blake" and "Talisman" expeditions, in the form of the abdomen and the larger eyes. It is apparently very young, and exhibits a slight advance from the *Megalopa* stage; possibly it was captured in the surface or intermediate waters. The following are the measurements:—Breadth of carapace 4.5 mm., length of carapace 5.5 mm., of chelipede 12 mm., of longest ambulatory leg 24 mm.

Habitat.—Station 196, off Gilolo Island; depth, 825 fathoms; bottom, hard ground.

Genus *Latreillopsis*, n. gen.

Carapace rectangular, the surface irregular; frontal region moderately wide, with a median spiniform rostrum and a supraorbital spine on each side. Ocular peduncles with the basal segment narrow, cylindrical, and elongated, the corneæ dilated. Antennules and antennæ as in *Homola*. External maxillipedes similar to those of *Homola*, but the merus more regularly four-sided. Chelipedes and ambulatory limbs slender, cylindrical, and of considerable length, the last or subdorsal pair formed as in *Homola*, but exceeding the chelipedes in length; the dactyli smooth and remarkably slender. Abdominal

segments broad and well developed in the female; five pairs of appendages present. Special features of the male unknown.

Latreillopsis occupies an intermediate position between the genera *Homola* and *Latreillia*. From *Homola* it is distinguished by the arrangement of the rostrum and supraorbital spines, the greater length of the ocular peduncles, and more especially by the elongated cylindrical legs. In *Latreillia*, on the other hand, the frontal region is narrow and produced so as to give the carapace a triangular outline, the supraorbital spines are more strongly developed, and the eye-stalks and legs are of greater length.

It is to be noted that Station 209, at which the single specimen of *Latreillopsis* occurred, is one of the two localities in which species of *Homola* and *Latreillia* were taken by the Challenger.

Latreillopsis bispinosa, n. sp. (Pl. II. fig. 3).

Characters.—Carapace somewhat rectangular, the length greater than the breadth, the surface irregular. Frontal region with three long acute spines, of these the median or rostrum is directed forwards and is about half the length of the other two, which are supraorbital in position, and placed as regards the rostrum at an angle of about 45°. Gastric region swollen, armed posteriorly with a rounded tubercle and a transverse row of slight elevations in front of this. Cardiac and branchial areas not sharply distinct from one another, their surfaces with numerous irregularities. The pterygostomial area partly appears on the dorsal surface, and gives rise to a well-defined elevation about the middle of the lateral border; anteriorly it is separated from the hepatic and subhepatic regions by a deep groove. The hepatic and subhepatic areas are apparently fused to form an oblique oval elevation capped by two acute anteriorly directed spines (hence the specific name), the superior of which is equal in size to the rostrum, the inferior slightly shorter; this region is separated from the margin of the buccal cavity by a narrow groove. The epistome is somewhat triangular, and the buccal margin remarkably pronounced, with two subacute lobes near the upper angle on each side.

The eyes are of moderate size, and the corneae dilated; the basal segment of the peduncle is long and cylindrical. The antennules have their basal segment dilated, and the second and third joints cylindrical; the flagella are of small size. Situated between the basal joints of the antennules, and on that portion of the epistome which passes towards the frontal region, is a small unpaired tubercle. The antennal peduncle is apparently composed of four segments; the first is of small size and bears a rounded tubercle on its inner surface (it is also overhung by a small acute spine which rises from the frontal margin); the second joint is stouter than, and about half the length of, the third, it bears a short prolongation at its inner border and distal end; the third and fourth segments are slender and cylindrical, the ultimate about one-third the length of the penultimate; the

flagella have been accidentally removed in the single specimen. The external maxillipedes have the dactylus and propodus subequal, and longer than the carpus; the merus is of large size and somewhat rectangular, the outer surface is concave from side to side, and the outer border slightly convex; the ischium is smaller in size, and the outer border slightly concave; the exognath extends almost to the end of the merus.

The chelipedes are long, slender, and smooth, a small spine is placed at the distal end of the merus on its upper surface, and a second is similarly situated on the ischium. The propodus and merus are subequal, and the former is about twice the length of the carpus. The digits are slightly incurved, and their apices cross one another; the opposed edges are thin and entire. The ambulatory limbs, with the exception of the last pair, are long and slender; a spine of moderate size is placed at the distal end of the merus. The propodus is three times the length of the carpus and slightly curved; the dactylus is about half the length of the propodus, remarkably slender and well curved. The last pair of legs are also slender and longer than the chelipedes; the merus slightly exceeds the carpus in length, and is armed with a distal spine; the dactylus is remarkably small and but slightly curved, with its edge dentate, it is folded over the short propodus, the margin of which bears a double row of spines.

The abdomen is composed of seven segments including the telson, which is of small size, triangular and pointed; the fifth segment shows the greatest width. The lateral margins are fringed with hairs, and there is a central rounded prominence running along the dorsal surface of each segment, which becomes tuberculate on the second, third, and fourth, a small spine is also present at the distal end of the sixth segment. Five pairs of appendages are present on the first five segments, the first pair uniramous and of small size, the remainder biramous. The telson fits into a depression between the bases of the external maxillipedes. In the female the sternum between the bases of the legs of the third pair exists as a transverse somewhat curved ridge.

Breadth of carapace 10.5 mm., length of carapace 14 mm., of chelipede 26 mm., of longest ambulatory leg 63 mm., of last leg 33 mm.

The single specimen taken is a female, unfortunately not in a good state of preservation.

Habitat.—Station 209, off Zebu, Philippine Islands; depth, 95 fathoms; bottom, blue mud.

Genus *Latreillia*, Roux.

Latreillia, Roux, Crustacés de la Méditerranée et de son Littoral, livr. v. pl. xxii. 1828.

„ Milne-Edwards, Hist. Nat. des Crust., t. i. p. 277, 1834.

„ De Haan, Crust. Japon., p. 105, 1850.

Carapace elongate, trigonal, not covering the coxæ of the legs; the anterior part sub-cylindrical. Frontal region narrow, terminating in three spines; the two lateral placed over the eyes, slender, acute, diverging; the median short and acute. Antennules equalling

the supraorbital spines in length, separated at the base by a partition; the first joint dilated, the second and third cylindrical. Antennæ rudimentary, not equalling the ocular peduncles in length; the first joint narrow and about equal to the third in length, the second twice as long. Ocular peduncles very long and slender, cylindrical, turned forwards, diverging in the same way as the supraorbital spines. External maxillipedes with the inner margin of the ischium and merus pilose, not spiny, the outer border of the latter joint slightly concave. Legs very long, slender, and cylindrical, the fifth pair of small size and subdorsal in position. Abdomen folded under the thorax, composed of seven segments in the male, of five in the female; five pairs of abdominal appendages present in the female.

This very characteristic genus includes four species, viz., *Latreillia elegans*, Roux, from the Mediterranean and east coast of the United States, *Latreillia valida* and *Latreillia phalangium*, both of De Haan, from the Japanese and neighbouring seas, and a fourth from the Australian coasts, described below.

Latreillia valida, De Haan.

Latreillia valida, De Haan, Crust. Japon., p. 107, tab. xxx. fig. 1, 1850.

Habitat.—Station 209, off Zebu, Philippine Islands; depth, 95 fathoms; bottom, blue mud.

A female with ova is apparently referable to this species. It corresponds closely to the original description, with the exception that the merus of the chelipedes is three- and not five-spined; the supraorbital spines also exhibit a minute spinule on the inferior surface, whereas they are stated by De Haan to be entire.

Latreillia australiensis, n. sp. (Pl. II. fig. 4).

Characters.—Carapace subtriangular, the frontal region narrow. The rostrum is of small size, considerably deflexed and acute; the supraorbital spines are slightly more than half the length of the ocular peduncles, with a slight downward curve, and two to three minute spinules are present on the outer surface in the female. The surface of the carapace is irregular and somewhat glabrous, the regions fairly marked but without spines. The buccal or subhepatic swelling is prominent, but unarmed in both sexes.

The ocular peduncles have the basal joint remarkably long and slender, the corneæ dilated. The antennules are about equal in length to the supraorbital spines, their basal joint subglobose. The antennæ are remarkably short and slender, apparently not equalling the antennules (the imperfect nature of the specimens renders this point doubtful). The epistome is smooth and lengthened out antero-posteriorly. The external maxillipedes have the merus and ischium subequal in length; the former presents a

concavity on its antero-external border, and is wider than the latter; the exognath is very slender.

The chelipedes are slender, and the terminal joints but little dilated, the merus is armed with three spinules on its anterior border and two on the posterior (in each case one of these overhangs the insertion of the carpus); the remaining joints are smooth. The fingers are incurved, and their apices cross; they possess a thin, entire, cutting edge. The ambulatory limbs have the meral joints fringed with spinules on both the anterior and posterior borders, but more numerous on the posterior, a few similar processes are present on the carpi, and a few very minute horny spinules on both borders of the propodus; the distal end of this last joint gives rise posteriorly to three or four horny spines articulated to a dilated portion of this segment; the digits are but slightly curved. The last pair of legs are subdorsal in position and of very small size, their total length not equalling the meral joint of the preceding pair; the merus is armed with spinules especially on its posterior border; the carpus and propodus are subequal in length, the former is somewhat flattened and dilated towards its distal end, and armed with spinules on both sides; the dactylus is very minute and opposed by a single spine on the posterior border of the propodus.

In the female the second and third abdominal segments are each provided with a dorsal spine; the fourth is glabrous and shield-shaped, its anterior border with a small tubercular spine on each side, and halfway down the outer surface a rounded elevation on either side; there is also a median rounded elevation running from end to end; the telson is of small size, and its apex acute. Five pairs of appendages are present; the first pair of small size, uniramous, and united at their bases. The fourth, fifth, and sixth abdominal segments in the male are devoid of spines.

A male specimen gives the following measurements:—Length of carapace 10 mm., of chelipede 32 mm., of second leg 63 mm., of last leg 22 mm., of ocular peduncle 7 mm., of supraorbital spine 4 mm. A female specimen is somewhat larger.

This species belongs to the section of the genus in which the last pair of legs do not extend beyond the meral joint of the preceding pair. It differs from *Latreillia phalangium*, De Haan, in the absence of cardiac and buccal spines, and in the presence of only two spines on the fourth abdominal segment of the female.

Habitat.—Station 163A, off Twofold Bay, Australia; depth, 150 fathoms; bottom, green mud. Two adult specimens, male and female, the latter bearing ova, and the remains of a third immature individual.

Off Port Jackson; depth, 30 to 35 fathoms; bottom, hard ground. Two young examples, male and female.

RANINIDEA.

Raniniens, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 190, 1837.

Raninoidea, De Haan, Crust. Japon., p. 136, 1850.

Raninidea, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 400, 1852.

Carapace ovato-oblong, smooth, the regions not defined; frontal margin of variable width. Ambulatory limbs with broad flattened dactyli; the last pair of small size and subdorsal in position. Abdomen short, semi-extended, not folded under the thorax, with four pairs of appendages in the female. Sterna of the thoracic legs fused to form a ventral shield which is wide anteriorly. External maxillipedes moderately elongate. Eyes placed in well-marked orbits; antennules not furnished with special fossæ, and placed to a certain extent behind the antennæ. Vasa deferentia protruded in the males.

There can be no doubt that the Raninidea have many characters in common with the Brachyura, indeed Dr. Boas places them without any hesitation in the latter section. According to this observer, the position of the female genital openings is entirely due to the extreme narrowing of the thoracic sterna which has taken place. In many of their external features they show a decided resemblance to the Oxystomatous Brachyura.

The members of this small and distinct group form a single family. Little appears to be known as to their habits, but according to Adams and White they are swimming Crustacea inhabiting deep pools of coral ledges, and moving by rapid jerks like the *Galatheæ*. It seems probable, however, that some of them at least burrow in sand or mud like the Hippidea, to which they bear some resemblance in the structure of the legs. They are almost entirely confined to the tropics, only a few occurring in the warmer temperate seas, where they live in shallow and moderately deep water, apparently not venturing beyond a depth of 300 fathoms.

The genera may be grouped as follows:—

I. External maxillipedes with the ischium longer than the merus—

<i>Ranina</i> , Lamarek.	|	<i>Notopoides</i> , n. gen.
<i>Raninoidea</i> , M.-Edw.		<i>Zanclifer</i> , n. gen.
<i>Notopus</i> , De Haan.		<i>Cosmonotus</i> , Adams and White (?).
<i>Raninops</i> , A. M.-Edw. (?)		

II. External maxillipedes with the ischium shorter than the merus.

<i>Ranilia</i> , M.-Edw.		<i>Lyreidus</i> , De Haan.
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Family RANINIDÆ.

Raninida, Dana, U.S. Explor. Exped., vol. xiv., Crust., part ii. p. 1428, 1852.

Genus *Raninoides*, Milne-Edwards.

Raninoides, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 196, 1837.

„ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 403, 1852.

Carapace ovately oblong, smooth, convex from side to side. Fronto-orbital border horizontal, slightly narrower than the carapace at its middle, with a triangular rostrum. Ocular peduncles capable of retraction into well-defined orbits, with the terminal joint basally dilated; the corneæ of small size. Antennal peduncle of large size (especially the second joint), the flagellum minute. Antennules well developed. External maxillipedes elongate, the merus considerably shorter than the ischium; the three terminal joints of small size, inserted near the apex of the merus. Sternal shield broad anteriorly, widely separating the legs of the first two pairs, and becoming narrower between those of the third pair. Last pair of legs short and filiform, situated above and in front of the penultimate pair.

Raninoides personatus, White, MS. (Pl. II. fig. 5).

Characters.—Carapace with its length nearly twice as great as the breadth, smooth and polished, but minutely punctate, especially towards the frontal margin; the regions not indicated. The fronto-orbital border is straight, the lateral borders curved. The rostrum is prominent and entire, its apex obtusely rounded, and the upper surface smooth. The orbital border is fringed with hairs, and possesses an internal pointed lobe on each side of the rostrum, separated by a deep fissure from a larger and squarer external lobe; a smaller fissure separates this last from the prominent antero-lateral spine. The lateral border may be said to commence at the antero-lateral angle in the aforesaid spine, which is acute and slightly incurved; at a short distance posterior to it is a similar but slightly larger spine; for its posterior half this border exhibits a narrow raised and beaded line.

The eyes are of moderate size, and the orbits fringed with hairs both above and below. The basal joint of the antennular peduncle is moderately dilated and partly concealed by the tips of the external maxillipedes and by the antennal peduncles; the second and third joints are subequal in length; the flagella are moniliform. The antennal peduncle is four-jointed, the second joint of large size with a strong prolongation from its outer and distal border, the fourth of small size, and the flagellum short; the third and fourth joints give rise to numerous long hairs. The pterygostomial areas are strongly granulated as well as slightly pubescent. The external maxillipedes are very long and narrow, their apices completely covering the epistomial region; the ischium is about one-

third longer than the merus, and both possess a raised inner margin which carries a fringe of hairs; the merus is slightly granulated, and furnished with a strong fringe of hairs on the outer border; the three terminal joints are of very small size, and inserted opposite a slight depression near the end of the merus; the exognath extends to the end of the ischium. The thoracic sternal region is smooth and polished, with a depression opposite the second pair of legs, and an acute granular projection on each side between the basal joints of the first and second legs.

The chelipedes are more than half the length of the carapace; the ischium with a small acute spine on its anterior border; the merus dilated and smooth, except on its inferior surface, where it is slightly granulated; the carpus about half the length of the merus, with two anteriorly directed spines on its upper surface (of which the external is larger); the propodus is somewhat flattened, with a single curved spine above, and three on the lower edge, the immobile finger is set nearly at a right angle to the main body of the propodus, and its inner edge is dentate; the dactylus is entire, slender and acute. The ambulatory limbs are smooth and polished, increasing in size from before backwards till the penultimate pair is reached; the propodus of the first and second pairs is produced into a rounded anterior lobe which is absent from the third pair, but these last have a well-marked posterior lobe; the dactyli are somewhat ovoid, those of the first and second pairs with acute apices; the legs of the third pair are fringed with hairs (especially their dactyli and propodi), the two anterior pairs are more sparsely clothed. The last pair of legs are about half the length of the penultimate pair, with the propodus and carpus subequal; the dactylus is very minute and scarcely curved.

The abdominal segments are smooth and polished above, ciliated laterally; they diminish in size gradually from before backwards. In the male the vasa deferentia are continued externally as tubular prolongations on both sides; the anterior pair of genital appendages are long, and their terminal joints curved, the second pair less than half the length of the first. The abdominal appendages in the female are strongly ciliated.

An adult male gives the following measurements:—Breadth of carapace 12·7 mm., length of carapace 23·5 mm., of fronto-orbital margin 8·5 mm., of chelipede 18 mm., of last leg 9·5 mm., of external maxillipede 9 mm., of abdomen 8·3 mm., of anterior genital organ 9 mm.

The British Museum collection contains specimens of this species from the Eastern seas, named (but never described) by Adam White; I have in the foregoing account adopted his manuscript name. In *Raninoides levis* (Latr.), the fronto-orbital border has the lobes more strongly marked, drawn out into teeth, and the intervening fissures deeper; the lower border of the hand also is armed with many spines. The West Indian *Raninoides nitidus*, A. Milne-Edwards, has the lateral border armed with two spines behind the antero-lateral angle.

Habitat.—Amboina; 15 fathoms. Several specimens, representing both sexes.

Genus *Notopoides*, n. gen.

Carapace broadly ovate, smooth, convex from side to side and from before backwards. Fronto-orbital border half as wide as the carapace, with a concavity on each side of the rostrum. Ocular peduncles with the terminal joint cylindrical, the corneæ well developed and oblique; orbits deep. Antennal peduncle massive, the second joint with an extensive prolongation from its outer and distal border; the flagellum short. Antennules with the basal joint concealed by the antennal peduncle, the second joint longer than the third. External maxillipedes similar to those of *Raninoides*, the ischium considerably longer than the merus and without the oblique line present in *Notopus*. Sternal shield narrow opposite the second pair of legs, but slightly widening out again between the second and third pairs; all the limbs except the chelipedes inserted close to the middle line. Chelipedes and ambulatory limbs as in *Raninoides*, but the last pair of legs moderate in size and not filiform.

This genus is in some respects intermediate between *Raninoides* and *Notopus*, though more closely allied to the latter. From *Raninoides* it is distinguished by the form of the carapace, ocular peduncles, sternal shield, and last pair of legs; from *Notopus* by the shape of the chelæ, antennal peduncles, and external maxillipedes.

Notopoides latus, n. sp. (Pl. III. fig. 1).

Characters.—Carapace with the length considerably greater than the breadth, polished, finely granular, the granulations more marked towards the anterior half of the lateral border; the regions are not defined, but the carapace rises somewhat abruptly behind and parallel to the fronto-orbital margin, the line thus formed being coarsely granulated. The fronto-orbital border is W-shaped; the rostrum broad at its base, subacute, hollowed out superiorly, with a median carina which loses itself before reaching the transverse elevation; on each side of the rostrum are three lobe-like processes separated by two narrow and deep fissures, the first process triangular, the second somewhat square in outline, the third fused with the antero-lateral spine. The lateral border is entire and convex, the anterior half with a series of granules which tend to become spiniform, the posterior with a raised finely beaded line.

The eyes are retractile into deep orbits, the margins of which are lined by hairs. The antennules have the basal joint moderately long and but slightly dilated. The segments of the antennal peduncles are granular and densely ciliated, the second short and stout, with a very large rectangular prolongation (exceeding the joint itself in length) arising from the outer distal border, the third narrower than, but almost as long as, the second, the terminal of small size; the flagellum equals the peduncle in length.

The external maxillipedes have a raised line running along the inner margin of the merus and ischium, the former joint is faintly granulated, with its outer border ciliated, the latter smooth; the three terminal joints are of very small size (less than half the length of the merus), and inserted opposite a well-marked depression on the inner edge near the apex of the merus; the exognath slightly exceeds the ischium. The epistome is deeply hollowed out on each side of a mesial ridge, and concealed by the apices of the outer maxillipedes. The pterygostomial regions are strongly granular, and pubescent. The sternal thoracic shield is broad between the chelipedes, but becomes narrow between the first pair of ambulatory limbs, between the second and third legs it widens out once more, and becomes linear between the legs of the third pair; the broad anterior portion is separated by a transverse suture in the line of the second pair of legs from the smaller dilated portion behind; immediately in front of this is a median depression. In the female there is an ovoid median opening in the sternum, between the third and fourth pairs (a similar opening is present in *Raninoides personatus* though of very small size). The side lappets present in *Raninoides* between the basal joints of the first and second legs are present in this species also, but obtusely rounded and fringed with hairs.

The chelipedes are similar in shape to those of *Raninoides*, the ischium and merus unarmed, but the latter with several transverse piliferous lines; the carpus and propodus are both granulated, the former with two subequal acute spines on the upper surface, the latter with three acute spines on the lower border, which decrease in size from before backwards; the immobile finger is armed with about six teeth; the dactylus is slightly granular above, entire, with a thin cutting edge. The ambulatory limbs are smooth, and (the last two pairs more especially) clothed with long hairs, the propodi of the first and second pairs are slightly bent upon themselves, and the dactyli are hatchet-shaped, with subacute apices. The last pair are of moderate size, almost equalling the first pair in length; their dactyli elongated and ovate.

The abdominal segments are smooth, with a slight median elevation; the second segment is slightly wider than the first in both sexes; the telson is triangular. The abdominal appendages of both male and female resemble those of *Raninoides*; the protruded vasa deferentia in the male are short.

The following are the measurements of an adult male:—Breadth of carapace 26 mm., of fronto-orbital border 13 mm., length of carapace 34 mm., of chelipede 29 mm., of last leg 22 mm., of abdomen 16 mm., of anterior genital organ 13 mm., of external maxillipede 16.5 mm.

Habitat.—Station 192, off Little Ki Island; depth, 140 fathoms; bottom, blue mud. Many individuals of both sexes.

Genus *Notopus*, De Haan.

Notopus, De Haan, Crust. Japon., p. 137, 1850.

„ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 404, 1852.

Carapace ovate, smooth, convex from side to side and from before backwards. Fronto-orbital border more than half the width of the carapace, the rostrum triangular, carinated. Ocular peduncles cylindrical, the corneæ well developed, oblique; orbits well defined. Antennal peduncle almost equal in length to the eye-stalk, the second joint with a small external prolongation; the flagellum moderately long. Antennules with the basal joint not concealed. External maxillipedes moderately elongate, the ischium but slightly longer than the merus, and with an oblique ridge on its outer surface; the three terminal joints more than half the length of the merus. Sternal thoracic shield becoming narrow between the second pair of legs, furnished with paired lateral processes. Chelipedes with the propodus trilateral; the last pair of legs of moderate size, not filiform.

Notopus ovalis, n. sp. (Pl. II. fig. 6).

Characters.—Carapace ovate, the length about one-fourth greater than the breadth; finely granular, the granulations more marked towards the anterior end. The fronto-orbital border is more than half the breadth of the carapace; the rostrum is triangular and acute, carinated superiorly, the carina passing a short distance back on the carapace; a single lobe exists on each side, forming the upper border of the orbit, and its inner portion is prolonged into an acute spine; this lobe is defined by two shallow fissures, the outer of which separates it from the antero-lateral spine, and is slightly deeper than the other; that portion of the border immediately external to the rostrum is finely serrated. The lateral border is convex, with a prominent acute spine placed about one-fourth of the distance back; posteriorly there is a raised beaded margin.

The eyes are well developed, with the corneæ of large size, oblique, and deeply pigmented; the orbits well defined with but few marginal hairs. The antennules have the basal joint considerably dilated and unconcealed, the second joint slightly longer than the third. The antennal peduncles are granulated, the second segment with a minute external prolongation; the flagella are wanting in the single specimen. The external maxillipedes have the ischium but slightly longer than the merus, with an oblique ridge (in line with the outer border of the first joint) developed on the outer surface of the ischium; the merus is faintly granular, and its inner margin is raised; the three terminal joints taken together are more than half the length of the merus, and inserted into this last at its apex, where there is a slight indentation; the exognath slightly exceeds the ischium. The pterygostomial region is granulated and slightly pubescent, the boundary

line between it and the carapace proper is well defined and continued back to the posterior limit of the latter. The thoracic sternum is broad between the chelipedes and becomes narrow between the second pair of legs; both in front of and behind the chelipedes it spreads out to form paired lateral pointed processes.

The chelipedes are slightly granular, the merus and ischium unarmed; the carpus possesses a single small spine overhanging the insertion of the following joint; the propodus is triangular, the immobile finger forms a straight line with the lower border of this joint (which has a raised margin), its inner border is irregularly dentate, one tooth in particular being of large size; the dactylus is entire. The ambulatory limbs are sparingly ciliated and smooth, with the exception of the last pair, which are faintly granular; the dactyli are hatchet-shaped; the last pair of legs are of moderate length and slender, with the carpus serrated on its anterior margin.

The second and third abdominal segments are both slightly wider than the first; the apex of the telson is acute.

The single specimen taken is apparently a young male, and gives the following measurements:—Breadth of carapace 8·7 mm., of fronto-orbital border 6·2 mm., length of carapace 11·7 mm., of chelipede 9 mm., of last leg 7 mm., of external maxillipede 5·5 mm.

In *Notopus dorsipes* (Fabr.) De Haan, the dorsal carina is more marked, and a row of strongly developed tubercles (almost spiniform) cross this at right angles near the anterior end of the carapace; the spines on the antero-lateral border are placed close together, and the last two are not separated by a wide interval as in *Notopus ovalis*. *Notopus atlanticus*, Studer, has the antero-lateral border armed with four spines (only three are present in *Notopus ovalis*), and the rostrum is much narrower than in the Challenger species.

Habitat.—Station 192, off Little Ki Island; depth, 140 fathoms; bottom, blue mud. Taken along with the last species.

Genus *Cosmonotus*, Adams and White.

Cosmonotus, Adams and White, Proc. Zool. Soc. Lond., p. 227, 1847; Voyage of H.M.S.

“Samarang,” Crust., p. 60, 1848.

„ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 404, 1852.

Carapace ovate, smooth, compressed laterally, with a prominent median keel strongly marked in front but fainter posteriorly. Fronto-orbital border narrow, concave, without a central rostrum; lateral borders of the carapace convex, unispinose. In other respects agreeing with *Notopus*.

Only a single species is known.

Cosmonotus grayii, Adams and White.

- Cosmonotus Grayii*, Adams and White, Proc. Zool. Soc. Lond., p. 227, with two woodcuts, 1847 ;
 Crust., Voyage of H.M.S. "Samarang," p. 60, pl. xiii. fig. 3, 1848.
 ,, ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 79, 1858.

Habitat.—Amboina, 15 fathoms ; a male specimen.

The type specimen came from Borneo, while those recorded by Stimpson were dredged off Formosa at a depth of 90 fathoms, on a sandy bottom.

Genus *Lyreidus*, De Haan.

- Lyreidus*, De Haan, Crust. Japon., p. 138, 1850.
 ,, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 404, 1852.
 ,, Haswell, Catal. Austral. Crust., p. 144, 1882.

Carapace oblongo-ovate, smooth, convex from side to side, and from before backwards. Fronto-orbital border narrow, less than half the width of the carapace ; the rostrum broadly triangular. Ocular peduncles short, the corneæ oblique, well developed ; orbits ill-defined. Antennules and antennæ of small size, subequal ; the second joint of the antennar peduncle with an inconspicuous external prolongation ; basal joint of the antennular peduncle incompletely concealed. External maxillipedes linear, the merus considerably longer than the ischium ; the three terminal joints minute, less than half the length of the merus. Sternal shield similar to that of *Notopus*, but not narrowing to such an extent between the second pair of legs. Chelipedes as in *Notopoides*. Ambulatory limbs with narrow elongate dactyli, of which those of the second pair are placed at right angles to the propodus ; the last pair of legs slender, almost filiform.

Lyreidus tridentatus, De Haan.

- Lyreidus tridentatus*, De Haan, Crust. Japon., p. 140, tab. xxxv. fig. 6, and tab. J. (mouth organs), 1850.
 ,, ,, Haswell, Catal. Austral. Crust., p. 144, 1882.

Habitat.—Off Port Jackson, 30 to 35 fathoms ; 3rd June 1874. About a dozen examples (of both sexes), taken in this locality, exhibit two prominent dorsal elevations on the third and fourth abdominal segments, that of the third blunt and tuberculate, the fourth acute. This spine is described but not figured by De Haan. The abdominal segments are slightly wider in the female than in the male, and the abdominal appendages long and hirsute.

Station 174, off Kandavu, Fiji Islands ; 210 fathoms, Globigerina ooze. The single male specimen possesses a mesial swelling on the third abdominal segment, and on the fourth a very prominent and acute spine directed upwards and forwards.

The discovery of this interesting species—originally described from Japan—at a considerable depth off the Fiji Islands, is an important addition to our knowledge of its distribution. It was previously recorded by Haswell from the Australian coast, where, however, it appears to be of rare occurrence. The Japanese species described by Miers as *Lyreidus elongatus*,¹ and doubtfully referred by this writer to *Lyreidus tridentatus*, appears to be distinct. More recently Professor S. I. Smith has described a third species, *Lyreidus bairdi*, from the east coast of the United States.

Genus *Zanelifer*, n. gen.

Carapace ovate, convex from side to side and from before backwards, its surface partly uneven. Fronto-orbital border very narrow, considerably less than half the width of the carapace, the frontal region trilobate, produced anteriorly. Eyes rudimentary, placed in ill-defined orbits; the peduncles short, and the corneae of small size though pigmented. Antennar peduncle massive, the first segment fused with the carapace, the second with a very prominent external prolongation; the flagellum short. Antennules of small size, completely concealed by the antennar peduncles, which meet together in the middle line. External maxillipedes moderately broad, with the ischium twice the length of the merus. Sternal thoracic shield narrow, becoming linear between the legs of the second pair, but slightly dilating again between the second and third pairs. Chelipedes of considerable length, the propodus swollen laterally, the fingers long. Ambulatory limbs with uncinatae daetyli, the fourth pair of small size but not filiform. Male generative appendages similar to but shorter than those of *Raninoides*.

The form and arrangement of the eyes, antennules and antennae, distinguish *Zanelifer* from all other genera of Raninidea. In the general shape of the carapace it comes nearest to *Lyreidus*, but this resemblance is probably accidental, for other generic features (especially the formation of the external maxillipedes) are widely different in the two genera. The rudimentary nature of the eyes and the structure of the limbs point to this genus being fossorial in habit.

Zanelifer caribensis (De Freminville) (Pl. III. fig. 2).

Eryon caribensis, De Freminville, Ann. d. Sci. Nat., sér. 1, t. xxv. p. 273, pl. viii.B. figs. 1-2, 1832.

Eryon trilobatus, De Freminville, Icones Crustaceorum quae ad littora America Meridionalis reperiuntur à C. P. de Freminville (unpublished, no date).

Characters.—The surface of this species is everywhere finely granulated. The carapace is ovate, granular, its length one and a half times as great as the breadth, the anterior half with very numerous eroded depressions arranged symmetrically on both sides; immediately behind the frontal region the carapace rises somewhat

¹ *Proc. Zool. Soc. Lond.*, p. 46, 1879.

abruptly, and the edge of the ridge thus formed is drawn out into three processes which are separated from one another by crotched depressions; the floor in all the depressions is more coarsely granular than the rest of the carapace. The fronto-orbital border is narrow, less than one-half the width of the carapace; the frontal region is considerably produced and terminates in three small rounded lobes, of which the median is largest; the orbital portion of this border is remarkably short, and marked externally by a rounded tooth. The lateral border commences anteriorly in a blunt projection which is separated by a concave depression from the antero-lateral (or orbital) tooth; for the first half of its course it is irregular owing to its being encroached on by the crosions of the carapace; posteriorly it exhibits a raised granular line which curves in on the dorsal surface of the carapace so as to leave a portion of the subbranchial or lateral region exposed.

The eyes are of small size and placed in ill-defined orbits; the peduncles with a slight range of movement. The antennules are minute, placed underneath the frontal region and completely concealed by the antennar peduncles; their peduncles are hirsute. The antennal peduncle is broad and composed of only three segments, the first (which is free in the other Raninidea) having fused with the trunk; the second has a strongly developed external prolongation which exceeds the remainder of the peduncle, the terminal segment is of small size; the flagellum is minute, but stout, and ciliated on both sides. The external maxillipedes have the ischium slightly convex and twice the length of the merus, the latter joint with a longitudinal sulcus on its outer surface and rather more coarsely granular than the ischium; the terminal joints are wanting in the single specimen; the exognath reaches to the end of the ischium and its apex is subacute. The pterygostomial region is moderately convex and separated from the carapace proper by a deep groove which becomes continuous with the line on the postero-lateral border. The thoracic sternum is nowhere very broad, reaching its maximum between the chelipedes and the first pair of ambulatory limbs, becoming linear between the basal joints of the latter, but dilating again between the first and second pairs of ambulatory limbs; the anterior part with a sulcus on each side, the posterior with a single median groove.

The chelipedes are well developed, with the surface finely granular; the merus is slightly hollowed out on its inner aspect; the propodus is remarkably swollen; the dactylus and immobile finger are slender, exceeding the propodus in length, their opposed edges with numerous teeth; the apex of the immobile finger is bent over that of the dactylus. The ambulatory limbs are granulated and fringed with long hairs, the propodi of the first three pairs drawn out into several sharp ridge-like processes, the dactyli but faintly granular and uncinatè or sickle-shaped (hence the generic name); the fourth pair are of small size and flattened from above downwards, with the dactyli less strongly curved.

The abdominal segments are moderately convex, gradually tapering towards the extremity, and fringed with long hairs; the apex of the telson is rounded. The sexual

appendages of the male are similar to those of *Notopoides*; the vasa deferentia are protruded as short tubular outgrowths.

The single specimen is an adult male, and gives the following measurements:— Breadth of carapace 14 mm., of fronto-orbital border (from one orbital spine to the other) 5 mm., length of carapace 21 mm., of chelipede 23 mm., of last leg 11·5 mm., of abdomen 9·5 mm., of first male appendage 7 mm., of external maxillipede 8·7 mm.

This species, which must be classed as one of the most interesting Crustaceans in the collection, was discovered more than fifty years ago in the Bay of Fort Royal, Martinique, by M. C. P. de Freminville, the captain of a French vessel, which was at that time cruising in the West Indies. Only a single specimen was obtained, and it does not appear to have been met with again till its rediscovery by the Challenger on the Brazilian coast. The description and figures originally given by this writer are very inaccurate; he referred the species to the fossil genus *Eryon*, to which it does not even bear a superficial resemblance, described the subdorsal legs as forming the second pair, and the antennules escaped his observation altogether. I should have had great hesitation in identifying the Challenger specimen with the *Eryon caribensis*, were it not that while in Paris, Professor Alphonse Milne-Edwards drew my attention to a collection of pencil-drawings of Crustacea, in the Library of the Museum of Natural History, in which the Challenger species is unmistakably figured under the name of *Eryon trilobatus*, and the locality "Caribbean Sea" assigned to it. It seems unlikely that two species were found, so I have adopted the specific name which appears in De Freminville's published paper.

Habitat.—Off Bahia, 7 to 20 fathoms.

HIPPIDEA.

Hippes, Latreille, Règne Anim. de Cuvier, 1re éd. t. iii. p. 28, 1817.

Hippiens, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 200, 1837.

Hippidea, De Haan, Crust. Japon., p. xxii, 1850.

„ Dana, U.S. Explor. Exped., vol. xiii., Crust., part. i. p. 400, 1852.

„ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 67, 1858.

„ Miers, Catal. New Zealand Crust., p. 58, 1876; Journ. Linn. Soc. Lond. (Zool.), vol. xiv. p. 312, 1877.

„ Haswell, Catal. Austral. Crust., p. 151, 1882.

Carapace ovate or subquadrate, comparatively smooth, the regions ill-defined; the frontal margin broad. Ambulatory limbs with flattened daetyli; the last pair slender and filiform, folded under the penultimate pair. Abdomen semi-extended, composed of six segments (the fifth and sixth fused), the penultimate with a prominent pair of

biramous lamellar appendages, the ultimate of large size, its length exceeding the breadth. Thoracic sterna linear, not forming a shield. External maxillipedes moderately broad, suboperculiform. Eyes not provided with distinct orbits, the corneæ of small size. Antennules strongly developed, without special fossæ, one of the flagella greatly elongated, the other of moderate size or absent. Antennæ with a massive peduncle composed of four or five joints, with or without a movable acicle; the flagellum short. Males destitute of copulatory organs and with only a single pair of abdominal appendages (on the penultimate segment).

Of this small though distinct group the collection contains but four species, all of which have been previously described; two, however, belong to rare and little-known forms. The Hippidea inhabit the shallow water of tropical and subtropical seas; many of the species (if not all) burrow in sand. In some respects they bear a superficial resemblance to the Raninidea, but have apparently undergone slighter modification; the presence of lamellar appendages on the penultimate abdominal segment, and of an antennal acicle—essentially Macruran characters—stamps them as of more primitive type.

Family I. HIPPIDÆ.

- Hippida*, Dana, U.S. Explor. Exped., vol. xiv., Crust., part ii. p. 1429, 1852 (*part*).
 ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 67, 1858.
 ,, Miers, Journ. Linn. Soc. Lond. (Zool.), vol. xiv. p. 316, 1877.

First pair of legs non-chelate, subcylindrical. Terminal segment of abdomen elongated, lanceolate. External maxillipedes suboperculiform, the merus broad; exognath absent.

Genus *Remipes*, Latreille.

- Remipes*, Latreille, Gen. Crust. et Insect., p. 45, 1806.
 ,, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 204, 1837.
 ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 67, 1858.
 ,, Miers, Journ. Linn. Soc. Lond. (Zool.), vol. xiv. p. 316, 1877.

Carapace ovate, the fronto-orbital border sinuous. Ocular peduncles slender. Antennular peduncle moderately stout, one of the flagella strongly developed. Second joint of the antennal peduncle of large size, with a slight external prolongation; the flagellum short. External maxillipedes with the merus dilated, the ischium rudimentary, and the dactylus unguiculate. Last thoracic segment free. Terminal abdominal segment lanceolate, exceeding the remainder of the abdomen in length. Female with three pairs of abdominal appendages in addition to the penultimate pair.

Remipes testudinarius, Latreille.

- Remipes testudinarius*, Latreille, Gen. Crust. et Insect., t. i. p. 45, 1806.
 " " Lamarck, Hist. Anim. sans Vert., t. v. p. 223, 1818.
 " " Desmarest, Consid. sur les Crust., p. 175, pl. xxix. fig. 1, 1825.
 " " Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 406, pl. xxi. figs. 14-20, 1837; Crust. in Cuvier Règne Anim. (3me éd.), Atlas, pl. xlii. fig. 1, no date.
 " " Guérin-Méneville, Icon. Règne Anim., Crust., pl. xv. fig. 3, 1829-44.
 " " Heller, Reise der Novara, Crust., p. 72, 1865.
 " " Hilgendorf, Crust. in Van der Decken's Reisen in Ost-Afrika, p. 94, 1869.
 " " Miers, Journ. Linn. Soc. Lond. (Zool.), vol. xiv. p. 316, 1877, *ubi synonym.*
 " " Haswell, Catal. Austral. Crust., p. 151, 1882.
 " *marmoratus*, White, List Crust. Brit. Mus., p. 58, 1847, *sine descr.*
 " " Jacquiouot et Lucas, Crust. in Voy. Pôle Sud, Zool., t. iii. p. 97, pl. viii. figs. 22-26, 1853.
 " " Miers, Catal. New Zealand Crust., p. 59, 1876.
 " *pacificus*, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 407, pl. xxv. fig. 7, 1852.
 " " Stimpson, Ann. Lye. Nat. Hist. New York, vol. vii. p. 241, 1862.
 " " Miers, Proc. Zool. Soc. Lond., p. 74, 1877.
 " *hirtipes*, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 408, pl. xxv. fig. 8, 1852.
 " *pictus*, Heller, Crust. Rothen Meeres, Sitzungsab. Akad. Wiss. Wien, xlv. i. p. 243, 1862.
 " *ovalis*, A. Milne-Edwards, Faune Carcinol. in Maillard, Ile Réunion, t. ii., Aunexe F, p. 12, pl. xvii. fig. 5, 1863.

Habitat.—Ternate, October 15, 1874. A single specimen (a female with ova) of this common and widely distributed Indo-Pacific species. The carapace measures 31 mm. in length.

Remipes scutellatus (Fabricius).

- Squilla barbadensis ovalis*, Petiver, Pterigraph. Amer., pl. xx. fig. 9, 1764.
Hippa scutellata, Fabricius, Ent. Syst., t. ii. p. 474, 1793.
Remipes scutellatus, White, List Crust. Brit. Mus., p. 57, 1847, *sine descr.*
 " " Miers, Journ. Linn. Soc. Lond. (Zool.), vol. xiv. p. 319, 1877, *ubi synonym.*
 " " Studer, "Gazelle" Crust., Abhandl. d. k. Akad. d. Wiss. Berlin, p. 23, 1883.
 " *cubensis*, Saussure, Rev. et Mag. Zool., t. ix. pp. 304, 308, 1857; Mém. Soc. Phys. et Hist. Nat. Genève, t. xiv. p. 452, pl. ii. fig. 19, 1858.
 " *barbadensis*, Stimpson, Ann. Lye. Nat. Hist. New York, vol. x. p. 120, 1871.

Habitat.—St. Vincent, Cape Verde Islands. Among a large number of specimens the majority are females with ova; males occur in the proportion of about one to two females.

Bermuda, on the sandy shore. Six females (one with ova) and two males. These

have the carapace slightly broader in proportion to its length than the Cape Verde examples.

A great disproportion in size exists between the two sexes; the males also have the terminal abdominal segment narrower. The largest female specimen has a length of carapace of 22 mm., while the largest male similarly measures only 13 mm.

Genus *Mastigochirus*, Miers.

Mastigopus, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 68, 1858, *nom. præocc.*

Mastigochirus, Miers, Journ. Linn. Soc. Lond. (Zool.), vol. xiv. p. 321, 1877.

Carapace ovate, the fronto-orbital border dentate. Ocular peduncles long and slender. Antennules and antennæ similar to those of *Remipes* but shorter. External maxillipedes more slender than those of *Remipes*. First pair of legs remarkably long and slender, exceeding the total length of the body, the terminal segment multiarticulate. Other characters as in *Remipes*.

This genus is separated from *Remipes* chiefly by the form of the first pair of legs. The multiarticulate nature of the terminal segment is altogether exceptional amongst Anomura, and recalls a somewhat similar arrangement in many Macrura.

Mastigochirus quadrilobatus, Miers.

Mastigochirus quadrilobatus, Miers, Journ. Linn. Soc. Lond. (Zool.), vol. xiv. p. 322, pl. v. fig. 8, 1877; Crust. in Zool. H.M.S. "Alert," p. 280, 1884.

Habitat.—Station 186, off Booby Island, Flinders Passage; depth, 8 fathoms; bottom, coral mud. Two males were dredged in this locality.

The type specimen came from the Philippines, and more recently the species has been taken by the "Alert" in Prince of Wales Channel, at a depth of 5 to 7 fathoms.

Family II. ALBUNEIDÆ.

Albunida, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 68, 1858.

Albuneida, Miers, Journ. Linn. Soc. Lond. (Zool.), vol. xiv. p. 326, 1877.

First pair of legs chelate, flattened. Terminal segment of abdomen ovate. External maxillipedes subpediform, the merus not greatly dilated; exognath of small size. Antennar peduncle usually with a distinct aciele arising from the second joint.

Genus *Albunea*, Fabricius.

- Albunea*, Fabricius, Suppl. Ent. Syst., pp. 372, 397, 1798.
 „ Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 202, 1837.
 „ Miers, Journ. Linn. Soc. Lond. (Zool.), vol. xiv. p. 326, 1877.
Albunea, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 68, 1858.

Carapace subquadrate, the fronto-orbital border serrated, with a median notch. Ocular peduncles lamellar, the corneæ minute. Antennular peduncle of large size, with a single long ciliated flagellum which exceeds the whole body in length. Antennæ with a well-developed peduncle of five joints, the second joint with a movable aciele; the flagellum short and stout. External maxillipedes moderately slender, the merus oblong and not greatly exceeding the carpus in length. Dactyli of second, third and fourth pairs of legs uncinatè. Last thoracic segment free. Female with four pairs of abdominal appendages in addition to the penultimate pair.

Albunea microps (White), Miers.

- Albunea microps*, White, List Crust. Brit. Mus. Appendix, p. 129, 1847, *sine descr.*
 „ „ Miers, Journ. Linn. Soc. Lond. (Zool.), vol. xiv. p. 328, pl. v. figs. 12, 13,
 1877.

Habitat.—Station 212, Celebes Sea; depth, 10 fathoms; bottom, sand. Three specimens, two of these unfortunately much crushed.

The unique specimen in the collection of the British Museum came from Sooloo Island.

PAGURIDEA.

Paguroidæ, Boas, Vidensk. Selsk. Skr. 6 Række nat. og math. Afd. i. 2. p. 110, 1880.

Frontal region of carapace usually prolonged in the form of a rostrum. Eyes not provided with distinct orbits, the peduncles cylindrical or subcylindrical. Antennal peduncle composed of five segments, the second segment furnished with a projecting spine or aciele. External maxillipedes subpediform, the meral and ischial joints elongate. Chelipedes well developed and in most cases asymmetrical; the last pair of legs always of small size and frequently chelate. Abdomen generally asymmetrical, the number of appendages variable.

The close affinity which exists between the Lithodids and Pagurids, although previously noticed by De Haan, has been up till within comparatively recent times entirely ignored by carcinologists. In 1880, Dr. J. E. V. Boas pointed out that

Lithodes is merely a highly specialised Pagurid (he considers it to be derived from *Eupagurus*), which has assumed certain Brachyuran characteristics. A somewhat similar parallel is seen in the case of *Birgus* and *Cænobita*, though the distinction between the two latter is less strongly marked. In the Lithodids the abdomen has become bent under the cephalothorax, though its primitive asymmetry is still retained and the appendages of the penultimate segment have entirely disappeared.

The term Paguridea has been retained in order to ensure uniformity of nomenclature among the subtribes of Anomura, though it is of course now used in a much wider sense than that proposed by Dana.

Section A. LITHODEA.

Homoliens, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 180, 1837, *in part*.

Lithodeacea, De Haan, Crust. Japon., p. 213, 1850.

Lithodea, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 401, 1852.

Lithodidea, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 68, 1858.

Carapace broadly ovate, uneven, with a prominent median rostrum in front, the regions well defined. Chelipedes and the three anterior pairs of legs well developed, cylindrical or subcylindrical, the posterior pair slender, chelate, folded in either branchial chamber. Abdomen bent under the thorax, composed of seven segments, the first of which is of small size and fused dorsally with the second; abdominal appendages only present in the female, consisting of a rudimentary pair on the first segment, and a single uniramous appendage on each of the four following segments (in *Hapalogaster*, Stimpson, the first of these is biramous). These last appendages are situated on the left side of the abdomen, which is more or less enlarged at the expense of the other side. Legs widely separated by broad thoracic sterna. Antennular peduncles cylindrical and of moderate size, with short flagella.

The members of this group (which form but a single family) inhabit the temperate and colder regions of both northern and southern hemispheres, where they live for the most part in shallow water; certain species have, however, been recently taken at great depths.

Family LITHODIDÆ.

Lithodidæ, Dana, U.S. Explor. Exped., vol. xiv., Crust., part ii. p. 1430, 1852.

Genus *Lithodes*, Latreille.

Lithodes, Latreille, Gen. Crust. et Insect., t. i. p. 39, 1806.¹

„ Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 184, 1837.

„ De Haan, Crust. Japon., p. 214, 1850.

„ Bell, Brit. Crust., p. 164, 1853.

„ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 68, 1858.

Rostrum long and spinulous. Abdomen with the third, fourth, and fifth segments provided with paired calcified plates, which in the female are enormously developed on the left side, the median portion membranous, with scattered calcareous particles.

The known species of this genus as restricted by Brandt and Stimpson are as follows:—

I. Northern species—

Lithodes maia (Linn.), North Atlantic.

„ *camtschaticus* (Tilesius), De Haan, Sea of Okhotsk.

„ *brevipes*, M.-Edw. and Lucas, South Pacific (?); Kamtschatka.

„ *spinosissimus*, Brandt, North Pacific.

„ *agassizii*, Smith, North Atlantic, deep water.

„ *ferox*, A. M.-Edw., off the north-west coast of Africa, deep water.

II. Southern species—

Lithodes antarcticus, Jacq. and Lucas, Fuegia.

„ *murrayi*, n. sp., Southern Ocean.

The *Lithode douteuse* of Milne-Edwards, described from a single mutilated specimen, and figured also by Seba, is probably a variety of *Lithodes maia*.

Lithodes agassizii, Smith.

Lithodes agassizii, S. I. Smith, "Blake" Crust., Bull. Mus. Comp. Zoöl., vol. x. p. 8, pl. i., 1882; Proc. Nat. Mus., vol. vi. p. 25, 1883; "Albatross" Crust., Rep. U.S. Fish Comm. 1882, p. 351, 1884.

Habitat.—Station 78, off the Azores; depth, 1000 fathoms; bottom, volcanic mud.

Two very young specimens, the carapace of the larger measuring only 9 mm. in length, are referable to this species. They are characterised by the extraordinary development of the spines on the carapace and rostrum. *Lithodes agassizii* appears to be not uncommon in deep water off the east coast of the United States; it is recorded by Smith from depths varying between 400 and 1250 fathoms.

¹ According to Agassiz (Nomencl. Zool.), the date of the creation of this genus by Latreille is 1802.

Lithodes murrayi, n. sp. (Pl. IV.).

Characters.—The carapace is broadly ovate, with the length (not including the rostrum) slightly greater than the breadth; the regions are well defined and the surface armed with broadly conical spines. The rostrum is five-spined, with a slight upward direction, the proximal part broad and terminating in two prominent diverging spines, which are directed forwards and upwards, the distal portion shorter and more slender, with its apex bifurcate, the spines thus formed being about half the size of the former pair; on the lower surface there is a large basal spine directed downwards and forwards, and at the same time slightly curved. The gastric area is swollen, with a few small tubercles scattered over its surface, and armed with four acute conical spines arranged in two rows, the anterior pair of larger size and separated by a wider interval than the posterior pair. The cardiac area is well-defined and somewhat triangular in outline, separated from the gastric area by a deep transverse sulcus; it bears on its most elevated part two spines similar to the gastric ones, and in front of these two conspicuous tubercles, a few smaller tubercles are also scattered over the region. The branchial area is moderately convex from side to side and armed with two conspicuous spines, one situated in the middle of the region opposite the anterior part of the cardiac area and larger than the other which is situated opposite the posterior part of the cardiac area; a few smaller elevations are placed near the latter, and scattered tubercles exist all over the area. The antero-lateral border possesses two spines, one external to the insertion of the ocular peduncle, the other at the antero-lateral angle. The lateral border is drawn out into about six prominent spines (excluding the antero-lateral one), a few of smaller size intervening; of these the first situated opposite the hepatic area is most prominent, indeed, this exceeds in size any other on the carapace, and is directed upwards and slightly forwards with a faint curve; a second prominent spine is placed a little in front of the first branchial spine, and a third opposite the second branchial. The posterior border possesses about six prominent spines on each side, of these the submedian pair are largest.

The eyes are of moderate size and freely movable, the corneæ well developed and oblique. The antennules have the third joint of the peduncle longer than the second, the first with a conspicuous auditory aperture on its upper surface. The second joint of the antennal peduncle has a conical spine on its outer and distal border, the ultimate joint is twice the length of the penultimate; the flagellum is about equal in length to the carapace. The external maxillipedes are similar to those of *Lithodes maia*, as figured by De Haan, the internal serrated projection of the ischium being well marked. The pterygostomial area presents an anterior convexity, with a concavity immediately behind.

The chelipedes are subequal in length, but the right is somewhat stouter, the ischium has several conical spines of large size on its lower surface, the merus has a prominent

curved spine on its inner border, and the carpus several on its upper and outer surfaces; the fingers are excavated internally, and have numerous tufts of bristle-like setæ scattered over their surfaces. The meral, carpal, and propodal joints of the ambulatory limbs are moderately spiny on the superior and inferior borders and the posterior surface; the dactyli have several basal spines both above and below, their apices are black, acute and horny. The legs of the last pair are smooth, with the terminal portion densely pubescent.

The first abdominal segment bears two small submedian spines, the second bears a pair of large size and has a raised posterior border, the penultimate segment has two small spines on its posterior border.

The above description is taken from a male. The female is of larger size and presents the following points of difference—the rostrum is shorter, especially its terminal portion, the chelipedes are less strongly developed, the plates on the left side of the abdomen possess a few marginal spines, and the central abdominal tubercles show a tendency to become spiny; the right border of the abdomen also is armed with a series of elongated spines.

Lithodes murrayi is apparently most closely allied to *Lithodes maia*, but the latter species is of larger size, and the spines on the carapace are more numerous and more uniformly equal in size.

The following are the chief measurements in both sexes:—

	Male.	Female.
Breadth of carapace,	59 mm.	66 mm.
Length of carapace,	64 "	73 "
,, of rostrum,	23 "	21 "
,, of right chelipede,	94 "	96 "
,, of first ambulatory limb,	167 "	157 "
,, of abdomen,	40 "	61 "
Diameter of eggs, nearly . . . . .	...	2 "

Habitat.—Station 145A, off Prince Edward Island; depth, 310 fathoms; bottom, volcanic sand.

Two specimens, a male and a female, the latter bearing ova, are in the collection.

I have pleasure in associating this fine species with the name of the Director of the Challenger Commission.

Genus *Paralomis*, White.

Paralomis, White, Proc. Zool. Soc. Lond., p. 134, 1856, *sine descr.*

,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 69, 1858.

Rostrum usually trispinose. Antennal acicle spinulose and freely movable on the second segment of the peduncle. Abdomen with the lateral plates of the third, fourth,

and fifth segments subequal in the female, the median portion with a series of large calcareous plates.

The only previously well-established member of this genus is *Paralomis verrucosus*, Dana, from Fuegia. A second as yet undescribed species was taken by the "Talisman," from the deep water of the Bay of Biscay. The *Lithodes granulatus*, Jacquinot and Lucas, from Fuegia, is probably founded on a young and imperfect specimen of *Paralomis verrucosus*, but the latter name though issued subsequently must in any case be retained.

Paralomis verrucosus (Dana).

Lithodes verrucosus, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 428, pl. xvi. fig. 16, 1852.

" " Cunningham, Trans. Linn. Soc. Lond. (Zool.), vol. xxvii. p. 494, 1871.

Paralomis verrucosus, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 69, 1858.

" " Miers, Proc. Zool. Soc. Lond., p. 71, 1881.

? *Lithodes granulatus*, Jacquinot and Lucas, Voy. au Pol Sud, Invert., pl. viii. fig. 15, 1855.

Habitat.—Specimens of this common Fuegian species were taken in the following localities:—

Station 316, Port Louis, Falkland Islands; depth, 4 fathoms; bottom, mud. A male, with the legs and under surface of the trunk thickly covered by Hydroids.

Label illegible. A male.

Port Stanley, Falkland Islands. A large male.

Paralomis aculeatus, n. sp. (Pl. V. fig. 1).

Characters.—The carapace is ovate, with the length (excluding the rostrum) slightly greater than the breadth, the regions well defined, and the surface uniformly covered with spiniform tubercles. The rostrum is trispinose, the two upper spines slightly diverging, directed forwards and upwards, the lower considerably larger and curved directly forwards; a single spine exists on either side at the junction of the rostrum with the carapace. The gastric region is very convex, and the tubercles become markedly spiniform towards its anterior and lateral boundaries. The cardiac area is well defined and somewhat triangular in outline; a moderately deep groove separates it from the gastric region. The branchial area is slightly convex, and the tubercles are crowded together, with a decided tendency to become spinulose; the cervical groove is represented by a shallow depression. The antero-lateral border of the carapace is marked by a prominent spine which is placed at the outer border of the ill-defined orbit and is separated by a considerable interval from the first lateral spine. The lateral border is

armed with a series of prominent acute spines, about twelve in number, interspersed with somewhat smaller projections. The posterior border is slightly raised and possesses a double row of acute conical tubercles.

The eyes are of moderate size and situated close together, the peduncles with a few small tubercles, one of which is terminal in position and acute; the corneæ are oblique and deeply pigmented. The antennular peduncle slightly exceeds the antennar and the basal joint of the former is elongated. The first joint of the antennal peduncle bears a small spine on its outer and lower surface, the second bears two of larger size in a similar position and one on the superior surface; the acicle is four-spined and has a basal tubercle; the flagellum is not quite equal in length to the carapace. The external maxillipedes have the three terminal joints subequal in size, the serrated internal lobe of the ischium is well marked; the sternum connecting these two appendages is bispinose. The pterygostomial region terminates anteriorly in an acute spine.

The chelipedes are subequal in length but the right slightly stouter; the ambulatory limbs are long and armed with numerous aculeate spines and stiff hairs, especially on the upper and posterior surfaces. The merus of the chelipedes bears two prominent distal spines on the inner border, the carpus also possesses several on its superior surface, the propodus has but few, and the fingers are slightly excavated. The ambulatory limbs have the spines very prominent on the meral, carpal, and propodal joints; the dactyli are compressed and slightly curved, terminating in black horny tips, with a row of horny spines articulated to the lower border. The legs of the last pair have the terminal joints pubescent.

The abdomen of the single specimen (a male) has the plates slightly uneven and covered with tufts of bristle-like hairs; the second segment is armed in a similar way to the carapace.

The following are the measurements: breadth of carapace 39 mm., length of carapace 42 mm., of rostrum 8.5 mm., of right chelipede 70 mm., of first ambulatory limb 98 mm., of last leg 25 mm., of abdomen 32 mm.

Habitat.—Station 145A, off Prince Edward Island; depth, 310 fathoms; bottom, volcanic sand. Taken along with *Lithodes murrayi*.

Paralomis formosus, n. sp. (Pl. V. fig. 2).

Characters.—The carapace is broadly ovate, with the length and breadth subequal, everywhere covered with pearly granulations, which are mostly arranged in groups; the regions are fairly well marked. The rostrum is composed of three subequal spines, the two upper considerably elevated and widely diverging; the lower almost horizontal. The gastric area is convex, and bears towards its centre a conical and acute spine of large size, with, on either side and slightly posterior, a small tubercle, and two short pyramidal

processes at the posterior part of the area. The surface of the gastric spine, as in the case of all the other spines found on this species, is granulated. The cardiac area is convex and moderately circumscribed, capped by four tubercular spines arranged as if at the four angles of a square; the groove which separates this region from the gastric area is smooth and devoid of granulations. The branchial area possesses a prominent and acute spine opposite the centre of the cardiac area, and towards the posterior border of the carapace one or two tubercles. The cervical groove is represented on the surface of the carapace by an irregular, sparingly granulated depression, at the anterior end of which there is a smooth oval elevation. The external orbital spine arises internally to but in line with the antero-lateral spine, the lateral border is armed with five or six spines, two of which are situated in front of the cervical groove, while the two immediately behind this are largest in size; the second spine is curved forwards and inwards. The posterior border possesses one or two tubercular spinules on each side and from four to six small subcentral tubercles.

The ocular peduncles are granulated above, and, as in the last species, terminate in a small spine; the corneæ are oblique and deeply pigmented. The second joint of the antennular peduncle extends to a point opposite the end of the antennar peduncle; the first joint of the latter possesses a prominent and acute external spine, the second bears one of much larger size with a secondary projection at its base; the squame is quadrispinose, two of the spines being of small size. The merus of the external maxillipedes is slightly granulated externally. The pterygostomial region bears a somewhat blunt spine anteriorly.

The chelipedes and ambulatory limbs are long, and as in the case of the carapace covered with fine granulations, which are more numerous arranged on the upper surface. The chelipedes are subequal in length, the right being stouter; the meral joint is furnished with two prominent spines on its inner and distal border, and several are also present on the carpus, the two posterior of these being of large size and curved; the propodus bears a double row of large tubercles on its outer surface, and a series of tubercular spines on the upper border; the fingers are each provided with three rounded teeth and numerous tufts of hairs. The meral, carpal, and propodal joints of the ambulatory limbs are bordered anteriorly by stout spiniform processes, of which one at the distal end of the merus and carpus respectively is most prominent; the posterior border of the merus and propodus bears a somewhat smaller series; the propodi are moderately curved, tipped with dark corneous spines, and fringed inferiorly by a row of horny spines.

The abdominal plates are distinctly granulated; the second segment bears two blunt spines on a mesial elevation, and two subcentral tubercles on the posterior border; the penultimate segment bears a terminal projection on each side, and the telson is bituberculate.

The above description is taken from a male. In the female, which is of slightly larger size, the spines on the carapace are comparatively more strongly developed.

The following are the chief measurements in both sexes :—

	Male.	Female.
Breadth of carapace,	14·5 mm.	15·8 mm.
Length of carapace,	14·5 "	16 "
„ of rostrum,	4 "	4·5 "
„ of right chelipede,	22 "	24 "
„ of first ambulatory limb,	28 "	31·5 "
„ of last leg,	8 "	9 "
„ of abdomen,	10 "	11·5 "

Habitat.—Station 320, off Rio Plata; depth, 600 fathoms; bottom, green sand. Two adult specimens (male and female), and two immature.

Section B. PAGURODEA.

Paguriens, Milne-Edwards, Ann. d. Sci. Nat., sér. 2, t. vi. p. 262, 1836; Hist. Nat. des Crust., t. ii. p. 209, 1837.

Paguroidea, De Haan, Crust. Japon., p. 197, 1850.

Paguridea, Dana, U.S. Explor. Exped., vol. xiii., Crust., part. i. p. 401, 1852.

„ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 70, 1858.

„ Miers, Catal. New Zealand Crust., p. 61, 1876.

„ Haswell, Catal. Austral. Crust., p. 152, 1882.

Carapace elongate, the part posterior to the cervical groove membranaceous, or less firm than the anterior portion. Chelipedes and the two anterior pairs of legs well developed, the ultimate and penultimate pairs of small size, and one or both usually chelate. Thoracic sterna linear. Abdomen spirally twisted, or extended, and usually membranous, the tergal elements as a rule rudimentary; abdominal appendages present in both sexes, consisting of a pair always present on the penultimate (sixth) segment, and of usually a single biramous limb present only on the left side of the second to the fifth segments inclusive, the first three of these well developed and ovigerous in the females.

The Hermit Crabs occur in all seas from between tide marks down to very great depths (over 2000 fathoms); they are most numerous represented, however, in shallow water, and a few forms are even subterrestrial. Numerous structural modifications are met with in the different genera, and these, as might be expected, are chiefly confined to the form of the abdomen, that part of the body having suffered most from the curious shell-inhabiting instinct noticeable in the majority of the species. There is every reason to believe that the Hermit Crabs of the present day are descendants of a race of Thalassinid-like ancestors, owing both their form and their persistence to the above-

mentioned habit. Many of the species live in a state of commensalism with an Actinia which adheres to the exterior of the shell, and in some cases at least the two are invariably found together.

The Paguroidea are divisible into two branches according to the structure of the gills, whether of the normal phyllobranchiate type as in other Anomura, or of the trichobranchiate type as in many Macrura. These may be termed Laminibranchiata and Fibribranchiata respectively.

LAMINIBRANCHIATA.

Family I. CÆNOBITIDÆ.

- Cenobitida*, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 432, 1852.
 ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 70, 1858.
 ,, Haswell, Catal. Austral. Crust., p. 159, 1882.

Antennular peduncle greatly elongated, the first joint deflexed and as long as or exceeding the eye-stalks, the second and third joints narrow and cylindrical; one of the flagella enlarged. Antennal peduncle compressed, the terminal joint long. Species subterrestrial.

This family includes the genera *Birgus* and *Cænobita*, the species of which are confined to tropical and subtropical regions. Their affinity with *Lithodes*, which was noticed by Milne-Edwards, though he did not accordingly group them together, is well seen in the form of the abdomen.

Genus *Birgus*, Leach.

- Birgus*, Leach, Trans. Linn. Soc. Lond., vol. xi. p. 337, 1815.
 ,, Desmarest, Consid. sur les Crust., p. 180, 1825.
 ,, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 244, 1837.
 ,, De Haan, Crust. Japon., p. 203, 1850.
 ,, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 435, 1852.
 ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 70, 1858.

Carapace broadly ovate, with a prominent rostrum in front. Ocular peduncles cylindrical. Abdomen not twisted, broad, the second, third, fourth and fifth segments each with a large, corneo-calcareous, overlapping tergal plate, which occupies the whole width of the segment, and with smaller lateral plates. Under surface of the abdomen membranous, with a plate situated posteriorly, which represents the sixth segment and is provided with a rudimentary appendage on each side; attached to this is a telson of small size. Respiratory chambers spacious, containing fourteen gills on each side, and in addition vascular pulmonary outgrowths.

Birgus latro (Linné).

- Cancer crementatus*, Rumphius, D'Amboinische Rariteitskammer, p. 7, taf. iv., 1705.
 " " Seba, Thesauri Rerum Natur., t. iii., tab. xxi. figs. 1, 2, 1761.
 " *latro*, Linné, Syst. Nat., ed. xii., t. ii. p. 1049, 1766.
 " " Herbst, Naturgeschichte der Krabben u. Krebse, t. ii, tab. xxiv. p. 34, 1796.
Pagurus latro, Fabricius, Suppl. Ent. Syst., p. 411, 1798.
 " " Bose, Hist. Nat. des Crust., t. ii. p. 76, 1802.
 " " Latreille, Hist. Nat. des Crust. et Insect., t. vi. p. 164, 1802.
 " " Olivier, Ency. Méth., t. viii. p. 639, Atlas, pl. cclxxxii., 1811.
 " " Lamarek, Hist. Anim. sans Vert., t. v. p. 221, 1818.
Birgus latro, Leach, Trans. Linn. Soc. Lond., vol. xi. p. 337, 1815.
 " " Quoy and Gaimard, Voy. de l'Uranie, pl. lxxx., 1824.
 " " Desmarest, Consid. sur les Crust., p. 180, pl. xxx. fig. 3, 1825.
 " " Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 246, 1837; in Cuvier, Règne Anim.,
 éd. 3e, Crust., pl. xliii. fig. 1, no date.
 " " De Haan, Crust. Japon., p. 212, 1850.
 " " Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 474, pl. xxx. fig. 5, 1852.
 " " Hilgendorf, in Van der Decken's Reisen in Ost-Afrika, Crust., p. 100, 1869.
 " " Brocchi, Ann. d. Sci. Nat., sér. 6, t. ii. p. 34, pl. xv. fig. 44, 1875.
 " " Willemoes Suhm, Zeitschr. f. wiss. Zool., Bd. xxvi. p. 73, 1875.
 " " Grube, Jahresb. Schles. Ges., p. 76, 1878.
 " " Semper, Zeitschr. f. wiss. Zool., Bd. xxx. p. 282, 1878.
 " " Miers, Crust. in Zool. H.M.S. "Alert," p. 555, 1884.
juv. Birgus laticauda, Latreille, Règne Anim., éd. 2e, t. iv., pl. xii. fig. 2, 1829.
 " " Desmarest, Consid. sur les Crust., p. 180, 1825.

Habitat.—Philippine Islands. Several large specimens of both sexes.
 Ternate, October 15, 1874; a young female.

Birgus latro is the largest and one of the most widely distributed of Indo-Pacific Pagurids.

Genus *Cænobita*, Latreille.

- Cænobita*, Latreille, Fam. Nat. du Règne Anim., p. 276, 1826.
Cænobita, Latreille, Cuvier, Règne Anim., éd. 2e, t. iv. p. 77, 1829.
Cænobita, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 238, 1837.
 " De Haan, Crust. Japon., p. 203, 1850.
 " Dana, U.S. Explor. Exped., vol. xiii., Crust., part. i. p. 435, 1852.
 " Stimpson, Proc. Acad. Nat. Sci. Philad., p. 70, 1858.
 " Haswell, Catal. Austral. Crust., p. 160, 1882.
Cænobita, Hilgendorf, in Van der Decken's Reisen in Ost-Afrika, Crust., p. 97, 1869.

Carapace elongated, the rostrum but slightly marked. Ocular peduncles compressed. Chelipedes markedly unequal, the left larger. Abdomen soft and membranous, twisted on itself. First five abdominal segments with narrow tergal plates, the sixth with a well-developed pair of appendages (of which the left is larger), followed by a well-marked telson. The species protect themselves by means of shells.

Cænobita clypeata (Herbst).

- Cancer clypeatus*, Herbst, Naturg. Krabben u. Krebse, t. ii. p. 22, taf. xxiii. fig. 2, 1796.
Pagurus clypeatus, Fabricius, Suppl. Ent. Syst., p. 413, 1798.
Cænobita clypeata, Latreille, Fam. Nat. du Règne Anim., p. 277, 1826.
 " " Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 239, 1837.
 " " Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 473, pl. xxx. fig. 4, 1852.
 " " Heller, Reise der Novara, Crust., p. 82, 1865.
Cænobita clypeata, Latreille, Règne Anim. de Cuvier, éd. 2e, t. iv. p. 77, 1829.
 " " Miers, Ann. and Mag. Nat. Hist., ser. 5, vol. v. p. 371, 1880.
 " *clypeatus*, Hilgendorf, in Van der Decken's Reisen in Ost-Afrika, Crust., p. 98, taf. vi. figs. 3c, 4a, 1869.

Habitat.—Wild Island, Admiralty Islands. A large male specimen, in a shell of *Dolium perdis*, Linn.

This species is extensively distributed over the Indo-Pacific region, ranging from the east coast of Africa to the islands of the Pacific.

Cænobita rugosa, H. Milne-Edwards.

- Cænobita rugosa*, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 241, 1837.
 " " Krauss, Südafrik. Crust., p. 58, 1843.
 " " De Haan, Crust. Japon., p. 212, 1850.
 " " Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 471, pl. xxx. fig. 1, 1852.
 " " Stimpson, Proc. Acad. Nat. Sci. Philad., p. 83, 1858.
 " " Heller, Sitzungsab. Akad. Wien, p. 254, pl. xlv. fig. 1, 1862; Reise der Novara, Crust., p. 82, 1865.
 " " Haswell, Catal. Austral. Crust., p. 160, 1882.
Cænobita clypeata, Owen, Crust. "Blossom," p. 85, pl. xxv. fig. 3, 1839.
Cænobita rugosus, Hilgendorf, in Van der Decken's Reisen in Ost-Afrika, Crust., p. 99, taf. vi. figs. 2, 3a, 4b, 1869.
 " *rugosa*, Targioni Tozzetti, Crostac. "Magenta," p. 232, pl. xiii. fig. 6, 1877.
 " " Miers, Ann. and Mag. Nat. Hist., ser. 5, vol. ii. p. 410, 1878; Phil. Trans. Roy. Soc., vol. clxviii. p. 492, 1879.
 " " Richters, Decapoda in Möbius, Beiträge zur Meeresfauna der Insel Mauritius und der Seychellen, p. 160, pl. xvii. figs. 14-17, 1880.

Habitat.—The collection contains a large series of this common and almost ubiquitous Indo-Pacific species from the following localities:—

Traey Island, Nares Harbour, Admiralty Islands. In shells of *Cerithium* (*Vertagus*) *martinianum*, Pfeiffer.

Wild Island, Admiralty Islands, shore. In shells of *Trochus* (*Chrysostoma*) *paradoxus*, Born.

Kandavu, Fiji Islands, July 1874, and August 1874 (from the shore).

Api, New Hebrides, shore. In the shell of *Natica albumen*, Linn.

Tahiti, near the reefs, September 28, 1875. In the shells of a species of *Melania* (a fresh-water Mollusc).

Wokan Dobbo, Arrou Islands, shore.

Cænobita perlata, H. Milne-Edwards.

- Cænobita perlata*, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 242, 1837; in Cuvier, Règne Anim., éd. 3e, Crust., pl. xlv. fig. 1, no date.
 " " De Haan, Crust. Japon., p. 213, 1850.
 ? " *purpurea*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 83, 1858.
Cænobita perlata, Brocchi, Ann. d. Sci. Nat., sér. 6, t. ii. p. 40, pl. xv. figs. 45-47, 1875.
 " " Miers, Ann. and Mag. Nat. Hist., ser. 5, vol. v. p. 372, 1880; Crust. in Zool. H.M.S. "Alert," p. 555, 1884.

Habitat.—Specimens from the following localities are with some hesitation referred to this species:—

Kandavu, Fiji Islands, shore, August 1874. Two males, one of considerable size, the smaller in a shell of *Bulimus (Placostylus) seemanni*, Dohrn (a terrestrial Mollusc).

Api, New Hebrides, shore. A female, of small size, in a shell of *Natica albumen*, Linn.

Cænobita perlata occurs at widely separate localities throughout the Pacific.

Family II. PAGURIDÆ.

- Paguridæ*, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 435, 1852.
 " Stimpson, Proc. Acad. Nat. Sci. Philad., p. 70, 1858.

Antennular peduncle of moderate size, the first joint short and stout, the second and third slender and cylindrical; both flagella of small size. Antennal peduncle sub-cylindrical. Species marine.

This family includes the greater number of known Pagurids. A synoptical arrangement of genera, partly based on the tables furnished by Dana and Stimpson, is given below:—

- I. Abdomen spirally twisted or bent abruptly, soft and membranous, the segmentation imperfect (Pagurinae, Dana).
1. First and second abdominal segments without genital appendages.
 - a. Fourth pair of legs chelate or subchelate. Males without a protruded vas deferens.

<i>Diogenes</i> , Dana.	<i>Ctibanarius</i> , Dana.
<i>Pagurus</i> (Fabricius), Dana.	<i>Isocheles</i> , Stimpson.
<i>Aniculus</i> , Dana.	<i>Eupagurus</i> , Brandt.
<i>Calcinus</i> , Dana.	<i>Ostraconotus</i> , A. Milne-Edwards.
 - b. Fourth pair of legs subchelate. Males with a protruded vas deferens.

<i>Spiropagurus</i> , Stimpson.	<i>Catapagurus</i> , A. Milne-Edwards.
	<i>Anapagurus</i> , Henderson.
 2. First and second abdominal segments provided with genital appendages (the first segment only in the female).

<i>Paguristes</i> , Dana.	<i>Tylaspis</i> , n. gen.
	<i>Sympagurus</i> , S. I. Smith.
- II. Abdomen not spirally twisted, composed of distinct movable segments which are usually calcified (Cancellinae, Dana).
- | | |
|------------------------------------|--|
| <i>Cancellus</i> , Milne-Edwards. | <i>Pomatocheles</i> , Miers. |
| <i>Glaucothoë</i> , Milne-Edwards. | <i>Mixtopagurus</i> , A. Milne-Edwards. |
| | ? <i>Xylopagurus</i> , A. Milne-Edwards. |

Two of the genera, viz., *Ostraconotus* and *Tylaspis*, agree in having the posterior part of the carapace broad and firm, and the abdomen poorly developed, characters in which they differ from all other Paguridæ.

Genus *Diogenes*, Dana.

- Diogenes*, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 438, 1852.
 ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 70, 1858.
 ,, Heller, Crust. südlichen Europa, p. 169, 1863.
 ,, Haswell, Catal. Austral. Crust., p. 156, 1882.
 ,, Henderson, Proc. Roy. Phys. Soc. Edin., vol. ix. part i. p. 66, 1886.

Front with a movable rostriform process situated between the ocular peduncles, but distinct from the rostrum. Antennal aciele with a broad base, occasionally bifid; the flagellum ciliated and frequently short. Chelipedes unequal, the left larger; fingers moving in an oblique plane. Second and third pairs of legs with long dactyli; the fourth pair subcheliform.

Diogenes eustos (Fabricius).

- Pagurus custos*, Fabricius, Suppl. Ent. Syst., p. 412, 1798.
 ,, ,, Latreille, Hist. Nat. des Crust. et Insect., t. vi. p. 165, 1802.
 ,, ,, Olivier, Ency. Méth., t. viii. p. 644, 1811.
 ,, ,, Milne-Edwards, Ann. d. Sci. Nat., sér. 2e, t. vi. p. 284, 1836; Hist. Nat. des Crust., t. ii. p. 236, 1837.
Diogenes eustos, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 439, pl. xxvii. fig. 10, 1852.
 ,, ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 83, 1858.
 ,, ,, Hess, Decapoden-Krebse Ost-Australiens, p. 35, 1865.
 ,, ,, Haswell, Catal. Austral. Crust., p. 157, 1882.

Habitat.—Port Jackson; depth, 2 to 10 fathoms. An adult male. It is recorded by Stimpson from the same locality, and by Dana also from New South Wales.

Diogenes eustos extends from the Australian seas to the shores of India.

Diogenes brevirostris, Stimpson (Pl. VI. fig. 3).

- Diogenes brevirostris*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 83, 1858.
 ,, ,, Studer, "Gazelle" Crust., Abhandl. d. k. Akad. d. Wiss. Berlin, p. 23, 1883.

Habitat.—Simon's Bay; depth, 10 to 20 fathoms. A female with ova, in an imperfect state of preservation.

Stimpson's types were from the above locality. This species may eventually prove to be synonymous with *Diogenes varians* (Costa), as the latter appears to be subject to considerable variation. The Challenger specimen differs, however, from the typical form

of *Diogenes varians*, in having the left chelipede with a tendency towards spinulation on its joints, and the lower border of the propodus curved; the ophthalmic scales also are sparingly dentate.

Diogenes guttatus, n. sp. (Pl. VI. fig. 4).

Characters.—The anterior portion of the carapace is slightly convex from side to side and smooth towards the centre; the front with its median process faintly marked, but a conspicuous projection external to each ophthalmic scale; the antero-lateral border (posterior to the insertion of the antennal peduncle) with an abrupt slope backwards, and armed with a few minute spinules; the lateral margin with about six acute curved spinules. The central portion of the carapace behind the cervical groove has a few granulations.

The rostriform process is entire, narrowing towards the acute apex which scarcely reaches the end of the ophthalmic scales; the latter are subentire, with two or three spinules at the inner and distal margin. The ocular peduncles extend to a point opposite the middle of the terminal joint of the antennal peduncle and the commencement of the same joint in the antennular peduncle. The antennal aciele is short, not reaching beyond the middle of the penultimate joint of the peduncle, and its inner border is quadrispinose; the second joint of the peduncle is broad, and possesses a prominent external spine; the flagellum is not twice the length of the carapace, and its under surface is fringed with long hairs.

The left chelipede has the meral and carpal joints subequal, slightly pubescent, and covered with spinuliform granulations, most strongly marked towards the borders, on which they become distinctly spinulous; the inner surface of the carpus is convex; the propodus is about one and a half times the length of the carpus, its outer surface is covered with perfectly circular, drop-like, and flattened elevations, the upper and lower borders are spinulous and almost straight; on the outer surface and near the carpal articulation are three curved denticles situated near the lower border, the inner surface is faintly granular; the dactylus has a series of dentations on the upper border and numerous granulations on the outer surface, the lower border is minutely toothed; the immobile finger has an obscure median ridge on the upper surface and numerous small teeth on the inner margin. The right chelipede is wanting in the single specimen. The first and second pairs of ambulatory limbs are smooth and sparingly ciliated, with a few spinules on the anterior borders of the meral joints; the dactyli are slightly bent, longitudinally canaliculate on the upper surface, and considerably longer than the propodi. The penultimate joint of the fourth leg has its lower border spinose.

The two terminal segments of the abdomen are smooth and moderately convex, the ultimate is longitudinally channelled.

Length of body¹ 13 mm., of carapace 6·8 mm., of left chelipede 15 mm., of first ambulatory limb 18·5 mm.

The peculiar markings on the left hand at once distinguish *Diogenes guttatus* from all other species of the genus. In some respects it approaches *Diogenes rectimanus*, Miers, but in this latter the outer surface of the hand is granulated and pubescent, and the lower border armed with strong spinules.

Habitat.—Station 187, Torres Strait; depth, 6 fathoms; bottom, coral mud. A single male specimen.

Genus *Pagurus*, Fabricius.

- Pagurus*, Fabricius, Suppl. Ent. Syst., p. 411, 1798 (*in part*).
 „ Milne-Edwards, Ann. d. Sci. Nat., sér. 2e, t. vi. p. 262, 1836; Hist. Nat. des Crust., t. ii. p. 213, 1837 (*in part*).
 „ De Haan, Crust. Japon., p. 202, 1850 (*in part*).
 „ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 449, 1852.
 „ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 71, 1858.
 „ Heller, Crust. südlichen Europa, p. 174, 1853.
 „ Miers, Catal. New Zealand Crust., p. 65, 1876.
 „ Haswell, Catal. Austral. Crust., p. 155, 1882.
 „ Henderson, Proc. Roy. Phys. Soc. Edin., vol. ix. part i. p. 67, 1886.

Front without a distinct rostral projection. Ocular peduncles stout, frequently constricted towards the middle, the basal scales of moderate size and usually separated by a considerable interval. Antennal acicle short and robust, the flagellum long and naked. Chelipedes rarely subequal, the left usually larger; fingers moving in a vertical plane, slightly excavated internally, and corneous at the tips. Penultimate pair of legs chelate.

Pagurus striatus, Latreille.

- Cancer arrosor*, Herbst, Naturg. Krabben u. Krebse, t. ii. p. 170, Taf. xliii. fig. 1, 1796.
Pagurus strigosus, Bosc, Hist. Nat. des Crust., t. ii. p. 77, 1802.
 „ *striatus*, Latreille, Hist. Nat. des Crust. et Insect., t. vi. p. 163, 1802.
 „ „ Olivier, Eucy. Méth., t. viii. p. 643, 1811.
 „ „ Risso, Crust. de Nice, p. 54, 1816.
 „ „ Desmarest, Consid. sur les Crust., p. 178, 1825.
 „ „ Roux, Crust. de la Médit., pl. x., 1828.
 „ „ Milne-Edwards, Ann. d. Sci. Nat., sér. 2e, t. vi. p. 270, 1836; Hist. Nat. des Crust., t. ii. p. 218, 1837.
 „ „ Costa, Fauna del Regno di Napoli, p. 7, 1845.
 „ „ Lucas, Anim. art. de l'Algér. Crust., p. 29, 1849.
 „ „ De Haan, Crust. Japon., p. 206, tab. xlix. fig. 1, 1850.
 „ „ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 84, 1858.

¹ Measured from the apex of the rostrum or median point of the frontal margin to the apex of the telson.

- Pagurus striatus*, Heller, Crust. südlichen Europa, p. 174, 1863.
 " " Brocchi, Ann. d. Sci. Nat., sér. 6e, t. ii. p. 34, pl. xiv. figs. 35-39; pl. xv. fig. 43, 1875.
 " " Miers, Ann. and Mag. Nat. Hist., ser. 5, vol. viii. p. 274, 1881.
 " " Studer, "Gazelle" Crust., Abhandl. d. k. Akad. d. Wiss. Berlin, p. 23, 1883.
 " *incisus*, Lamarek, Hist. Anim. sans Vert., t. v. p. 220, 1818.
 " " Latreille, Ency. Méth., Atlas., pl. ccex., 1818.
juv. Savigny, Descr. de l'Egypte, Zool. Crust., pl. ix. fig. 1, 1809-22 (*nomen nullum*).

Habitat.—Reefs, Zebu, Philippines. An adult male, in a shell covered by several specimens of a spotted Anemone.

Stations 204A, 204B, off Tablas Island; depth, 100 to 115 fathoms; bottom, green mud. An adult male, in a shell of *Ranella fijiensis*, Watson, with a single specimen of apparently the same species of spotted Anemone.

The true home of this species is the Mediterranean and north-west coast of Africa; its occurrence in the Oriental region is therefore a matter of extreme interest, for at present there is no evidence to show that it is cosmopolitan in its distribution. It has been previously recorded from Japan by De Haan, who states that on comparing Japanese and Mediterranean specimens no points of distinction could be found; a similar comparison of the Challenger specimens has in like manner failed.

Pagurus granulatus, Olivier.

- Cancellus maximus Bahamensis*, Catesby, Nat. Hist. Carolina, Florida, and the Bahama Islands, vol. ii. tab. xxxiv., 1731-43.
Macáo, Parra, Descripcion de diferentes piezas de historia natural, tab. lxi., 1787.
Pagurus granulatus, Olivier, Ency. Méth., t. viii. p. 640, 1811.
 " " Lamarek, Hist. Anim. sans Vert., t. v. p. 220, 1818.
 " " Milne-Edwards, Ann. d. Sci. Nat., sér. 2e, t. vi. p. 275, 1836; Hist. Nat. des Crust., t. ii. p. 225, 1837.
 " " Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 453, 1852.
 " " E. v. Martens, Archiv f. Naturgesch., vol. xxxviii. p. 120, 1872.
Petrochirus granulatus, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 71, 1858.
 " " Heller, Reise der Novara, Crust., p. 85, 1865.

Habitat.—Simon's Bay; depth, 10 to 20 fathoms. Two males, the body of the larger measuring $7\frac{1}{2}$ inches (0.190 mètre) in length.

This species—one of the largest of known Pagurids—belongs to the West Indian region, extending as far south as Rio Janeiro, from which locality it is recorded by Dana and Heller; its occurrence at the Cape is therefore of interest as greatly increasing its range of distribution. It was constituted by Stimpson the type of his genus *Petrochirus*, on grounds which appear to be of specific rather than of generic importance.

Pagurus calidus, Risso.

- Pagurus calidus*, Risso, Hist. Nat. de l'Eur. Mérid., t. v. p. 29, 1826.
 „ „ Roux, Crust. de la Médit., pl. xv., 1828.
 „ „ Milne-Edwards, Ann. d. Sci. Nat., sér. 2e, t. vi. p. 271, 1836; Hist. Nat. des Crust., t. ii. p. 220, 1837.
 „ „ Lucas, Anim. art. de l'Algér., Crust., p. 29, 1849.
 „ *calidus*, White, Catal. Crust. Brit. Mus., p. 59, 1849.
 „ „ Heller, Crust. südlichen Europa, p. 176, 1863.
 „ *diogenes*, Costa, Fauna del Regno di Napoli, Crust., p. 5, 1845.

Habitat.—St. Vincent, Cape Verdes. Three specimens (two adult and one young), the largest inhabiting a shell which is covered by Anemones. Bands of a brilliant red colour are still visible on the carapace, ocular peduncles, and ambulatory limbs.

Station VIII, off Gomera, Canaries; depth, 78 fathoms; bottom, volcanic sand. A single immature specimen.

Pagurus calidus is a well-known Mediterranean species. It is recorded by Miers from Madeira and the Canaries.

Pagurus deformis, H. Milne-Edwards.

- Pagurus deformis*, Milne-Edwards, Ann. d. Sci. Nat., sér. 2e, t. vi. p. 272, pl. xiii. fig. 4, 1836; Hist. Nat. des Crust., t. ii. p. 222, 1837.
 „ „ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 449, 1852.
 „ „ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 84, 1858.
 „ „ Heller, Reise der Novara, Crust., p. 86, 1865.
 „ „ Hilgendorf, Monatsber. d. k. preuss. Akad. d. Wiss. Berlin, p. 818, taf. iii. figs. 6, 7, 1878.

Habitat.—Reefs, Papeite. A single incomplete specimen (with the chelipedes wanting) is apparently referable to this widely distributed Indo-Pacific species.

Pagurus imbricatus, H. Milne-Edwards.

- Pagurus imbricatus*, Milne-Edwards, Ann. d. Sci. Nat., sér. 3e, t. x. p. 61, 1848.
 „ „ Miers, Catal. New Zealand Crust., p. 66, 1876; Crust. in Zool. H.M.S. "Alert," p. 264, 1884.

Habitat.—Station 186, Flinders Passage; depth, 8 fathoms; bottom, coral mud.

A female specimen (in spirit) has the imbricated scales which cover the chelipedes and ambulatory limbs of a beautiful deep red colour, those on the propodal joint of the larger chela marked by conspicuous white tubercles.

Pagurus imbricatus has been taken only in the New Zealand and Australian seas.

Pagurus euopsis, Dana.

Pagurus euopsis, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 452, pl. xxviii. fig. 6, 1852.

Habitat.—Station 172, off Nukalofa, Tongatabu ; depth, 18 fathoms ; bottom, coral mud.

Two specimens (male and female) agree closely with Dana's description, though the colours have somewhat faded. The joints of the apical half of the antennal flagellum are characteristically gibbous on the inner side, and the hairs on the limbs are of a reddish colour, tipped with white.

The types came from Upolu, Navigator Group, and Balabac Passage.

Pagurus dearmatus, n. sp. (Pl. VI. fig. 5).

Characters.—The anterior portion of the carapace is somewhat square in outline with a projection external to the insertion of each ocular peduncle, the surface tolerably smooth, with a few hairs towards the margins ; the posterior portion is entirely membranous.

The ocular peduncles are of large size, slightly flattened from above downwards, and constricted towards the middle, which is crossed by a broad red band ; the corneæ are deeply pigmented and semilunar in outline when seen from above ; the ophthalmic scales are broad at the base, their apices with three or four spines each. The antennal peduncles extend almost to the end of the eye-stalks and are sparingly ciliated, the acicle is of small size, not reaching beyond the distal end of the penultimate joint, the second joint is moderately broad, with a slightly marked external prolongation. The terminal joint of the antennular peduncle extends slightly beyond the apices of the eye-stalks.

The left chelipede is considerably larger than the right, with its basal joints sparingly ciliated ; the lower border of the merus is sharp and granulated ; the carpus is somewhat trigonal, the upper border with two or three curved denticles, the outer surface with a few granulations towards the anterior border ; the propodus is more than equal in length to the merus and carpus taken together, its outer surface uniformly covered with fine granulations, which show a tendency to become slightly coarser towards the apex of the immobile finger, the upper border with a series of small denticles ; the outer surface of the dactylus is coarsely granular and its lower border irregularly dentate (as is also the corresponding border of the immobile finger), the tips of both fingers are black and corneous. The right chelipede is almost smooth, the joints being but slightly granulated, though clothed with a few hairs ; the upper border of the carpus and propodus is provided with marginal denticles ; both fingers possess tufts of hairs, and the lower is moderately dilated. The ambulatory limbs are smooth and but sparingly ciliated ; the

third left leg has the propodus dilated, with its outer surface faintly granular and a well-marked series of granules on the lower border, which is sharp; the dactylus is about one and a half times the length of the penultimate joint, with its outer surface longitudinally canaliculate, the borders are faintly granular, and fringed with hair-like setæ which become yellow and horny towards the apex.

The penultimate abdominal segment bears a T-shaped marking; the terminal segment is irregular in shape, with a sinuous margin.

Length of body 24 mm., of left chelipede 16 mm., of right chelipede 13 mm., of third left leg 22.5 mm., of ocular peduncle 5 mm.

Pagurus dearmatus is allied to *Pagurus deformis*,^{*} Milne-Edwards, and *Pagurus pedunculatus* (Herbst); it comes nearest to the latter, in which, however, the propodus of the left chelipede is both tubercular and granular on the outer surface. From *Pagurus deformis* it is distinguished by the form of the penultimate joint of the third left leg, which in that species is carinated on the outer surface.

Habitat.—Admiralty Islands, 16 to 25 fathoms. A female with ova, in a shell of *Strombus variabilis*, Sow.

Pagurus similimanus, n. sp. (Pl. VI. fig. 6).

Characters.—The anterior portion of the carapace is six-sided, the front with a well-marked projection external to the insertion of each ocular peduncle, the surface is smooth towards the middle and bounded by a Y-shaped line posteriorly; a few long hairs arranged in tufts are present towards the lateral margins; the posterior portion is entirely membranous.

The ocular peduncles are of large size and shaped as in *Pagurus deformis*, Milne-Edwards, constricted towards the middle, with the corneæ dilated and not deeply pigmented, and their outline semilunar when seen from above; a dark band runs along the inner and outer surfaces of each peduncle; the ophthalmic scales are broad at the base, their apices with three spines each and several long hairs. The antennal peduncles extend almost to the end of the eye-stalks, while the joints are broad and fringed with numerous long hairs; the acicle is of moderate size and extends beyond the distal end of the penultimate joint, while its surface is pubescent; the external prolongation of the second joint is fairly well marked. The terminal joint of the antennular peduncle extends very slightly beyond the tips of the eye-stalks.

The chelipedes are of equal size and in every respect similar to one another, belonging essentially to the form which is characteristic of the genus *Clibanarius*; the merus is trigonal, with the surface smooth, but the borders are dentate and fringed with hairs; the three terminal joints are remarkably hirsute, the hairs long, of a reddish colour, and arranged in tufts, more sparingly met with on the inner surface; the outer surface of the carpus

and propodus (more especially the latter) is armed with numerous acute, corneous-tipped spines arranged in longitudinal rows, on the upper border of both joints the spines are of large size; the fingers are densely hirsute even on the inner surface, their opposed edges are armed with tubercular teeth, and their apices have a black horny external margin. The ambulatory limbs are hirsute, the hairs being confined to the margins, the anterior surface of the three terminal joints is armed with spines similar to those met with on the chelipedes, and a few spinules exist on the posterior borders of the meri. The last two pairs of legs are moderately pubescent.

The penultimate abdominal segment bears a deep T-shaped impression; the terminal segment has its sinuous margin thrown into four lobes.

Length of body 34 mm., of chelipede 26 mm., of third right leg 41 mm., of ocular peduncle 8 mm.

This species is characterised by the form of its chelipedes, which are those of a *Clibanarius* (the fingers moving almost in a horizontal plane as in that genus), though in all other respects it is a true *Pagurus*; it thus serves to illustrate the close connection which exists between these two genera.

Habitat.—Station 212, Celebes Sea; depth, 10 fathoms; bottom, sand. A female specimen, in the shell of a species of *Fusus*.

In addition to the above recorded species, the collection contains a *Pagurus* from off Port Jackson, 30 to 35 fathoms, too young to be satisfactorily identified.

Genus *Clibanarius*, Dana.

Clibanarius, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 461, 1852.

„ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 72, 1858.

„ Heller, Crust. südlichen Europa, p. 177, 1863.

„ Miers, Catal. New Zealand Crust., p. 67, 1876.

„ Haswell, Catal. Austral. Crust., p. 159, 1882.

Front with a distinct rostral projection. Ocular peduncles usually slender, the basal scales of small size and situated close together. Antennal acicle short, the flagellum naked. Chelipedes subequal and of similar conformation; the hand small, with the fingers moving in a horizontal plane, excavated internally, and corneous at the tips. Ambulatory limbs often with longitudinal colour markings, the penultimate pair chelate.

Clibanarius strigimanus (White).

Pagurus strigimanus, White, Proc. Zool. Soc. Lond., p. 122, 1847; Ann. and Mag. Nat. Hist. ser. 2, vol. i. p. 224, 1848.

Habitat.—Station 162, off East Moneœur Island, Bass Strait; depth, 38 fathoms; bottom, sand and shells. An adult male, in a shell of *Voluta undulata*, Lam.

The type specimen in the British Museum is from Tasmania.

As in the case of *Pagurus similimanus* this species shares the characters of *Pagurus* and *Clibanarius*, though its affinities are more with the latter genus; the chelipedes are subequal, a distinct rostral projection is present, and the ocular peduncles are tolerably long and slender, at the same time the ophthalmic scales are arranged as in *Pagurus*. The special features of *Clibanarius strigimanus* are the curious striated (stridulating?) areas on the inner surface of the hand of each chelipede, and the narrow and acute terminal portions of the ophthalmic scales.

The carapace of a Pagurid from Station 192, off the Ki Islands, with a very prominent rostrum and acute ophthalmic scales, is probably referable to the genus *Clibanarius*.

Genus *Calcinus*, Dana.

- Calcinus*, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 456, 1852.
 ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 72, 1858.
 ,, Haswell, Catal. Austral. Crust., p. 158, 1882.

Front with a distinct rostral projection. Ocular peduncles usually slender, the basal scales of moderate size and situated close together. Antennal aciele short, the flagellum naked. Chelipedes unequal, the left larger; the fingers moving in a vertical plane, excavated internally and calcareous at the tips. Second and third pairs of legs with short dactyli. Surface comparatively smooth and often highly coloured.

The species are confined to the tropics.

Calcinus tibicen (Herbst).

- ? *Cancer tibicen*, Herbst, Naturg. Krabben u. Krebse, t. ii. p. 25, pl. xxiii. fig. 6, 1796.
Pagurus tibicen, Latreille, Hist. Nat. des Crust. et Insect., t. vi. p. 169, 1802.
 ,, ,, Olivier, Ency. Méth., t. viii. p. 646, 1811.
 ,, ,, Milne-Edwards, Ann. des Sci. Nat., sér. 2e, t. vi. p. 278, 1836; Hist. Nat. des Crust., t. ii. p. 229, 1837; in Cuvier, Règne Anim., éd. 3e, Crust., pl. xlv. fig. 3, no date.
 ,, *levimanus*, Randall, Journ. Acad. Nat. Sci. Philad., vol. viii. p. 135, 1839.
Calcinus tibicen, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 457, 1852.
 ,, ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 85, 1858.
 ,, ,, Heller, Reise der Novara, Crust., p. 87, 1865.
 ,, ,, Hilgendorf, Monatsber. d. k. preuss. Akad. d. Wiss. Berlin, p. 823, 1878.
 ,, ,, Miers, Phil. Trans. Roy. Soc., vol. clxviii. p. 491, 1879; Crust. in. Zool. H.M.S. "Alert," p. 557, 1884.

Habitat.—Tahiti, near reefs, September 28, 1875. A female specimen of this widely distributed Indo-Pacific species, still retaining much of the original vivid coloration.

It has been pointed out by Hilgendorf that the description and figure of *Cancer tibicen*, Herbst, agree much better with the West Indian *Calcinus sulcatus* (Milne-

Edwards), and that the species referred by Milne-Edwards to *Pagurus tibicen* is probably distinct from that of Herbst. Herbst gives no locality, and his types have apparently been lost.

Genus *Eupagurus*, Brandt.

- Eupagurus*, Brandt, Middendorff's Sibirische Reise, Zool., Thl. i. p. 105, 1851.
 ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 74, 1858.
 ,, Heller, Crust. südlichen Europa, p. 158, 1863.
 ,, Miers, Catal. New Zealand Crust., p. 62, 1876.
 ,, Haswell, Catal. Austral. Crust., p. 152, 1882.
 ,, Henderson, Proc. Roy. Phys. Soc. Edin., vol. ix. part i. p. 68, 1886.
Bernhardus, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 440, 1852.

Front with a distinct rostral projection. Ocular peduncles scarcely so massive as those of *Pagurus*, the basal scales of moderate size and separated by a wide interval. Antennal aciele elongated and slender, the flagellum long and naked. Chelipedes rarely subequal, the right usually larger; the fingers moving in a horizontal plane, and calcareous at the tips. Penultimate pair of legs subchelate.

Eupagurus contains a larger number of species than any other genus of Paguridæ.

Eupagurus excavatus (Herbst), var. *meticulosa*, Roux.

- Cancer excavatus*, Herbst, Naturg. Krabben u. Krebse, t. ii. p. 31, tab. xxiii. fig. 8, 1796.
Pagurus angulatus, Risso, Crust. de Nice, p. 58, pl. i. fig. 8, 1816; Hist. Nat. de l'Eur. Mérid., t. v. p. 39, 1826.
 ,, ,, Desmarest, Consid. sur les Crust., p. 178, 1825.
 ,, ,, Roux, Crust. de la Médit., pl. xli., 1830.
 ,, ,, Milne-Edwards, Ann. d. Sci. Nat., sér. 2e, t. vi. p. 268, 1836; Hist. Nat. des Crust., t. ii. p. 217, 1837.
 ,, ,, Costa, Fauna del Regno di Napoli, Crust., p. 7, 1838.
 ,, ,, Lucas, Anim. art. de l'Algér., p. 28, 1849.
Eupagurus angulatus, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 75, 1858.
 ,, ,, Heller, Crust. südlichen Europa, p. 166, 1863.
 ,, *excavatus*, Miers, Ann. and Mag. Nat. Hist., ser. 5, vol. viii. p. 280, 1881.
 ,, ,, Henderson, Proc. Roy. Phys. Soc. Edin., vol. ix. part i. p. 70, 1886
 (ubi synonym).
 var. *Pagurus meticulosus*, Roux, Crust. de la Médit., pl. xlii., 1830.
 ,, ,, Milne-Edwards, Ann. d. Sci. Nat., sér. 2e, t. vi. p. 268, 1836; Hist. Nat. des Crust., t. ii. p. 217, 1837.
Eupagurus meticulosus, Heller, Crust. südlichen Europa, p. 167, 1863.
Pagurus tricarinatus, Norman, Brit. Assoc. Rep., p. 264, 1868.
Eupagurus tricarinatus, G. O. Sars, Norske Nordhavs-Exped., Crust., p. 11, pl. i. figs. 8-10, 1885.

Habitat.—"Label lost, probably Madeira." Two specimens, one a female with ova in a shell of *Fusus* (*Siphonorbis*) *amblyterus*, Watson.

The Rev. R. Boog-Watson, who identified the shell, states that the locality is more probably the Bay of Biscay, where *Eupagurus excavatus*, var. *meticulosa*, has more

recently been taken in deep water by the "Travailleur." The spines on the carpal and propodal joints of the second pair of ambulatory limbs are almost obsolete, though well-marked on those of the first pair, and the dactylus of the right chelipede has the tip folded under that of the immobile finger. In other respects the two examples agree closely with the recently published description of Sars. In British specimens (= *Pagurus tricarinatus*, Norman) the central carina on the larger hand is more strongly marked.

St. Vincent Harbour, Cape Verdes, 7 to 20 fathoms, July 1873. A specimen in a shell of *Pisania lineata*, Gmel., is referred somewhat doubtfully to the above species. The larger chela is wanting, and the smaller has the central carina less strongly developed than usual; the ophthalmic scales are also proportionately larger.

Eupagurus excavatus is a Mediterranean and North Atlantic species; the variety ranges as far north as the Norwegian seas and appears to be most prevalent in moderately deep water.

Eupagurus lacertosus, n. sp. (Pl. VI. fig. 7).

Characters.—The anterior portion of the carapace is smooth and moderately convex, the lateral border is also convex, the median frontal process prominent and acute, the lateral projections less strongly marked, but each tipped by a small spine; the posterior portion is entirely membranous, and raised somewhat above the level of the anterior part.

The ocular peduncles are moderately slender, with the corneæ but slightly dilated, and a few indistinct piliferous lines are seen on the upper surface; the ophthalmic scales have their apices slender and acute, with a faint inward inclination. The antennal peduncles exceed the eye-stalks by almost the whole length of the ultimate joint; the acicle is long and slender, with a slight double curve, and the inner border is pubescent, it extends to the middle of the terminal joint; the second joint has a well-marked external prolongation extending to the middle of the penultimate joint, and its inner border is spinulose, an acute spinule is also present in a corresponding position on the inner margin of the joint; the under surface of the third joint is densely pubescent. The second joint of the antennular peduncle has its distal end situated nearly opposite the end of the eye-stalk.

The right chelipede is considerably larger than the left, both are of large size as compared with the trunk, and the surface is granular and spiny. The right chelipede has the merus somewhat trigonal, the upper border with two or three spinules and a few hairs, the antero-external border is armed with a series of acute spines, and the lower surface is tubercular, the outer surface is slightly granular, and the superior and distal border bears two spinules situated close together; the upper surface of the carpus is covered with tubercular spines (with the exception of an elongated strip near the inner margin), the outer surface slopes abruptly and is granular, the inner border gives rise

throughout its extent to a row of acute spines, the two anterior of which are bifid; the propodus is about one-third longer than the carpus, its upper surface granular, with two oblique tubercular ridges, one running from near the outer margin of the posterior border to the external border of the immobile finger, the other from the inner margin of the posterior border to the middle of the base of the dactylus, an indistinct central row of tubercles is also present; the fingers are finely granular and less than half the total length of the propodus, their opposed edges are irregularly toothed, and the apex of the dactylus is slightly folded under that of the immobile finger; the dactylus has an obtuse median carina on its upper surface, and both fingers possess a minute corneous apical spine. The left chelipede has the merus similar to that of the right chelipede, with the exception that the spinules on the superior border are absent; the carpus is moderately pubescent, and bears two rows of acute spines above, those of the inner row being more numerous, a large bifid spine is placed near the centre of the anterior and upper border; the propodus has an acute central carina armed with tubercular spines, and the outer border is likewise acute, the surface is finely granular except the under part of the fingers, where there are numerous tufted hairs; the fingers cross one another towards their apices and are excavated inferiorly. The ambulatory limbs have the carpal joints slightly spiny on the anterior margin, a few spinules also exist on the posterior border of the merus of the first pair; the dactyli are curved and considerably longer than the propodi, their posterior surface is slightly canaliculate, and the apices are corneous.

The penultimate abdominal segment is crossed by a deep transverse impression; the ultimate segment is composed of four lobes, the two terminal with their margins spinulous.

Length of body 33 mm., of right chelipede 40 mm., of left chelipede 29 mm., of third leg 47 mm., of ocular peduncle 5.5 mm.

This species belongs to that section of the genus in which the hand of the left chelipede is carinated superiorly. It bears some resemblance to *Eupagurus excavatus*, but is at once distinguished by the absence of the central carina from the propodus of the right chelipede.

Habitat.—Station 166, off New Zealand; depth, 275 fathoms; bottom, Globigerina ooze. Two specimens, one an adult male, the other immature.

Eupagurus lacertosus, n. sp., var. *nana*, nov. (Pl. VII. fig. 1).

Characters.—Those of *Eupagurus lacertosus* with the following exceptions:—the lateral frontal projections are not tipped by spines, the antennal acicula extends only as far as the end of the eye-stalk, and the external prolongation of the second antennal joint is shorter; the chelipedes have essentially the same form and armature, though the spines are less strongly marked, and in some positions fewer in number, the granulations on the

surface of the right hand are also almost obsolete in some individuals. The difference in size is, however, the only one of importance.

In spite of the disparity in size this can only be regarded as a remarkably dwarfed variety of the above species, possibly confined to shallow water. In a tolerably large series of specimens, the body of the largest (a male) measures only 12 mm. in length, and several females bearing ova are even considerably less.

Eupagurus sinuatus, Stimpson, from Port Jackson, has the hand of the right chelipede armed with median and marginal series of spines, and the upper surface of the dactylus with a median row of acute tubercles. In *Eupagurus acantholepis*, Stimpson, from the same locality, the median frontal projection is obsolete, the eye-stalks exceed the antennal peduncles, and the hands of the chelipedes are spinulose. *Pagurus minutus*, Hess, also from Port Jackson, is unrecognisable; indeed, the short description given of this species is not sufficient to identify even the genus.

Habitat.—Station 161, off the entrance to Port Philip; depth, 33 fathoms; bottom, sand. Several specimens inhabiting shells of *Nassa pauperata*, Lam., *Turritella* sp., and *Natica* sp.

Station 162, off East Monecœur Island, Bass Strait; depth, 38 fathoms; bottom, sand and shells. Many specimens, in the following shells:—*Nassa pauperata*, Lam., *Turritella lamellosa*, Watson, *Turritella runeinata*, Watson, *Turritella cordisimei*, Watson, *Murex cordisimei*, Watson, and *Eburna australis*, Sow. One specimen from this locality has a species of *Peltogaster* adhering to its abdomen.

Station 163B, off Port Jackson; depth, 35 fathoms; bottom, hard ground. Several specimens in shells of *Ancilla oblonga*, Sow., *Nassa pauperata*, Lam., *Turritella sinuata*, Reeve, *Pleurotoma* sp., and *Natica* sp.

Eupagurus pubescens (Kröyer), var. *kroyeri*, Stimpson.

Pagurus pubescens, Kröyer, Conspect. Crust. Groenl., Naturh. Tidsskr., ii, p. 251, 1839; in Gaimard, Voyages en Scandinavie, pl. ii. fig. 1, 1849.

„ *Thompsoni*, Bell, Brit. Crust., p. 372, 1853.

„ „ White, Pop. Hist. Brit. Crust., p. 78, 1857.

Eupagurus pubescens, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 75, 1858.

„ „ Henderson, Crust. Decap. Firth of Clyde, p. 26, 1886; Proc. Roy. Phys. Soc. Edin., vol. ix. part i. p. 71, 1886.

var. *Eupagurus kroyeri*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 75, 1858; Ann. Lye. Nat. Hist. New York, vol. vii. p. 89, 1859.

Habitat.—Station 49, south of Halifax, Nova Scotia; depth, 85 fathoms; bottom, gravel, stones. Two small specimens in shells of *Natica affinis*, Gmel.

Eupagurus pubescens is one of the commonest North Atlantic Pagurids found in moderately deep water, the variety usually occurring in a state of commensalism with a species of *Epizoanthus*. It is recorded by Stimpson from the North Pacific.

Eupagurus tristanensis, n. sp. (Pl. VII. fig. 5).

Characters.—The anterior portion of the carapace is smooth, with the median frontal process moderately prominent, and subacute, the lateral projections less strongly marked; the posterior portion is entirely membranous.

The ocular peduncles are stout, with the corneæ slightly dilated; the ophthalmic scales have the terminal portion slender and acute. The antennal peduncle slightly exceeds the eye-stalks in length; the acicle is slender and curved, reaching the middle of the ultimate joint, its inner margin slightly pubescent; the external prolongation of the second joint is short, extending only as far as the middle of the penultimate joint. The antennular peduncle exceeds the eye-stalk by more than half the length of the terminal joint, which broadens out towards its distal end.

The chelipedes are unequal and of moderate size, the terminal joints are armed with acute spinules. The right chelipede has the meral joint trigonal, the upper and anterior border possesses three minute spinules, and a few spinules are also present on the lower surface and outer border; the carpus is more than two-thirds the length of the propodus, and its upper surface is uniformly covered with projections which become distinctly spiniform on the inner margin, the outer surface is smooth and of considerable vertical extent; the propodus is of almost the same breadth as the carpus, and the spinules on its upper surface are arranged in longitudinal rows, the margins are distinctly spinulose; the upper surface of the dactylus possesses a median row of tubercular spinules, and its tip is folded under that of the immobile finger. The left chelipede has the merus unarmed, with the exception of a few minute spinules on the lower border; the carpus has two rows of spinules on its upper surface, with a groove-like portion between, and the outer surface is granular; the propodus bears a central carina on the upper surface, surmounted by a row of spinules, and elsewhere it is obscurely tubercular; the dactylus is unarmed. The ambulatory limbs are smooth, a few indistinct spinules alone existing on the propodi of the first pair; the dactyli are canaliculate and but little curved, they exceed the propodi in length, and their lower border is fringed by a series of delicate corneous spines.

The penultimate abdominal segment is divided by a transverse constriction, and the ultimate segment is obscurely four-lobed.

Length of body 10 mm., of right chelipede 11 mm., of left chelipede 9 mm., of third left leg 13.5 mm., of ocular peduncle 2 mm.

This species is distinguished by its small size and the armature of the right chelipede.

Habitat.—Station 135c, off Nightingale Island, Tristan da Cunha; depth, 110 fathoms. A male specimen in a shell of *Murex* (*Pseudomurex*) *aëdonius*, Watson.

Eupagurus comptus (White), var. *jugosa*, nov. (Pl. VII. fig. 2).

Pagurus comptus, White, Proc. Zool. Soc. Lond., p. 122, 1847; Ann. and Mag. Nat. Hist., ser. 2, vol. i. p. 224, 1848.

Eupagurus comptus, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 75, 1858.

„ „ Miers, Zool. "Erebus" and "Terror," Crust., p. 3, pl. ii. fig. 5, 1874; Proc. Zool. Soc. Lond., p. 72, 1881.

Pagurus forceps, Cunningham, Trans. Linn. Soc. Lond. (Zool.), ser. 1, part. xxvii. p. 495, 1871.

Habitat.—Station 308, off Tom Bay, Patagonia; depth, 175 fathoms; bottom, blue mud. Many specimens were obtained in this locality.

Station 315, Falkland Islands; depth, 5 to 12 fathoms; bottom, sand, gravel. A young specimen, still retaining the red banding of the ambulatory limbs noted by White.

The Challenger examples all belong to the above-named new variety, which is characterised by the prominence of the ridges on the hand of the larger chelipede, the inner being especially raised; towards the centre there is a conspicuous bifurcate Λ -shaped ridge extending from the base of the immobile finger to the carpo-propodal articulation. In addition to the typical form Miers has described a variety which he terms var. *latimanus*, distinguished by the breadth of the hand and the prominence of its ridges.

Eupagurus comptus is only known as an inhabitant of the Patagonian region.

Eupagurus constans, Stimpson (Pl. VI. fig. 8).

Eupagurus constans, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 86, 1858.

Habitat.—Off Yokohama, Japan.

Originally taken by Stimpson in the Bay of Hakodadi, Yedo Island, at a depth of 4 fathoms, on stony ground. The front possesses three prominent acute projections, the mesial more produced than the two lateral. The chelipedes are elongated and of large size, the terminal joints armed with conical spines and setigerous tubercles; the right ischium possesses a prominent internal spine, and the merus has several spinules on its upper and distal border; the carpus and propodus have the conical spines arranged in marginal and central series, with the bristle-tufted tubercles scattered between; the dactylus of the left chelipede is devoid of spines. The ambulatory limbs are comparatively smooth. In the allied *Eupagurus spinulimanus*, Miers, from New Zealand, the median frontal tooth is almost obsolete, the spines on the hand of the larger chelipede are arranged in two rows, and the carpal joint of the second pair of ambulatory limbs is spinose on the upper surface.

Eupagurus spinulentus, n. sp. (Pl. VII. fig. 3).

Characters.—The anterior portion of the carapace is flattened but perfectly smooth, the median frontal projection is rounded and less prominent than the lateral processes, which are subacute; the posterior portion is also smooth and entirely membranous.

The ocular peduncles are stout, and constricted towards the base, with the corneæ much dilated and of a semilunar outline when seen from above; the ophthalmic scales are broad at the base, with the apices rounded and slightly pubescent, each tipped by a single spinule. The antennal peduncles slightly exceed the eye-stalks in length; the acicle is long and slender, extending almost to the distal end of the terminal joint, and its surface is provided with a few hairs; the external prolongation of the second joint is spinulous and almost reaches the distal end of the penultimate joint. The second joint of the antennular peduncle has its distal end situated nearly opposite the end of the eye-stalk.

The right chelipede is considerably larger than the left, and the surface of both is armed with numerous conical spines. The right chelipede has the merus somewhat trigonal, with its lower surface tubercular and pubescent, the upper and distal border is armed with eight or nine conical spines; the carpus is about two-thirds as long as the propodus, and its length exceeds the breadth, the upper surface is pubescent, and everywhere covered with the characteristic short and conical, yet acute spines, these being slightly more strongly marked towards the inner margin; the upper surface of the propodus is armed in a similar way, but the central part is elevated, and a groove devoid of spines runs parallel to the inner margin, the spines show a tendency towards arrangement in rows, more especially those near the margins, the lower surface of both carpus and propodus is armed with rounded tubercles; the dactylus is armed with tuberculiform spines, and its apex passes under that of the immobile finger; both fingers are sparingly toothed and possess numerous tufts of short setæ, their length is less than that of the remaining part of the hand. The left chelipede has the merus and carpus both trigonal, the upper and distal end of the former with two unequal spines, the upper surface of the latter is pubescent, and the carina strongly spinose; the upper surface of the hand is similar to that of the right chelipede, but the fingers are proportionately longer. The ambulatory limbs are long; the anterior border of the carpal and propodal joints is spinose, of the meral joint simply granular; the dactyli are remarkably long, and slightly tortuous, with the anterior surface longitudinally canaliculate, and fringed by a double row of yellow hairs. The last two pairs of legs are moderately pubescent.

The penultimate abdominal segment bears a deep transverse groove; the terminal segment is composed of four nearly equal and symmetrical lobes.

Length of body 41 mm., of right chelipede 40 mm., of left chelipede 32 mm., of third right leg 55 mm., of ocular peduncle 7.2 mm.

This species is allied to *Eupagurus constans*, Stimpson, and *Eupagurus spinulimanus*, Miers; from the former it is distinguished by the absence of the spine on the inner surface of the ischial joint of the right chelipede, the spines on the hand are scattered all over the upper surface, and the setigerous tubercles are absent; in the latter species the eyes are slender, the antennal acicle does not exceed the ocular peduncle, and the spinules on the right hand are mostly arranged in two rows. *Eupagurus armatus* (Dana), is an allied species, but the corneæ are not dilated, and the general form of the chelipedes is different.

Habitat.—Stations 204A, 204B, off Tablas Island; depth, 100 to 115 fathoms; bottom, green mud. A female with ova, in a shell of *Fusus nipponicus*, E. A. Smith.

Eupagurus rubricatus, n. sp. (Pl. VII. fig. 4).

Characters.—The anterior portion of the carapace is smooth and moderately flat, the frontal projections are scarcely indicated, the median being obtusely rounded; the posterior portion is entirely membranous.

The ocular peduncles are moderately stout, with the corneæ dilated; the opthalmic scales have the terminal portion slender and acuminate. The antennal peduncle slightly exceeds the eye-stalks in length; the acicle is long and slender, reaching nearly to the end of the peduncle, its inner margin is pubescent and has a double curve; the external prolongation of the second joint is spinulous, and extends as far as the distal end of the penultimate joint, a minute spinule is also present on the inner margin of the second joint. The second joint of the antennular peduncle has its distal end not reaching the termination of the eye-stalk.

The chelipedes are unequal and of moderate size, the terminal joints are covered with a matted pubescence, and the hands are swollen from side to side. The right chelipede has the meral joint trigonal, its lower surface tuberculate, and its distal and upper border with a single spine and a fringe of hairs; the carpus is a little more than half the total length of the propodus, with its breadth considerably less, the upper surface is pubescent, and a number of conical spines are scattered over the inner half, those on the free margin being specially prominent; the propodus is much broader than the carpus, its upper surface is covered with a matted pubescence, and possesses an irregular central elevation; scattered somewhat sparingly here and there, but especially towards the centre of this surface, are white rounded tubercles, the inner and outer margins are fringed with long hairs, and bear in addition a row of somewhat blunted spines; the upper surface of the dactylus possesses several rows of rounded tubercles, and its inner margin is armed with tubercular spines, the tip is folded under that of the immobile finger. The left chelipede has the merus similar to that of the right chelipede, the upper surface of the carpus is traversed by two rows of spines, with a smooth portion between; the propodus is placed at an

angle to the preceding joint, and its surface is covered by the characteristic short dense pubescence seen on the right chelipede, the outer border is strongly convex, and armed with blunt spines; the upper surface of the dactylus is densely pubescent, and the joint terminates in a minute horny claw. The ambulatory limbs have the carpal joints moderately spiny in front, the meri and propodi with a series of transverse piliferous lines on the upper surface; the dactyli are considerably longer than the propodi, slightly twisted towards their ends, and each terminates in a yellow horny claw; the borders, more especially towards the apex, are fringed with delicate horny spines.

The abdomen is wanting in the single specimen taken.

The following colour markings are still evident, though the specimen is preserved in spirit. At the distal end of the meral joint of both chelipedes and of the second and third pairs of legs, there is a conspicuous red band, deficient on the under surface, and the carpus of either chelipede has a patch of the same colour on both its inner and outer surfaces, near the junction with the merus; an indistinct patch is present also on the anterior surface and proximal end of the carpal joints of the second and third legs.

Length of carapace 13 mm., of right chelipede 28 mm., of left chelipede 21 mm., of third right leg 36 mm., of ocular peduncle 5·8 mm.

The form of the left chelipede is very characteristic of this species. It bears some resemblance to *Eupagurus novi-zealandiæ* (Dana), but the latter has the hand of the right chelipede not broader than the wrist, and the tubercles are arranged in six rows, the margins of the ambulatory limbs are also densely hirsute. In *Eupagurus angustus*, Stimpson, the hand of the left chelipede is somewhat swollen externally, but the median frontal process is acute, the carpus and propodus of the right chelipede are merely granulated, and there is a prominent tubercle on the under surface of the merus.

Habitat.—Station 169, off New Zealand; depth, 700 fathoms; bottom, blue mud. A male specimen.

Eupagurus oclusus, n. sp. (Pl. VII. fig. 6).

Characters.—The anterior portion of the carapace is smooth and moderately convex, with the median frontal process prominent and subacute, the lateral projections but slightly marked; the posterior portion is entirely membranous, and its surface is thrown into numerous folds.

The ocular peduncles are short and moderately stout, with the corneæ slightly dilated; the ophthalmic scales are slightly curved and hollowed out towards their apices, which are subacute. The antennal peduncle exceeds the eye-stalk by nearly the whole length of the ultimate joint; the acicle is slender and curved, reaching almost to the end of the peduncle, the external prolongation of the second joint is short and somewhat stout.

The antennular peduncle exceeds the eye-stalk by nearly the whole length of the last joint, which also extends considerably farther than the end of the antennal peduncle.

The chelipedes are very unequal and almost devoid of spines, the right with a broad and flattened hand. The right chelipede has the merus with its outer surface rugose, the lower surface convex and granular, a few spiniform tubercles are present on the lower and outer edge; the carpus is more than half the total length of the propodus, its upper surface is coarsely granular, and the lateral borders are raised and slightly spinose, the lower surface is somewhat angular and covered with small tubercles; the propodus is much broader than the carpus though its vertical dimension is considerably less, the upper surface is polished, slightly convex from side to side, and everywhere finely granular, the lateral borders are convex and remarkably thin, the lower surface is also finely granular; the free edge of the dactylus is very thin and the upper surface is finely granular. The left chelipede is of small size and extremely narrow, the lower surface of the merus is slightly spinose, and the carpus possesses a median row of spinules, its inner border also is somewhat tubercular; the propodus is a little wider than the carpus, a short tubercular carina exists on its proximal half, and the outer border is thin, the fingers are slightly bent downwards, and are more than half the total length of the hand. The ambulatory limbs are subequal in length to the right chelipede, and comparatively smooth, a few spinules exist on the anterior border of the carpal joints of the first pair; the dactyli are longer than the propodi, moderately curved, with a few setæ on the outer border towards the apex.

The terminal portion of the abdomen is wanting in the single specimen.

Length of body 16 mm., of right chelipede 22 mm., of left chelipede 15 mm., of third left leg 22 mm., of ocular peduncle 3 mm.

The form of the right chelipede—the broad flattened hand of which probably serves to plug up the mouth of a shell—is characteristic of this species; in this respect it bears some resemblance to "*Pagurus severus*," A. Milne-Edwards, from the "Talisman" dredgings.

Habitat.—Station 122, off Pernambuco; depth, 350 fathoms; bottom, red mud. A male specimen, in a shell of *Pleurotoma* sp.

A Pagurid without chelipedes from Station 201, off Samboangan, Philippines, appears to belong to the genus *Eupagurus*. It occurred in the shell of a species of *Trochus*.

Genus *Spiropagurus*, Stimpson.

Spiropagurus, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 74, 1858.

Anterior portion of the carapace depressed, the cervical groove deep; front with the rostral projection but slightly marked. Ocular peduncles short and stout, with the corneæ dilated; the basal scales of moderate size and separated by a considerable

interval. Antennal acicle slender, the flagellum naked. Chelipedes subequal and of small size, the right slightly larger; the fingers moving in a horizontal plane and calcareous at the tips. Second and third pairs of legs with long, flattened and ciliated dactyli. Coxa of the fifth left leg in the male with a long, spirally coiled, membranous organ (formed by a protrusion of the vas deferens), strengthened along its outer surface by a corneous band; the vas deferens of the right side scarcely produced.

Spiropagurus spiriger (De Haan).

Pagurus spiriger, De Haan, Crust. Japon., p. 206, tab. xlix. fig. 2, 1850.

Spiropagurus spiriger, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 86, 1858.

Habitat.—Torres Strait. A young male.

Station 188, Arafura Sea; depth, 28 fathoms; bottom, green mud. An adult male.

Station 190, Arafura Sea; depth, 49 fathoms; bottom, green mud. A female with ova.

Hong Kong, 10 fathoms. An adult female, in a shell of *Pleurotoma tuberculata*, Gray.

Station 208, off Manila; depth, 18 fathoms; bottom, blue mud. Two male specimens, one of which is young.

Admiralty Islands, 16 to 25 fathoms. A female with ova.

The Challenger dredgings have increased the known area of distribution of this species, previously recorded only from the Japanese and Chinese Seas.¹ Great variation is exhibited in the size of the piliferous lines on the chelipedes and legs, and in the amount of pubescence. The inner border of the carpus in both chelipedes possesses a row of spinules which vary considerably as to prominence in different individuals; the piliferous lines on the upper surface of both hands are usually arranged in double series; the flagellum of the antennæ is broad and flattened towards its base. In very hairy individuals the piliferous lines may occur even on the upper surface of the ocular peduncles and on the posterior part of the carapace, especially the branchial region (where they tend to become piliferous tubercles). The ocular peduncles only extend as far as the commencement of the penultimate joint of the antennal peduncle, and they are slightly exceeded by the acicle; the external prolongation of the second joint of the antennal peduncle is spinulose but of no great length; the ophthalmic scales are obtusely rounded at their apices. The terminal abdominal segment is bifid, and the margin spinuliferous. The female differs from the male in being of larger size, the chelipedes are proportionately smaller, and no sexual appendage is present; in the male the abdominal appendages—except those of the penultimate segment—are of very small size.

¹ *Spiropagurus spiriger* occurs also in the Indian seas, the writer having taken it recently at Madras, where it is apparently common in shallow water.

Spiropagurus elegans, Miers.

Spiropagurus elegans, Miers, Ann. and Mag. Nat. Hist., ser. 5, vol. viii. p. 278, pl. xvi. fig. 5, 1881.

Habitat.—Station VIII, off Gomera, Canaries, February 10, 1873; depth, 78 fathoms; bottom, volcanic sand. An adult male without the right chelipede.

This species is very closely allied to the last, and distinguished chiefly by the absence of piliferous lines from the chelipedes. The type specimen came from Goree Island, Senegambia.

Genus *Anapagurus*, Henderson.

Anapagurus, Henderson, Clyde Decapoda, Trans. Nat. Hist. Soc. Glasgow, p. 27, 1886; Proc. Roy. Phys. Soc. Edin., vol. ix. part i. p. 73, 1886.

Anterior portion of the carapace depressed, the cervical groove deep; front with the rostral projection but slightly marked. Ocular peduncles usually short and stout, with the corneæ dilated; the basal scales of moderate size and separated by a considerable interval. Antennal acicle slender, the flagellum usually ciliated. Chelipedes unequal, the right larger (in adult males the disparity in size is often very striking), the fingers moving in a horizontal plane and calcareous at the tips. Ambulatory limbs long and slender, the dactyli but slightly ciliated. Coxa of the fifth left leg in the male with a short, curved, membranous organ (formed by the protruded external portion of the vas deferens). Species of small size.

Anapagurus was originally described as constituting a subgenus of *Spiropagurus*; I am now, however, of opinion that it is entitled to rank as a separate genus. It is distinguished from the latter by the form of the chelipedes, ambulatory limbs, and sexual appendage.

The following species are referable to this genus:—

Anapagurus chiroacanthus (Lilljeborg), Scandinavian and British Seas.

Anapagurus hyndmanni (Thompson), British Seas.

Anapagurus lævis (Thompson), Scandinavian and British Seas; Mediterranean, in deep water ("Travailleur").

Anapagurus pusillus, n. sp., Azores, Canaries, and Cape of Good Hope (?).

Anapagurus australiensis, n. sp., New South Wales.

Anapagurus pusillus, n. sp. (Pl. VII. fig. 7).

Characters.—The anterior portion of the carapace is smooth. The ocular peduncles extend as far as the end of the penultimate joint of both the antennal and the antennular peduncles; the corneæ are moderately dilated, and the ophthalmic scales are long and acuminate. The antennal acicle slightly exceeds the eye-stalk; the external prolongation

of the second peduncular joint is well-marked and acute, and a smaller spine is also present on the inner margin of the same joint; the flagellum is almost naked.

The right chelipede has three acute spinules on the outer and distal border of the merus, and several curved and acute spines on the inner border of the carpus, towards the outer surface of the latter joint there is a second but very indistinct row of spinules; the carpus is about equal in length to the propodus (not including the immobile finger), and the upper surface of both joints is finely granular; the hand is but little dilated, and two slight elevations are present on its upper and inner surface, near the articulation with the carpus. The left chelipede is very narrow; the carpus possesses two rows of spinules on its upper surface; the fingers are slightly pubescent and comparatively long, exceeding in length the remainder of the propodus. The ambulatory limbs are smooth, a few spinules alone existing on the anterior border of the carpal joints; the dactyli are long and but slightly curved, that of the second pair being slightly longer on the left side.

The above description is taken from a male. In the female the antennal acicle and the external prolongation of the second peduncular joint are both less strongly marked, the dactyli of the ambulatory limbs are also shorter.

A full-grown male measures about 8 mm. in length, and females with ova even less.

In *Anapagurus chiroacanthus* (Lilljeborg) = *Pagurus ferrugineus*, Norman, to which this species bears some resemblance, the hand is pubescent, and the ophthalmic scales are shorter, with their apices subobtusely. In *Anapagurus laevis* (Thompson), the ophthalmic scales are rounded and their apices obtuse.

Habitat.—Station 75, near the Azores; depth, 50 to 90 fathoms; bottom, volcanic mud. Several specimens; the original shells have disappeared, leaving an investment which appears to consist of an *Epizoanthus*.

Station VIII, off Gomera, Canaries, February 10, 1873; depth, 78 fathoms; bottom, volcanic sand. Many specimens; the majority firmly ensconced in shells of *Turritella bicingulata*, Lam., one individual in a shell of *Nassa limata*, Chem.

Simon's Bay, 18 fathoms. A male specimen, in a shell of *Trochus benzi*, Krauss. It is with some hesitation that this is referred to the present species, and subsequent investigation may show it to be distinct. The chelipedes and ambulatory limbs are more hairy, and the dactyli of the latter are ciliated and slightly longer on the right side; the hand of the right chelipede is more strongly granulated, and a distinct finely tubercular line is present near the outer border. In other respects it agrees with *Anapagurus pusillus*.

Anapagurus australiensis, n. sp. (Pl. VII. fig. 8).

Characters.—The anterior portion of the carapace is smooth. The ocular peduncles are long and slender, exceeding the antennal peduncle and reaching the end of the

antennular peduncle, with the corneæ not dilated; the ophthalmic scales terminate in four small spines. The antennal acicle is short, only extending as far as the middle of the eye-stalk; the external prolongation of the second joint is fairly well marked.

The chelipedes are clothed rather sparingly with long hairs. The right chelipede has the carpus armed with three or four spines on its inner border; the propodus is subovate and but slightly dilated, its total length being greater than that of the carpus, the outer border possesses a row of prominent upturned spines, a few similar processes are met with on the inner border, and two prominent curved spines occur on the upper surface in the middle line and near the carpal articulation; the fingers are shorter than the remaining part of the propodus. The left chelipede is slender; the carpus is not equal in length to the propodus and its upper surface bears a few spinules arranged in two rows; the outer border of the propodus is slightly concave, and the inner border possesses a rounded projection near the insertion of the dactylus; the fingers are more than half the total length of the propodus and of considerable width, each terminating in a short, curved, horny claw. The ambulatory limbs are moderately pubescent; the dactyli are by no means slender, and scarcely equal in length to the propodi, their surface is curved, and a few horny spines are present on the lower border.

The sexual appendage in the male is rather long in proportion to the size of the species.

The total length is about 8 mm.

Anapagurus australiensis is characterised by the length of the eye-stalks, the form of the ophthalmic scales, and the armature of the chelipedes.

Habitat.—Port Jackson; depth, 2 to 10 fathoms. Two specimens (male and female); one of these occurred in a shell of *Trochus (Ziziphinus) decoratus*, Phil.

Genus *Catapagurus*, A. Milne-Edwards.

Catapagurus, A. Milne-Edwards, Bull. Mus. Comp. Zool., vol. viii. p. 46, 1880.

„ S. I. Smith, "Blake" Crust., Bull. Mus. Comp. Zool., vol. x. p. 14, 1882.

Hemipagurus, S. I. Smith, Ann. and Mag. Nat. Hist., ser. 5, vol. vii. p. 143, 1881; Proc. Nat. Mus. Washington, vol. iii. p. 422, 1881.

Front with the rostral projection but slightly marked. Ocular peduncles short and stout, with the corneæ dilated; the basal scales well developed and separated by a considerable interval. Antennal acicle slender; the flagellum not distinctly ciliated. Chelipedes slender and unequal, the right longer and stouter; the fingers moving in a horizontal plane and calcareous (?) at the tips. Ambulatory limbs long and slender, the dactyli distinctly ciliated. Coxa of the fifth right leg in the male with a membranous protrusion of the vas deferens, which is curved over the right side of the abdomen.

The species described below is referred with some uncertainty to this genus, although on the whole it agrees with the general characters furnished by Professor S. I. Smith.

It is to be noted, however, that the sexual appendage is rather longer and more slender than in the case of American specimens,¹ and there is indication of a slight protrusion on the left side. The gills are of the normal phyllobranchiate type.

The previously known species are two in number, viz., *Catapagurus sharreri*, A. Milne-Edwards (= *Hemipagurus socialis*, S. I. Smith), from off Barbados and the east coast of the United States, and *Catapagurus gracilis*, S. I. Smith, also from the latter locality; both are from moderately deep water.

Catapagurus australis, n. sp. (Pl. VIII. fig. 1).

Characters.—The anterior portion of the carapace is smooth. The eye-stalks are long, slightly exceeding the antennal peduncle, and reaching the middle of the last joint of the antennular peduncle; the corneae are slightly dilated; the ophthalmic scales have their apices rounded, but a prominent acute spine is present on the inner and distal margin of each. The antennal aciele reaches the middle of the last joint of the antennal peduncle; the external prolongation of the second joint is but slightly marked.

The right chelipede has the merus armed with two or three spines on the outer and distal border; the carpus is not equal in length to the propodus, its upper surface is densely pubescent and carries three rows (two marginal and one central) of curved acute spinules; the upper surface of the propodus is covered with a matted pubescence, and the margins are fringed with long hairs, a median ridge capped by about five spinules is present, though most prominent towards the proximal end, where it finally passes on to the upper surface of the immobile finger, and several spinules smaller than those of the carpus are found on the inner margin; the fingers are less than half the total length of the propodus, and a ridge is present on the upper surface of the dactylus. The left chelipede is more slender and slightly shorter than the right, but the armature is the same, the fingers are, however, more than half the total length of the propodus, and they terminate in well-marked horny claws. The ambulatory limbs are smooth, with the anterior borders of the carpal and propodal joints very slightly spinulous; the dactyli are considerably longer than the propodi, and moderately curved, a series of long horny setae is present on the anterior border, and a few shorter setae on the posterior border.

The abdomen is wanting in the better preserved specimen, but the carapace measures 4.8 mm. in length, and the ocular peduncle 2.5 mm.

Habitat.—Station 188, Arafura Sea; depth, 28 fathoms; bottom, green mud. A male specimen, from which the above description is taken.

Reefs at Levuku, Fiji Islands. A very imperfect specimen; in this the antennal aciele is slightly longer than in the above, almost reaching the end of the eye-stalk.

¹ Vide "Albatross" Crust., Rep. U.S. Fish. Comm., 1882, pls. iii., iv.

Genus *Paguristes*, Dana.

- Paguristes*, Dana, U.S. Explor. Exped., vol. xiii, Crust., part i. p. 436, 1852.
 ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 73, 1858.
 ,, Heller, Crust. südlichen Europa, p. 172, 1863.

Front with the rostral projection prominent and often acute. Ocular peduncles remarkably long and slender, the ophthalmic scales of moderate size and separated by a considerable interval. Antennules long. Antennal acicle robust, the flagellum usually short and ciliated. Chelipedes subequal, or of equal size, the fingers moving in a horizontal plane and calcareous or corneous at the tips. Penultimate pair of legs not chelate. Abdomen of the male with the first two segments bearing each a pair of appendages; in the female a single pair present on the first segment and a membranous oviferous sac borne on the left side of the second, third, and fourth segments.

Paguristes pilosus (H. Milne-Edwards).

- Pagurus pilosus*, Milne-Edwards, Ann. d. Sci. Nat., sér. 2e, t. vi. p. 282, pl. xiv. fig. 1, 1836;
 Hist. Nat. des Crust., t. ii. p. 233, 1837.
 ,, ,, White, in Dieffenbach's New Zealand, vol. ii. p. 266, 1843.
 ,, ,, Miers, Catal. New Zealand Crust., p. 66, 1876.
Paguristes pilosus, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 74, 1858.

Habitat.—Station 167A, off New Zealand; depth, 10 fathoms; bottom, mud. A male specimen, from which the left chelipede and ambulatory limbs have disappeared, apparently belongs to this species. The hairs on the chelipede and other parts are characteristically branched.

Paguristes pilosus has hitherto been taken only in the New Zealand seas.

Paguristes subpilosus, n. sp. (Pl. VIII. fig. 2).

Characters.—The anterior portion of the carapace is smooth, with a few slight rugosities towards the front, the anterior border is raised and the median frontal process is prominent and subacute, passing between the ophthalmic scales, the lateral processes are subacute and less prominent; the posterior portion is semicalcareous towards the centre.

The ocular peduncles are long and slender, reaching the end of the antennular peduncle and passing considerably beyond that of the antenna, each is slightly curved from above downwards, and with the exception of a small part near the cornea is of a faint reddish tinge; the ophthalmic scales are bidentate, one of the terminal spines being of small size. The antennal acicle extends almost to the end of the peduncle, its surface is pubescent and is armed with two spinules on the posterior border and one on the inner border near the base, the external prolongation of the second joint is broad and

quadrispinose, with its surface pubescent; the flagellum is very short (about equal in length to the anterior part of the carapace) and but slightly pubescent.

The chelipedes are of equal size and similar configuration. The merus is smooth above, with a few denticles on the lower and inner margin; the upper surface of both carpus and propodus is spinulose and densely pubescent, the spinules being most prominent on the inner margin, and some having corneous apices; on the carpus the pubescence is less striking and many of the hairs appear to arise from tubercles; the propodus is longer than the carpus, and its lower surface is considerably swollen, the fingers are more than half the total length of the propodus, and each terminates in a black horny claw, their upper surfaces are both spinulose and pubescent. The ambulatory limbs are moderately pubescent, and the propodal, carpal, and the ends of the meral joints are slightly spinose on the anterior border; the dactyli are half as long again as the propodi, somewhat flattened, and moderately curved, with both margins densely ciliated, they terminate also in strong horny claws. The last two pairs of legs are moderately pubescent.

The penultimate abdominal segment is traversed by a cross-shaped impression, the ultimate segment is trilobed, one of the lobes being greatly produced.

The larger (female) specimen gives the following measurements:—Length of body 28 mm., of chelipede 16 mm., of third right leg 26 mm., of ocular peduncle 5.5 mm.

The hairs on the surface of this species are regularly pinnate. It is allied to *Paguristes pilosus*, but distinguished at once by the greater prominence of the rostrum, and the form of the ophthalmic scale, antennal acicle, and external prolongation of the second joint of the antennal peduncle. A New Zealand species of *Clibanarius*, the *Clibanarius barbatus* of Heller, apparently presents many points of resemblance, but the dactyli of the ambulatory limbs are described as scarcely shorter than the corresponding propodi.

Habitat.—Station 167, off New Zealand; depth, 150 fathoms; bottom, blue mud. Two specimens, male and female, in shells of *Ancilla pyramidalis*, Reeve.

Paguristes visor, n. sp. (Pl. VIII. fig. 3).

Characters.—The anterior portion of the carapace is somewhat rugose in front, moderately convex from side to side, and the anterior border is slightly raised; the median frontal process is very prominent, with its apex subacute and slightly depressed, passing a considerable distance between the ophthalmic scales, the lateral processes are slightly less prominent and each is capped by one or two minute spinules; the posterior portion of the carapace is semicalcareous towards the centre.

The ocular peduncles have a slight lateral curve and are remarkably long and slender, extending to the end of the antennular peduncle and for more than one-third of their

length beyond the antennal peduncle, a few hairs are present on their upper surface; the ophthalmic scales are of small size and obscurely bidentate. The antennal acicle extends to the middle of the last joint of the peduncle, its surface is pubescent, and it is armed with two spines on the outer border and one or two on the inner; the external prolongation of the second joint is short and its apex bidentate; the flagellum is nearly as long as the body and but slightly ciliated.

The chelipedes are similar in appearance and subequal in size, with their terminal joints slightly pubescent. The merus has a circular red patch of large size on both its inner and outer surfaces towards the distal end, the external surface is also slightly tuberculate, and the inner and distal margin inferiorly bears a few spinules; the carpus is of small size, not equalling the dactylus in length, its upper surface, which is somewhat narrow, is covered with scattered spiniform tubercles; the upper surface of the propodus is armed in a similar way, many of the tubercles having corneous tips, and a specially prominent row is found on the inner margin; the fingers are more than half the total length of the propodus, and armed in the same manner as the last joint, their opposed edges are provided with small, regular, pearly teeth. The ambulatory limbs are moderately pubescent, and the anterior borders of the carpal and propodal joints are slightly spiny; the dactyli are slightly more than one and a half times the length of the propodi, and both their surfaces and margins are clothed with long stiff hairs, the terminal horny claws also are well developed. The penultimate pair of legs are moderately pubescent, but the last pair are almost smooth. The merus of the external maxillipedes possesses a few minute spinules on the internal border.

The penultimate abdominal segment is traversed by a deep transverse impression, and a faint longitudinal groove is also present, the ultimate segment is four-lobed, two of the lobes being produced.

The above description is taken from an adult male which gives the following measurements:—Length of body 43 mm., of carapace 16 mm., of chelipede 30 mm., of third right leg 42 mm., of ocular peduncle 10 mm.

This species is distinguished by the remarkable development of the ocular peduncles.

Habitat.—Station 122, off Pernambuco; depth, 350 fathoms; bottom, red mud. Two specimens (one of which is immature), in shells of *Cassidaria (Sconsia) striata*, Lam.

Paguristes hians, n. sp. (Pl. VIII. fig. 4).

Characters.—The anterior portion of the carapace is ovate, and slightly tuberculate towards the margins and anterior border, the projections on the frontal margin are subacute and but slightly prominent, the two lateral being more strongly marked than the median; the posterior portion is membranous and shows very slight traces of calcification towards its centre.

The ocular peduncles are long and of extreme tenuity, slightly exceeding the antennular peduncle and extending for more than one-third of their length beyond that of the antenna, they are also slightly curved from above downwards; the ophthalmic scales are elongated, with their apices hirsute and obscurely bidentate. The antennal acicle is stout and densely hirsute, extending as far as the middle of the terminal joint of the peduncle, it is armed with three spinules on the inner and two on the outer margin; the external prolongation of the second joint is short and stout, with its apex bidentate, the whole outer border of the peduncle is fringed with long hairs; the flagellum is sparingly ciliated and remarkably short, its total length being less than that of the ocular peduncle.

The chelipedes are similar in appearance and subequal in size, with the joints pubescent and spiny. The merus has its surface almost smooth, but the upper border is armed with a few spinules towards the distal end; the carpus is less than half the total length of the propodus, its upper surface is clad with long hairs and a few spinules are also present, four prominent spines are found on the inner margin; the upper surface of the propodus is slightly convex, the lower strongly so, above there are numerous long hairs and spinules, also several spines on the inner margin near the articulation with the carpus; the fingers are more than half the total length of the propodus, and both are pubescent and tubercular above, even when their apices meet a considerable hiatus exists between their inner margins. The ambulatory limbs have their borders, and to a certain extent the posterior surface also, covered with long delicate hairs; a few spines are present on the anterior border of the carpal and propodal joints, especially the latter; the dactyli are longer than the propodi and their margins are densely pubescent.

The penultimate abdominal segment bears a T-shaped impression, and the ultimate segment is four-lobed.

Length of body 18 mm., of carapace 9 mm., of chelipede 13 mm., of third right leg 17 mm., of ocular peduncle 4.5 mm.

This species is characterised by its extremely slender eye-stalks, the short antennal flagella, and the hiatus which exists between the fingers.

Habitat.—Station 208, off Manila; depth, 18 fathoms; bottom, blue mud. A male specimen.

A single specimen of a *Paguristes* taken along with the last species is in too imperfect a condition to be described in detail. The eye-stalks extend only as far as the end of the antennal peduncle and are exceeded by the antennular peduncle; the corneæ are dilated; the antennal acicle is long and slender, without lateral spinules. The carpus of the chelipede is clothed with iridescent hairs, and two rows of curved spinules are found on the upper surface; the propodus has its upper surface tuberculate, the tubercles being arranged in three rows; there is no hiatus between the fingers.

Genus *Tylaspis*, Henderson.*Tylaspis*, Henderson, Narr. Chall. Exp., vol. i. p. 900, 1885.

Carapace subcalcareous throughout, the anterior part strongly convex, the posterior part (behind the cervical groove) of considerable breadth. Front with a prominent rostral projection. Ocular peduncles moderately slender, the corneæ scarcely dilated; ophthalmic scales absent. Antennules long. Antennal acicle slender, the flagellum of moderate length. Chelipedes slender and unequal, the right larger, fingers moving in a vertical plane and calcareous at the tips. First two pairs of ambulatory limbs elongated and flattened, with long slender dactyli; the penultimate pair not chelate, and the last pair of small size. Abdomen semi-extended and of comparatively small size, with two pairs of genital appendages in the male; the appendages of the penultimate segment slender and sub-symmetrical.

The form of the carapace alone suffices to distinguish *Tylaspis* from all other Pagurids. It indeed presents some points of similarity to *Ostraconotus*, A. Milne-Edwards, but the latter genus has the dactyli of the ambulatory limbs broad and flattened, and a strikingly reduced abdomen. The single specimen came from the greatest depth at which any Anomurous Crustacean was taken by the Challenger. The form of the abdomen points to the species having occupied some other dwelling-place than the Gastropod shell usually selected by the soft-tailed Pagurids.

Tylaspis anomala, Henderson (Pl. VIII. fig. 5).*Tylaspis anomala*, Henderson, Narr. Chall. Exp., vol. i. p. 900, fig. 329, 1885.

Characters.—The anterior portion of the carapace is subglobose, and provided with several smooth rounded tubercles, of which two of large size are situated near the lateral border, and two others of small size nearer the median line. The anterior or frontal border possesses a well-marked median rostrum, with the apex subacute and the upper surface carinated; a slight lateral projection is also present opposite the base of each antennal peduncle. The posterior portion of the carapace is bounded anteriorly by the deep and continuous cervical grooves; the cardiac area is smooth and convex, distinctly circumscribed, with its wall calcified; the lateral or branchial region is of considerable extent, the surface is slightly convex and slopes downwards, while the outer border is convex, a longitudinal curved line divides it into two subequal areas covered everywhere with small irregular elevations. The posterior border of the carapace has a well-defined median concavity into which the first abdominal segment fits. The pterygostomial region is slightly pubescent, and separated from the remainder of the carapace by a conspicuous groove.

The ocular peduncles are somewhat slender, and the corneæ (which are deeply

pigmented) but slightly dilated, the proximal end of the peduncle is, however, enlarged. The antennal peduncle exceeds the eye-stalk by half the length of its terminal joint; the acicle is slender and but slightly curved, extending almost to the end of the terminal joint of the peduncle; the second joint is without an external prolongation, and a minute spinule is present on the inner border of the third joint; the last joint is broad and flattened; the flagellum slightly exceeds the body of the animal in length. The antennular peduncle is extremely long, as the eye-stalk only reaches to the middle of its second joint, the terminal joint is broad and flattened vertically; the inferior of the two flagella is composed of only six segments. The propodus of the external maxillipedes exceeds any of the other joints in length.

The right chelipede is considerably longer and very much stouter than the left; the merus is slightly longer than the ischium, and the lower border of both joints is armed with a row of minute spinules; the carpus is not half the total length of the propodus, its surface is trigonal, and armed both above and below with numerous small tubercular spinules; the hand is somewhat dilated, with the lower surface convex, and a series of minute tubercles on the inner margin; the fingers are considerably longer than the palm, to the axis of which they are placed at an obtuse angle, the dactylus bears two and the immobile finger three teeth on the inner margin. The left chelipede is slender, the merus and ischium are subequal, the carpus is longer than the palm, and its upper surface bears a few insignificant tubercles; the propodus is smooth and not dilated; the fingers are slender and incurved, with their opposed edges straight and minutely serrated. The first and second pairs of ambulatory limbs are long and flattened, those of the second pair greatly exceeding the first, the anterior and posterior borders of the meri, carpi, and propodi, more especially the first of these, carry a series of minute spinules, and their upper surfaces are granulated; the dactyli are subcylindrical, remarkably long and slender, and slightly tortuous. The ultimate and penultimate pairs of legs are extremely short, the former being almost rudimentary, the penultimate terminates in a curved horny claw-like dactylus.

The abdomen is short and membranous, without the usual spiral twisting seen in the majority of shell-inhabiting Pagurids. The appendages of the penultimate segment are almost symmetrical, and somewhat slender; the terminal segment is oblong, with its margins entire. The male has in addition three minute biramous appendages on the left side, and two pairs of genital appendages attached to the anterior segments.

Length of body of a male 16 mm., of right chelipede 17 mm., of left chelipede 14 mm., of first ambulatory leg 30 mm., of second ambulatory leg 46 mm., of ocular peduncle 3 mm.

Habitat.—Station 285, Mid South Pacific; depth, 2375 fathoms; bottom, red clay. A male specimen. There is nothing to indicate the manner in which the abdomen was protected.

Genus *Glaucothoë*, H. Milne-Edwards.

Glaucothoë, Milne-Edwards, Ann. d. Sci. Nat., sér. 1e, t. xix. p. 334, 1830; Hist. Nat. des Crust., t. ii. p. 306, 1837; in Cuvier, Règne Anim., Crust., éd. 3e, pl. xliii. fig. 2, no date.
? *Prophylax*, Latreille, in Cuvier, Règne Anim., éd. 2e, p. 78, 1829.

Carapace submembranous, with or without a median rostral projection. Ocular peduncles well-developed; ophthalmic scales absent. Chelipedes subequal or unequal, the fingers moving in a vertical plane; penultimate pair of legs subchelate, the ultimate pair chelate. Abdomen composed of seven distinct segments (including the telson), with submembranous terga, the second to the sixth segments inclusive each provided with a pair of biramous appendages (one of the rami being rudimentary), the last pair forming with the telson a symmetrical swimming fin.

Although such eminent authorities as Milne-Edwards and Dana placed *Glaucothoë* in the Thalassinidæ among the Macrura, there can now be no doubt, since the discovery of allied forms, that the general characters of this interesting and little-known genus justify its position in the family Paguridæ. The form of the abdomen is really its only essentially Macruran character, and this part more than any other is subject to modification in the Paguridæ; indeed the abdomen is scarcely less developed in *Cancelbus*, a genus the position of which in the Paguridæ has never been questioned. It is exceedingly probable that we have in *Glaucothoë* and allied forms, Pagurids of a very primitive type, still retaining many of the ancestral Thalassinid characters. Mr. Spence Bate, in a paper¹ written many years ago, maintains that *Glaucothoë* is merely an immature stage of *Pagurus* (or *Eupagurus*?), and he supports this theory by the description and figures of a larval Crustacean, taken on the surface off the south coast of England; it seems, however, that these are insufficient to prove that his specimen belonged to this genus, and he adduces no evidence to show that it subsequently becomes transformed into a soft-tailed Pagurid. The theory that ordinary Pagurids pass through a *Glaucothoë*-stage prior to taking possession of a shell, and even up to their attaining some size, is rendered improbable by the fact that specimens of *Glaucothoë* are extremely rare, while Hermits of very small size are frequently met with, in which the abdomen agrees with that of the adult in being soft and imperfectly segmented. The Challenger species described below has all the appearance of an adult animal, and, judging from the nature of its appendages, must have lived on the bottom. The previously known species of *Glaucothoë* are two in number, viz. *Glaucothoë peronii*, Milne-Edwards, which probably came from the Asiatic seas, and *Glaucothoë rostrata*, Miers, taken by the "Alert" off Madeira, at a depth of 15 to 50 fathoms. The genus *Prophylax*, Latreille, of which the type specimen has apparently been lost, is very closely allied to and perhaps identical with *Glaucothoë*; the latter name

¹ *Ann. and Mag. Nat. Hist.*, ser. 4, vol. ii. p. 116, pl. ix., 1868.

has in any case received general acceptance by later writers. Mr. E. J. Miers has described an allied genus *Pomatocheles* from the Japanese seas, found living in the shells of a *Dentalium*, distinguished chiefly by the form of its chelipedes (the fingers of which move in a horizontal plane), the shape of the ocular peduncles and of the carapace.

Glaucothoë carinata, n. sp. (Pl. IX. fig. 1).

Characters.—The anterior part of the carapace is slightly convex from side to side, and produced into a broad and subacute median projection situated between the bases of the ocular peduncles. The frontal process possesses a sharply defined median carina, which after passing a short distance back, loses itself on the carapace; a slight lateral ridge also diverges from each margin of the rostrum, and between this and the median carina a depression exists. The posterior part of the carapace is considerably broader than the anterior portion, and a somewhat shallow cervical groove separates the two. The cardiac area is narrow and triangular; the branchial area is convex.

The ocular peduncles are of large size, almost equalling half the length of the anterior part of the carapace; the corneae are broad and dilated, and each peduncle is constricted towards its middle. The antennular peduncle exceeds the eye-stalk by half the length of its terminal joint. The antennal peduncle is provided with a small pointed acicle, and the terminal joint is long and cylindrical, slightly exceeding the eye-stalk.

The chelipedes are equal in size, with the joints smooth and polished, though clothed with a few short silky hairs; the propodus is more than twice the length of the carpus, and considerably swollen from side to side, the outer surface is rather more pubescent than the remainder of the chelipede; the fingers are not equal in length to the hand, and even when closed a slight hiatus exists between their opposed edges, on the margin of which one or two obscure teeth can be made out; their apices are slightly corneous. The ambulatory limbs are smooth; the daetyli are long and moderately curved, ending each in a small backward claw, two minute spinules and a few hairs are present on their posterior margins.

The abdominal segments are smooth; the telson is oblong and narrows slightly towards the apex, which presents a slight median emargination, the lateral borders are straight and more than twice as long as the breadth at the apex. The appendages of the penultimate segment are broad and symmetrical.

The single specimen taken is an apparently adult male, with the following measurements:—Length of body 10 mm., of chelipede 6 mm., of first ambulatory leg 10·5 mm., of ocular peduncle 1·3 mm.

In *Glaucothoë peronii*, Milne-Edwards, there is no median frontal projection, and the chelipedes are unequal. In *Glaucothoë rostrata*, Miers, with which the Challenger specimen agrees in many respects, the rostrum is not carinated superiorly, the daetyli of

the ambulatory limbs are less strongly curved, and without black horny tips, while the apex of the telson is rounded.

Habitat.—Station 163A, off Twofold Bay, Australia; depth, 120 fathoms; bottom, green mud.

FIBRIBRANCHIATA.

Family PARAPAGURIDÆ.

Parapaguridæ, S. I. Smith, "Blake" Crust., Bull. Mus. Comp. Zoöl., vol. x. p. 20, 1883.

Antennular peduncle elongated or of moderate size, the first joint short and stout, the second and third joints slender and cylindrical; both flagella of small size. Antennal peduncle subcylindrical. Species marine and confined to deep water.

With the exception of the important difference in the structure of the branchiæ,¹ and the fact that the species appear to occur only in deep water, the general characters of this family are those of the Paguridæ.

Genus *Parapagurus*, S. I. Smith.

Parapagurus, S. I. Smith, Trans. Connect. Acad., vol. v. p. 50, 1879; "Blake" Crust., Bull. Mus. Comp. Zoöl., vol. x. p. 20, 1883.

Front with the rostral projection but slightly marked. Ocular peduncles usually slender; the ophthalmic scales spinular and of small size, separated by a considerable interval. Antennules long. Antennal aeicle well developed; the flagellum longer than the body, and usually naked. Chelipedes markedly unequal, the right larger; fingers moving in an oblique plane and calcareous or but slightly corneous at the tips. Ambulatory limbs with long and slightly tortuous dactyli; the penultimate pair of legs subchelate. Abdominal segments with fairly well developed terga; the male with the first two segments bearing each a pair of appendages, in the female the second is biramous and represented only on the left side, while the first pair are absent; in both sexes the third, fourth, and fifth segments are provided with a biramous appendage on the left side, one of the rami being rudimentary in all the male appendages, and in that of the fifth segment in the female.

All the females of this genus which I have had the opportunity of examining, possess the remarkable peculiarity of having an external genital opening present only on the coxa of the third left leg; but owing to the very imperfect state of preservation of

¹ In all, the gills are modified trichobranchiæ, each consisting of a central stem which gives rise to two collateral rows of rounded filaments, gradually decreasing in size towards the apex, whereas in the Paguridæ the stem gives rise to two rows of flattened leaflets.

the soft parts, I have been unable to ascertain by dissection whether there exists any corresponding deficiency as regards the right ovary. The previously known species of this characteristically deep-water genus are *Parapagurus pilosimanus*, S. I. Smith (= *Eupagurus jacobii*, A. Milne-Edwards), which has been taken in abundance off the east coast of the United States, by the Fish Commission and Coast Survey vessels, and *Parapagurus dimorphus* (Studer) recorded below.

Parapagurus dimorphus (Studer) (Pl. X. fig. 1).

Eupagurus dimorphus, Studer, "Gazelle" Crust., Abhandl. d. k. Akad. d. Wiss. Berlin, p. 24, taf. ii. figs. 11-12, 1883.

Habitat.—Station 135c, off Nightingale Island, Tristan da Cunha; depth, 110 fathoms. Several specimens of small size, in shells of *Murex* (*Pseudomurex*) *aëdonius*, Watson, taken along with *Eupagurus tristanensis*.

Station 142, off the Agulhas Bank; depth, 150 fathoms; bottom, sand. A large number of specimens (including several females with ova), inhabiting shells which have become almost completely absorbed by an investing *Epizoanthus*.

Station 145 or 145A, off Marion Island; depth, 140 or 310 fathoms; bottom, volcanic sand. A single specimen in a very imperfect state of preservation.

Station 311, off Port Churrua, Patagonia; depth, 245 fathoms; bottom, blue mud. A female with ova, in a shell of *Pleurotoma acanthodes*, Watson.

In this species the eye-stalks are of considerable size and the cornæ dilated, although these organs are slender in all other known members of the genus. The sexual dimorphism chiefly manifests itself in the form of the right chelipede, which in the female has the hand short and broad, with the dactylus (when closed) bent almost at a right angle to the upper border, whereas in the male the hand is proportionately narrower and the fingers are elongated and oblique. Dr. Studer has figured what is evidently an old male, for the fingers of the right chela are represented as meeting only at the tip, leaving a considerable intervening hiatus; in none of the Challenger specimens is this condition observable. The right chelipede has a prominent and acute dentate lobe on its lower and distal margin, and a similar less extensive, though more pronounced, lobe occurs in the same position on the carpus; the lateral margins of the hand are sharp and dentate. The ophthalmic scales are poorly represented, and a reddish band is still visible on each lateral surface of the eye-stalk. The antennal peduncle extends to the end of the eye-stalk, the external prolongation of the second joint is moderately long and acute, and the third joint bears a prominent spinule on its inner surface; the inner margin of the acicle is distinctly spinose, and the flagellum is faintly ciliated. The terminal joint of the antennular peduncle is considerably shorter than the antennal

peduncle. The ambulatory limbs, with the exception of a few spinules on the anterior border of the carpal joints, are comparatively smooth. An adult male measures 31 mm. in length.

Parapagurus dimorphus was dredged by the "Gazelle" off the Cape of Good Hope, at a depth of 117 fathoms, living in shells of *Buccinum porcatum*, Gm., which were completely covered by colonies of *Epizoanthus cancrisocius*, von Martens.

Parapagurus abyssorum, A. Milne-Edwards, MS. (Pl. IX. fig. 2).

Characters.—The anterior portion of the carapace is strongly calcified, somewhat square in outline, and moderately convex both from side to side and from before backwards. The surface is smooth and polished, though certain slight inequalities are noticeable towards the lateral margins, and the frontal border is raised. The median frontal projection is obtusely rounded, scarcely reaching the bases of the ocular peduncles, the lateral projections are even less strongly marked, but with pointed apices. The carapace behind the cervical groove is submembranous, with the exception of the narrow cardiac area which is calcified; the branchial regions are strongly convex.

The ocular peduncles are narrow, especially towards the centre, but dilated somewhat at the base; the corneæ are of small size though deeply pigmented; the ophthalmic scales are narrow and spinulose, and each terminates in a pointed projection. The antennal peduncles are massive and exceed the eye-stalks by the whole length of the ultimate joint; the acicle is long and slender, extending slightly beyond the distal end of the terminal joint, it has a slight sigmoid curve and the inner margin bears a row of small spinules; the external prolongation of the second joint is short and its apex rounded; the terminal peduncular joint is broad and somewhat flattened; the flagellum is more than twice the total length of the body. The first joint of the antennular peduncle has its distal end situated opposite the end of the eye-stalk, the terminal joint is half as long again as the second joint, and almost equal in length to the whole antennal peduncle.

The chelipeds are moderately slender and of considerable length, with the joints granular and pubescent. The right chelipede has the merus somewhat shorter than the carpus, with its outer surface granular, and a dense pubescence underneath, the inner surface is comparatively smooth, and a raised tubercular line exists immediately behind the anterior margin, at the inner and distal margin on the under surface a few tubercular spines of small size are met with; the carpus is about equal in length to the hand (not including the fingers), and the upper surface is uniformly granulated, the lower surface is convex from side to side, and is both pubescent and granular, while the lateral borders are not sharply defined; the propodus is but little dilated and its general characters are those of the carpus. The immobile finger is placed at an obtuse angle to the lower border and

its upper margin bears two irregular compound teeth, in addition to some small tufts of setæ; the dactylus has its upper surface granular, and like the immobile finger is slightly incurved, its lower margin bears two compound teeth and numerous tufts of setæ. The left chelipede is slender and the joints are comparatively smooth, though the inner border of the carpus is raised and tubercular, and its lower surface is densely pubescent; the dactylus is equal to more than half the total length of the propodus, whereas that of the right chelipede is less than half the length. The ambulatory limbs are remarkably long and slender, the extreme tenuity of the dactyli being a special feature; the second exceeds the first by about half the length of its dactylus; the meral, carpal, and propodal joints have their anterior, and to a certain extent their lateral surfaces granular; the dactyli are comparatively smooth and slightly tortuous, with the apex acute, they are also obscurely canaliculate, their length appears to vary considerably in different specimens, and in certain adult males may equal that of the body. The ultimate and penultimate pairs of legs have their borders fringed with delicate hairs.

The penultimate abdominal segment bears a cruciform impression; the terminal segment is composed of a single lobe with a sinuous margin.

The above description is furnished by an adult male taken at Station 300, which gives the following measurements:—Length of body 50 mm., of right chelipede 73 mm., of left chelipede 55 mm., of third right leg 140 mm., of dactylus of same leg 49 mm., of ocular peduncle 6 mm.

A certain amount of variation is noticeable in specimens from different localities, more especially as regards the amount of pubescence and granulation on the chelipedes and ambulatory limbs. In a specimen from Station 133, the ophthalmic scales are bidentate, and the external prolongation of the second antennal peduncular joint is dentate. In spite of these apparent incongruities, an examination of the numerous specimens taken by the Challenger has convinced me that they all belong to a single species. Females are of much smaller size than males, indeed one with ova from Station 300 (where the largest males occurred) measures only 29 mm. in length; in females also, the immobile finger of the right chela is bent at a more obtuse angle to the hand than in males.

Parapagurus abyssorum is of special interest on account of its very extended distribution and deep-water habitat. It was taken by the Challenger in all the great ocean beds explored (with the exception of the Southern Ocean between the Cape and Australia), and nowhere in less than 1000 fathoms of water. It appears to be invariably associated with an Anemone which exerts a solvent action on the Gastropod shell originally selected as a dwelling-place by the Hermit; in many cases the shell has entirely disappeared, and in others it is greatly reduced, while the Anemone forms a soft and saccular covering on the exterior. The "Talisman" collection at Paris contains examples of this species, named *Pagurus abyssorum* by Professor A. Milne-Edwards; I have therefore in the above description adopted his specific name. In *Parapagurus pilosi-*

manus, S. I. Smith, the chelipedes are more densely pubescent, the immobile finger of the right chela is not bent at an angle to the lower border of the hand, and the fingers of the left chela are relatively shorter than in the present species.

Habitat.—Station 56, off Bermuda; depth, 1075 fathoms; bottom, coral mud. A female with ova in a shell of *Trochus (Margarita) infundibulum*, Watson.

Station 106, off Sierra Leone; depth, 1850 fathoms; bottom, Globigerina ooze. Several specimens in shells of *Pleurotoma* sp. and *Dentalium* sp.

Station 133, near Tristan da Cunha; depth, 1900 fathoms; bottom, Globigerina ooze. Three specimens in shells of *Ianthina rotundata*, Leach (a pelagic Mollusc, the shells of which had sunk to the bottom), and *Pleurotoma* sp.

Station 195, off Banda; depth, 1425 fathoms; bottom, blue mud. Several specimens protected merely by Anemones.

Station 205, off the Philippines; depth, 1075 fathoms; bottom, blue mud. A single specimen in a shell of *Pleurotoma* sp.

Station 218, north of Papua; depth, 1070 fathoms; bottom, blue mud. A single specimen protected by an Anemone.

Station 237, off Yokohama; depth, 1875 fathoms; bottom, blue mud. Several specimens protected by Anemones, as well as two young individuals in bare shells of *Pleurotoma* sp. (?).

Station 300, west of Valparaiso; depth, 1375 fathoms; bottom, Globigerina ooze. Many fine specimens protected by Anemones, with the shells absent or so wasted as to be unrecognisable.

Station 304, Port Otway, Patagonia; depth, 45 fathoms; bottom, green sand; a single specimen in a shell of *Trochus* sp. There can be little doubt that in this case some error has arisen in the labelling, as a shallow-water habitat for the species is quite out of the question.

Station 335, near Tristan da Cunha; depth, 1425 fathoms; bottom, Pteropod ooze; A single specimen in a shell of *Pleurotoma* sp.

Parapagurus abyssorum, A. Milne-Edwards, var. *scabra*, nov. (Pl. IX. fig. 3).

Characters.—The granulations present on the chelipedes and ambulatory limbs in the typical form of the species, are replaced in the variety by short thick spinules. In the chelipedes these are most strongly developed on the upper surface of the carpus, and on the lower surface of the merus, while in the ambulatory limbs they are well marked on the anterior border of the meral, carpal, and propodal joints. The external prolongation of the second antennal peduncular joint is dentate, and an acute spinule is present on the inner and distal margin of the same joint; the antennal acicle has a series of distinct spinules on its inner border. The eye-stalks as well as the antennal peduncles show a

slight amount of pubescence. A small tuft of corneous hairs is noticeable towards the apex of the ambulatory dactyli—a feature which may also be detected in some specimens of the typical form.

The single specimen taken is a female measuring 37 mm. in total length; but for the large series of examples of *Parapagurus abyssorum*, and the occurrence of intermediate forms, I should have felt inclined to regard it as belonging to a distinct species.

Habitat.—Station 68, between Bermuda and the Azores; depth, 2175 fathoms; bottom, Globigerina ooze. A female with ova, in an investment of Zoanthoid polypes.

Parapagurus affinis, n. sp. (Pl. IX. fig. 4).

Characters.—The anterior portion of the carapace is moderately convex, and slightly pubescent towards the lateral margins, the frontal projections are scarcely represented, the median being obtusely rounded; the posterior portion is entirely membranous.

The ocular peduncles are moderately slender, and pubescent above, with the corneæ slightly dilated; the ophthalmic scales terminate in from four to six minute denticles. The antennal peduncle exceeds the eye-stalk by more than half the length of its terminal joint; the acicle extends almost to the distal end of the last joint, and is moderately curved, its inner margin is pubescent and armed with a row of minute teeth; the external prolongation of the second joint is short, with its apex dentate, an ill-defined tooth is also present on the inner and distal margin of the second joint; the remaining joints of the peduncle as well as the flagellum are slightly pubescent. The antennular peduncle exceeds the eye-stalk by the length of its terminal joint and about half that of the second joint; the ultimate joint is slightly pubescent, and somewhat shorter than the antennal peduncle.

The chelipedes are unequal and of moderate size, the terminal joints granular, and covered with long delicate hairs. The right chelipede has the meral joint almost smooth, with a few granulations on the lower surface, and a serrated lobe on the distal inferior margin, a piliferous line is seen on the upper surface running parallel to the anterior border; the carpus is about two-thirds the length of the propodus, the upper surface is granular and faintly pubescent, and a raised piliferous line runs parallel to the anterior border, with the exception of its inner margin the lower surface is comparatively smooth; the propodus is considerably broader than the carpus, the granulations are well marked on the rounded lateral margins, while the remainder of the upper surface is smooth, though clothed with long silky hairs, the lower surface is densely pubescent, especially towards its anterior end; the dactylus is more than half the total length of the hand, and its upper border and inner surface are densely clothed with hairs; the fingers terminate in minute horny tips, and several ill-defined teeth are present on their opposed edges. The left chelipede has the carpus almost equal in length to the propodus, its

inner surface is hairy, and two acute spinules are seen on the anterior border; the fingers are almost straight, and more than half the length of the hand, with their opposed edges parallel and minutely serrated. The ambulatory limbs are smooth and moderately long, the anterior border of all the joints is pubescent, and a small spine exists on the anterior border and distal end of the carpi; the dactyli are about equal in length to the propodi and carpi taken together, each terminates in a yellow horny spine, and a tuft of corneous hairs is present on the anterior surface near the apex. The last two pairs of legs are moderately pubescent.

The penultimate abdominal segment bears a T-shaped impression; the terminal segment is irregularly lobed.

An adult female gives the following measurements:—Length of body 25 mm., of right chelipede 30 mm., of left chelipede 22 mm., of third right leg 43 mm., of ocular peduncle 4 mm.

This species is allied to *Parapagurus abyssorum*, from which it is distinguished by the form and armature of the right chelipede, ophthalmic scales, and the dactyli of the ambulatory legs, in addition to other less important distinctions. The form of the eye-stalks, and the diminished length of the terminal antennular peduncular joint, separates it from *Parapagurus pilosimanus*, S. I. Smith.

Habitat.—Station 214, off the Meangis Islands; depth, 500 fathoms; bottom, blue mud. A female with ova, in a shell of *Pleurotoma* sp.

Parapagurus latimanus, n. sp. (Pl. X. fig. 2).

Characters.—The anterior portion of the carapace is slightly convex, and rugose towards the lateral margins, the three frontal projections are obtusely rounded and but slightly marked; the two cervical grooves form a rounded line separating the two portions; the posterior portion of the carapace is smooth and entirely membranous.

The ocular peduncles are slender though dilated towards the base, with a few hairs on their upper surface; the ophthalmic scales are short, entire, and subacute. The antennal peduncle exceeds the eye-stalk by more than half the length of its terminal joint, the acicle is but slightly curved, extending almost to the end of the ultimate joint, and its surface is pubescent, especially towards the apex which is provided with a tuft of hairs; the external prolongation of the second joint is well marked, and terminates in two subacute teeth; the flagellum is of moderate length and slightly pubescent. The first joint of the antennular peduncle has its distal end situated almost opposite the end of the eye-stalk, the terminal joint slightly exceeds the total length of the antennal peduncle.

The disparity in size is very marked in the chelipedes; the surface of both is pubescent, and the larger is also granulated. The right chelipede has the merus with an oval

impressed line on its inner surface (seen to a lesser extent in other members of the genus) and the lower and distal margin is produced into a serrated lobe, the upper surface is faintly granular, and bears a raised line parallel to and adjoining the anterior border; the carpus is about two-thirds the length of the propodus, and its upper surface is uniformly granular and pubescent, a few granulations are also present on the lower surface; the propodus is considerably dilated and its upper surface is glabrous, a number of granulations with a tendency towards linear arrangement exist over the greater part of this surface, but towards the lateral borders these are replaced by short crowded spinules, with hairs interspersed, the lower surface is smooth and polished, a few granulations and hairs being merely present towards the lateral margins, the immobile finger is not bent at an angle to the lower margin of the hand; the dactylus is slightly more than half the total length of the propodus, while its upper surface is pubescent, and covered with short crowded tubercular spinules, the opposed edges of the fingers are provided with short hairs and a few small irregular teeth. The left chelipede has its joints unarmed though pubescent, the upper surface of the carpus being specially hairy, the hand is but little dilated, and the fingers are more than half the total length of the propodus. The ambulatory limbs are smooth and unarmed, the dactyli are remarkably long and slender, being nearly twice the length of the propodi, and a series of corneous setæ is present on the anterior border near the apex. The last two pairs of legs are smooth and moderately pubescent, especially towards the terminal joints.

The penultimate abdominal segment bears a cruciform impression; the terminal segment is obscurely bilobed.

Length of body 22 mm., of right chelipede 18 mm., of left chelipede 13 mm., of third right leg 26 mm., of ocular peduncle 3 mm.

Habitat.—Station 167A, off New Zealand; depth, 10 fathoms; bottom, mud. A male specimen.

Parapagurus gracilis, n. sp. (Pl. X. fig. 3).

Characters.—The anterior portion of the carapace is smooth and moderately convex, submembranous towards the middle, with the lateral surfaces calcified, and each traversed by an oblique line which passes outwards and backwards from the submembranous part, the frontal projections are scarcely evident; the two cervical grooves form an evenly rounded line; the posterior portion is entirely membranous.

The ocular peduncles are stouter than is usual in this genus, with a few hairs on the upper surface and a faint reddish band still evident along each lateral surface, the corneæ are slightly dilated and of rather large size; the ophthalmic scales are broad towards the base, but acute and spinulous at the apex. The antennal peduncle scarcely exceeds the

eye-stalk; the aeicle is moderately curved, and almost reaches the end of the terminal joint, with its surface pubescent and the inner margin dentate; the external prolongation of the second joint is moderately long, and entire. The antennular peduncle exceeds the eye-stalk by the length of its terminal joint, which at the same time is greater than the total length of the antennal peduncle.

The chelipedes are narrow and elongated, with the joints slightly pubescent and faintly granular. The right chelipede has the merus provided with a serrated lobe on its lower and distal margin; the carpus is slender and elongated, almost equalling the hand in length, the granules are most strongly developed on its lower surface which projects considerably; the propodus is almost twice the breadth of the carpus, the outer border is thin and curved, while the inner is thick, and traversed by two ridges, of which the inner (as regards the axis of the joint) is continued back to the carpo-propodal articulation, and the outer or marginal is deficient behind, the granulations are almost obsolete on the upper surface, though a few can be made out towards the lateral margins, the lower surface is smooth, and concave in front; the fingers are short and remarkably incurved, the upper surface of the dactylus is dentate and densely pubescent, while a few ill-defined teeth of small size are seen on the opposed margins. The left chelipede is slender, and compressed laterally, with the carpus slightly longer than the propodus; the fingers are bent downwards and slightly incurved, while their length is less than that of the palm. The ambulatory limbs are smooth, with the exception of a few hairs scattered over the joints (a minute spinule is seen in one of the specimens on the anterior border and distal end of the carpal joints); the dactyli are not twice the length of the propodi, and their anterior margin is fringed by long and delicate setæ, a patch of dark colour is still evident at the distal end of the meral, carpal, and propodal joints, in the more perfect specimen.

The penultimate abdominal segment is traversed by a deep transverse impression; the ultimate segment is obscurely rounded.

The smaller though more perfect specimen (a male) gives the following measurements:—Length of body 11 mm., of right chelipede 13 mm., of left chelipede 9 mm., of third right leg 18 mm., of ocular peduncle 2 mm. The larger specimen measures 14 mm. in length.

Habitat.—Station 122, off Pernambuco; depth, 350 fathoms; bottom, blue mud. Two male specimens in the shells of a species of *Pleurotoma*.

Genus *Pagurodes*, n. gen.

Front with the rostral projection of moderate size. Ocular peduncles short; the ophthalmic scales spinular and separated by a considerable interval. Antennules long. Antennal acicle strongly developed, the flagellum long. Chelipedes slender and unequal, the right larger; fingers moving in a horizontal plane, and calcareous or but slightly corneous at the tips. Ambulatory limbs with long and slightly tortuous dactyli, the penultimate pair subchelate. Males with a short curved tubular organ (formed by the protruded vas deferens) attached to the coxa of the fifth right leg. Abdominal segments with the terga linear; males with three minute appendages on the left side, of which the first and second are uniramous, and the third is partially concealed by the appendage of the penultimate segment; females with four appendages on the left side, the first two of which are biramous and oviferous.

This genus agrees in some respects—particularly in the position of the protruded vas deferens,—with *Catapagurus*, A. Milne-Edwards, from which it is, however, distinguished by the form of the eyes, and the non-ciliated ambulatory dactyli, as well as by the trichobranchiæ. The shape of the chelipedes, the protruded vas deferens, and the absence of genital appendages from the first two abdominal segments in the male, separate it from *Parapagurus*, S. I. Smith.

Pagurodes inarmatus, n. sp. (Pl. X. fig. 5).

Characters.—The anterior portion of the carapace is smooth and moderately convex, with the median frontal process fairly prominent and acute, the lateral projections are also acute and no less prominent; the frontal margin is slightly raised, and a few slight inequalities are seen towards the lateral margins; the cervical groove forms a straight line on each side of the carapace, placed obliquely to a deep transverse sulcus which connects the two, and a deep sinuous depression runs immediately in front of and parallel to each; the posterior portion is entirely membranous.

The ocular peduncles are short and compressed laterally, with a few hairs on the upper surface, and their bases swollen, the eorneæ are slightly dilated; the ophthalmic scales are short and spinulous, with their apices acute. The antennal peduncle exceeds the eye-stalk by the length of its two last joints; the acicle is strongly curved and extends beyond the apex of the ultimate joint; the second joint has a prominent and acute external prolongation, as well as an acute spinule on the inner and distal margin; the first joint bears a minute spinule on its outer border; the proximal half of the flagellum shows slight lateral compression. The antennular peduncle exceeds the eye-stalk by the length of the ultimate and penultimate joints, the former

broadens out towards its distal end, and a tuft of long hairs is placed at the apex overhanging the two flagella.

The chelipedes are slender and not strikingly unequal in size, the disparity being chiefly noticeable in the chelæ. The right chelipede has the meral joint elongated and about equal in length to the carpus, the outer surface is covered with granules which tend to become tubercular on the lower and inner margin; the upper and outer surfaces of the carpus are uniformly granular, the inner margin is moderately sharp and the lower surface is comparatively smooth; the propodus is about one and a half times the length of the carpus and one-third stouter, the upper surface is convex from side to side, with the granules somewhat deficient towards the centre, where the surface is glabrous, towards the carpal articulation a short median tubercular carina is present, in addition to two less prominent elevated lines which are situated nearer the outer border and pass some distance forwards on the upper surface, the lower surface is comparatively smooth, and slightly concave towards the inner margin; the fingers are pubescent and slightly curved, their length is less than that of the hand, the dactylus bears two teeth and the immobile finger a single tooth on the inner margin. The left chelipede differs from the right in the following respects:—the hand is but slightly dilated, and a short median carina is alone noticeable on the upper surface, the fingers are longer than the palm, and more curved than those of the right side, while their opposed edges are sharp and devoid of teeth. The ambulatory limbs are long and slender, with slight granulations present on the meral, carpal, and propodal segments; the dactyli are slender and elongated, with a well-marked sigmoid curve, and a few setæ are present on their anterior surface near the apex. The penultimate pair of legs are considerably shorter than the ultimate pair, with which they agree in being slightly pubescent. The protruded vas deferens is moderately curved and entirely membranous.

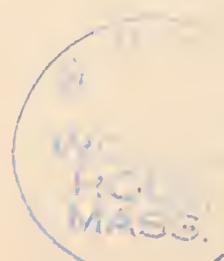
The penultimate abdominal segment is divided by a deep transverse depression; the ultimate segment is bilobed, with its margins fringed by short setæ.

The above description is furnished by an adult male taken at Station 168, which gives the following measurements:—Length of body 28 mm., of right chelipede 36.5 mm., of left chelipede 34 mm., of third left leg 49 mm., of ocular peduncle 2.5 mm., of protruded vas deferens 2 mm.

Some amount of variation is to be noted as regards the pubescence of different individuals; in certain specimens the chelipedes are almost completely clothed with short silky hairs. Females are of much smaller size than males, of two with ova from Station 168, the larger measures only 17 mm. in length.

Habitat.—Station 146, near Marion Island; depth, 1375 fathoms; bottom, Globigerina ooze. Two males and a female.

Station 168, off New Zealand; depth, 1100 fathoms; bottom, blue mud. Three males and two females, both the latter bearing ova, in shells of *Pleurotoma* sp., and *Nassa* sp.



Pagurodes piliferus, n. sp. (Pl. IX. fig. 5).

Characters.—The anterior portion of the carapace is smooth and convex, with a few scattered tufts of hairs, the lateral borders are also convex and slightly pubescent, the median frontal projection is obtusely rounded and fairly prominent, the lateral projections are well marked and acute; the posterior portion is wholly membranous and somewhat wrinkled.

The ocular peduncles are stout, with the corneæ strongly dilated, a few short hairs are seen on their upper surface; the apices of the ophthalmic scales are bidentate. The antennal peduncle is somewhat pubescent, and considerably longer than the eye-stalk; the acicle is slender and curved, slightly exceeding the ocular peduncle; the external prolongation of the second joint extends almost as far as the proximal end of the terminal joint. The antennular peduncle exceeds the eye-stalk by more than half the length of its terminal joint.

The chelipedes are subequal in length, but the right is considerably stouter; both are uniformly pubescent. The merus of the right chelipede bears a few piliferous lines on its upper surface, and a small spine is present on the lower and outer border; the carpus is more than half the total length of the propodus, and the latter is slightly dilated, the upper surface of both joints, but particularly of the propodus, is clothed rather densely with long hairs, those of the carpus appearing to take their origin from tubercles, the free borders are also pubescent, and a few spinules exist on the inner margin of the carpus; the fingers are less than half the total length of the propodus, and the upper surface of the dactylus is hairy. The left chelipede, with the exception of the difference in size, is similar to the right; the tubercles on the upper surface of the carpus are well marked, and the fingers are slightly longer in proportion to the hand. The meral, carpal, and propodal joints of the ambulatory limbs are crossed anteriorly by transverse piliferous lines, and one or two spinules exist on the carpi; the dactyli are longer than the propodi, moderately curved, and ciliated externally.

The penultimate abdominal segment is crossed by a deep transverse groove, and the ultimate segment is obscurely four-lobed.

Length of body 20 mm., of right chelipede 19 mm., of left chelipede 18 mm., of third right leg 26 mm., of ocular peduncle 3·8 mm.

This species is distinguished from *Pagurodes inarmatus* by the larger size of the eye-stalks and the dilatation of the corneæ, the ambulatory dactyli are also shorter, and without the double or sigmoid curve seen in the former.

Habitat.—Station 204A or B, off Tablas Island; depth, 100 to 115 fathoms; bottom, green mud. A female with ova.

Arafura Sea. A small male in a very imperfect state of preservation, from this locality, is doubtfully referred to the present species.

Pagurodes limatulus, n. sp. (Pl. X. fig. 6).

Characters.—The anterior portion of the carapace is smooth and convex, as are also the lateral borders, the median frontal projection is prominent and obtusely rounded, the lateral projections are less strongly marked, with their apices obtuse; the posterior portion of the carapace is entirely membranous.

The ocular peduncles are remarkably short, with the corneæ not sensibly dilated, and a few hairs are seen on their upper surface; the apices of the ophthalmic scales are rounded and entire. The antennal peduncle is two and a half times the length of the eye-stalk, the aciele is long, slender, and curved; the external prolongation of the second joint terminates opposite the end of the eye-stalk, and a slight prolongation is present on the inner margin of the same joint. The antennular peduncle exceeds the eye-stalk by the whole length of the last joint and a portion of the penultimate joint.

The chelipedes are long and remarkably slender, with the length subequal, though the right is considerably stouter. The right chelipede has the merus with its upper surface crossed by transverse piliferous lines, the lower surface is slightly tuberculate, and three spinules are present on the lower and outer border at its distal end; the carpus is about two-thirds the total length of the propodus, with its upper surface pubescent and slightly granular, while the inner border is spinulose, especially towards its distal end; the upper surface of the propodus is smooth and polished, convex from side to side, and with traces of granulation towards the inner margin; the fingers are smooth, and less than half the length of the propodus, while they are provided with a few short hairs. The left chelipede is unusually slender, with the lower surface of the merus tuberculate and slightly pubescent; the carpus nearly equals the propodus, its upper surface bears two indistinct rows of spinules separated by a considerable interval, and a rounded swelling is present on the inner and distal surface; the upper surface of the propodus has an obscurely marked central ridge, the fingers are longer than those of the right chelipede and perfectly smooth above. The ambulatory limbs slightly exceed the chelipedes in length; the anterior surface of the meral, carpal, and propodal joints bears a few indistinct pubescent ridges, the daetyli are one and a half times the length of the propodi, slender, and but slightly curved, their lower borders are armed with delicate corneous spines, and each terminates in a yellow horny claw.

The penultimate abdominal segment is crossed by a moderately deep transverse groove; the ultimate segment is four-lobed, with the two terminal lobes of small size.

Length of body 15 mm., of right chelipede 20 mm., of left chelipede 19 mm., of third left leg 23 mm., of ocular peduncle 2 mm.

The armature of the meral and carpal joints of the chelipedes, and the form of the

ambulatory daetyli, at once distinguish this species from *Pagurodes inarmatus*, to which it is in other respects closely related. The single male specimen is without the protruded vas deferens, but as it is otherwise mutilated it is possible that this organ has been accidentally removed.

Habitat.—Station 214, south of the Philippines; depth, 500 fathoms; bottom, blue mud. A male, in a shell of *Pleurotoma* sp.

A minute Pagurid found in the shell of a species of *Pleurotoma* from Station 73, near the Azores; depth, 1000 fathoms; bottom, Pteropod ooze, is probably referable to the genus *Pagurodes*. It is, however, in too imperfect a condition for satisfactory identification.

Genus *Paguroopsis*, n. gen.

Front with a prominent rostral projection. Ocular peduncles stout; the ophthalmic scales minute and separated by a considerable interval. Antennules of moderate length. Antennal aeicle of small size; the flagellum of moderate length. Chelipedes subequal and well developed; the fingers moving in a horizontal plane, slightly corneous and excavated towards the tips. Ambulatory limbs compressed and of moderate length, with long, slender, and tortuous daetyli; the last two pairs chelate and subdorsal in position. Abdomen short and simply bent, the terga membranous and of moderate width; males with two pairs of genital appendages on the ventral aspect of the first and second segments, and a minute uniramous appendage on the right side of the third and fourth segments respectively; females with a pair of appendages on the first segment, and three biramous appendages of large size on the right side of the second, third, and fourth segments, enclosed in a spacious marsupial pouch.

The characters of this interesting genus are in many respects peculiar, indeed two of these are sufficient to give it a unique position among Hermit Crabs, viz., the subdorsal position of the last two pairs of thoracic legs, and the presence of the unpaired abdominal appendages on the right side. Among the Pagurids generally, the soft abdomen, as a result of its being thrust into a Gastropod shell the spiral of which is normally right handed, has assumed a similar curve, and the original right side thus closely applied to the columella loses its appendages. In the species described below there is nothing to indicate the nature of the habitation selected by the animal, and an examination of the abdomen leaves little doubt that it must have been protected in some way; the presence of the abdominal appendages on the right side, and the fact that the abdomen is simply bent on itself, render it probable that in this case a Gastropod shell has not been selected.

Paguroopsis typicus, n. sp. (Pl. X. fig. 4).

Characters.—The anterior portion of the carapace is smooth, strongly convex from side to side, and firmly calcified; the rostral projection is compressed laterally and carinated superiorly, with its apex which is acute and slightly deflexed extending beyond the tips of the ophthalmic scales, a slight swelling is seen on the carapace on either side of the base of the rostrum, and the lateral frontal projections are but slightly marked; on the posterior portion the cardiac area is calcified, as is also though to a lesser extent the antero-internal margin of the branchial area.

The ocular peduncles are short, with the corneæ deeply pigmented, strongly dilated, and semi-lunar in outline when viewed from above; the ophthalmic scales are of small size, and each terminates in an acute spinule. The antennal peduncle scarcely exceeds the eye-stalk in length; the acicle is poorly developed and but slightly curved, not reaching the middle of the last joint of the peduncle; the external prolongation of the second joint is almost obsolete. The antennular peduncle exceeds the eye-stalk by the length of its terminal joint; the upper of the two flagella is strongly developed, and densely ciliated.

The chelipedes are of similar conformation and almost equal size (in the single male specimen the left is somewhat larger, a condition possibly due to accident), while the terminal joints are thickly clad with bristle-like hairs. The lower and inner margin of each ischial joint bears a few tubercular spinules; the merus is twice the length of the carpus and distinctly trigonal in shape, the upper margin is tuberculate and slightly rounded, the two lower margins are pubescent, and armed with blunt spinules, the surfaces are comparatively smooth, and the anterior margin is slightly raised on the superior surface; the carpus is about half the length of the propodus, and its surface is remarkably deficient below, so that the hand can be folded till it comes in contact with the proximal half of the limb, the upper surface is slightly oblique, and armed with numerous long setæ, most of which arise from tubercles; the upper surface of the propodus also shows a slight amount of obliquity, the lateral borders are rounded (especially the outer), and the marginal setæ are of considerable length, the setæ on the upper surface arise from tubercles which show a tendency towards arrangement in rows, and numerous tufts of setæ are present on the lower surface; the fingers are slightly more than half the total length of the hand and but slightly curved, the dactylus bears a few small teeth on its inner proximal margin, and the corresponding margin of the immobile finger is finely crenated, the lower surface is slightly excavated towards the apices, which are tipped by small horny processes, the setæ are chiefly seen on the upper and outer surfaces and are mostly arranged in tufts. The ambulatory limbs are of moderate length, with the meral, carpal, and propodal joints smooth and flattened, a few marginal hairs alone being present; the dactyli of the second pair are twice the length of the propodi

and decidedly tortuous. The last two pairs of legs are folded up on the sides of the carapace; those of the third pair are one-half longer than the fourth pair and extend forwards as far as the sides of the eye-stalks, the joints are smooth, and a few hairs are present on the borders, the dactylus is small and curved, forming a perfect chela with a similar process of the propodus, which latter bears two or three minute teeth on its inner margin, and a hiatus exists between the two processes; the legs of the last pair are slightly more cylindrical, and are situated over the branchial regions, their margins are somewhat pubescent, and the terminal chela is without a hiatus between the claws.

The abdomen is short and stout; the first pair of appendages are of small size in the female, whereas in the male they are large and closely applied together in the middle line; the second pair in the male are long and slender; the lateral appendages in the female consist of an elongated protopodite, a long slender and curved exopodite, and a shorter and stouter endopodite. The penultimate segment is crossed by a transverse impression, and its lateral appendage on each side bears a long and slender exopodite and a rudimentary endopodite; the ultimate segment is somewhat rectangular, and its free margins are ciliated.

The above description is taken from the larger (female) specimen, which gives the following measurements:—Length of body 20 mm., of carapace 11 mm., of chelipede 25 mm., of third right leg 31 mm., of ocular peduncle 4 mm. The male specimen measures only 18 mm. in length, and in it the left chelipede exceeds the right by more than half the length of its fingers.

Habitat.—Station 204A or B, off Tablas Island; depth, 100 to 115 fathoms; bottom, green mud. Two specimens, male and female, both apparently adult.

Genus *Pylocheles*, A. Milne-Edwards.

Pylocheles, A. Milne-Edwards, Bull. Mus. Comp. Zool., vol. viii, p. 38, 1880.

Carapace completely calcified; front with the rostral projection but slightly marked. Ocular peduncles long and slender, the ophthalmic scales of small size and separated by a considerable interval. Antennules of moderate length. Antennal acicle short and stout; the flagellum short. Chelipedes of equal size; the fingers moving in an oblique or almost horizontal plane, and corneous at the tips. Ambulatory limbs slender, with short dactyli; the penultimate pair of legs subchelate. Abdomen symmetrical and well developed, the segments with broad semi-calcareous terga, the ventral region membranous and provided with rudimentary sterna on the first and sixth segments; males with two pairs of genital appendages on the ventral aspect of the first two segments, and a pair of symmetrical biramous appendages on the third, fourth, and fifth segments; females with a single minute pair of genital appendages on the ventral aspect of the first segment, and four pairs of symmetrical biramous appendages on the second, third, fourth, and fifth segments, of

which the first two are of large size ; the appendages of the penultimate segment are large and symmetrical in both sexes, forming with the telson a powerful swimming fin.

The characters of this remarkable genus are extremely primitive, and it forms, as has been pointed out by Professor A. Milne-Edwards, a connecting link between the Thalassinids and the Pagurids ; at the same time there can be no doubt that its affinities justify its position in the latter group. In *Pylocheles* we have as it were one of the first downward steps in the series of degenerative changes which have transformed certain *Maerura* into soft-tailed Hermit Crabs. It is closely allied to *Pomatocheles*,¹ Miers, in which, however, the carapace is narrower and more elongated, the chelæ are operculiform, and the fingers move in a distinctly horizontal plane. The only previously known species is *Pylocheles agassizii*, A. Milne-Edwards, dredged by the "Blake" at a depth of 200 fathoms off Barbados, and found inhabiting an excavation in a piece of sandstone, the mouth of which was closed by its chelæ. It is doubtful whether the Challenger species possessed any such habitation.

Pylocheles spinosus, n. sp. (Pl. XI. fig. 1).

Characters.—The anterior portion of the carapace is broad and moderately convex, with a few slight inequalities towards the lateral surfaces and in front. The frontal margin is slightly raised, the median process projects but slightly and is broad and subacute, though tipped by a minute spinule ; the lateral processes are more prominent, and their apices are acute. A transverse depression exists on the carapace a slight distance behind the median part of the frontal margin, and a few hairs are scattered over the surface ; the posterior portion is less strongly calcified than the anterior, and the cardiac area is triangular in shape ; the cervical groove is moderately shallow.

The ocular peduncles are slightly compressed from above downwards, and extend for about one-third of their length beyond the apices of the antennal peduncles, the corneæ are slightly dilated, and semilunar in outline when viewed from above ; the ophthalmic scales are of small size and their apices are acute. The antennal acicle does not reach the middle of the last peduncular joint, and its apex is bidentate, a small spinule is present on its anterior surface and another on the outer margin ; the external prolongation of the second joint is short and its apex bidentate, while an acute spinule is present on the anterior surface of the same joint ; the terminal joint is slender and subcylindrical ; the flagellum is about equal in length to the carapace, and its segments are faintly pubescent. The terminal joint of the antennular peduncle extends slightly beyond the tip of the eye-stalk.

The chelipedes are of equal size and similar appearance, with their terminal joints

¹ I have provisionally included this genus in the section Laminibranchiata, but so far as I know its gills have not yet been examined.

spinose and pubescent. The merus is smooth and trigonal, two small spinules are present at the distal end of its superior margin, separated by a transverse groove, and a few minute tubercles are present on the lower and internal margin, in line with a series of short spinules on the corresponding part of the ischium; the carpus is less than half the length of the propodus and remarkably deficient below, so that the hand can be folded under the merus, its upper surface bears three conical spines on the inner margin, with others of smaller size situated externally to these; the propodus is rather more pubescent than the carpus, and bears five curved acute spines on its inner margin, the spines on the upper surface are of small size, and towards the outer rounded border become replaced by granules, the outer surface is smooth; the fingers are less than half the total length of the propodus, and each is provided with a black horny terminal plate; their external surfaces are tubercular and pubescent, and each is provided with from two to three ill-defined pearly teeth. The ambulatory limbs are of moderate length and slightly pubescent, the anterior border of the carpal and propodal joints bears a row of curved acute spines (nearly obsolete on the carpus of the second pair), the dactyli are almost straight, and more densely clothed with hairs than the preceding joints, each terminating in a curved brownish claw. The last two pairs of thoracic legs are smooth and subchelate; in each case the propodus bears at its distal end the oval punctate area seen in this position in most Pagurids; the dactylus of the last pair is of very small size.

The abdominal segments are all distinct, and their posterior margins are fringed with extremely short hairs. The sixth segment is more strongly calcified than the others, its length and breadth are subequal, and a deep fissure is present on each lateral margin, while a shallow median groove traverses its upper surface; the telson is oblong and its distal end is bilobed, with the margins fringed by long hairs, and a transverse line present near the apex, placed at right angles to an obscure median carina. The appendages of the sixth segment have a firmly calcified protopodite, the posterior margin of which bears a single spine. The ova are moderately large in size.

Length of the largest specimen (a female with ova) 26 mm., of carapace 8 mm., of chelipede 14 mm., of third right leg 18 mm., of ocular peduncle 4.5 mm. The largest male measures only 18.5 mm. in length.

This species is distinguished from *Pylocheles agassizii*, A. Milne-Edwards, by the spiny armature of its chelipedes and ambulatory limbs; in the latter species the chelæ are simply granulated, and the ambulatory limbs are smooth.

Habitat.—Station 163A, off Twofold Bay, Australia; depth, 150 fathoms; bottom, green mud. Several specimens of both sexes, including two females with ova.

GALATHEIDEA.

Galatheida, Boas, Vidensk. Selsk. Skr., 6 Række, nat. og math. Afd., i, 2, p. 124, 1880.

Carapace well developed; the frontal region prominent, provided with a median rostrum and frequently lateral processes. Eye-stalks short and stout. Antennal peduncle composed of four segments (the second and third having fused); the flagellum long and slender. Chelipedes elongated and not markedly asymmetrical; the first three pairs of ambulatory limbs well developed, the ultimate pair slender and inflexed, frequently chelate. Thoracic sterna broad. Abdomen symmetrical, composed of seven segments, of which the first is usually concealed by the carapace; the penultimate segment with a pair of lamellar appendages, which form with the telson a broad swimming fin; the second segment in the males nearly always provided with genital appendages.

This group as instituted by Boas includes the Porcellanids and the Galatheids, which were placed in separate subtribes by previous writers, several of whom had, however, noted their close affinities. The former must be regarded as highly specialised Galatheids, which have to a certain extent assumed Brachyuran characteristics, and though the abdomen still retains its primitive form, it has, in accordance with altered life-habits, become reduced in size and of secondary importance as an organ of locomotion.

As in the case of the Paguridea I have retained, though with wider significance, the subtribal name formerly applied to one of the sections only.

Section **A.** PORCELLANOIDEA.

Porcellaniens, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 246, 1837.

Porcellanidea, De Haan, Crust. Japon., p. 199, 1850.

„ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 400, 1852.

„ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 65, 1858.

„ Miers, Catal. New Zealand Crust., p. 59, 1876.

„ Haswell, Catal. Austral. Crust., p. 145, 1882.

Carapace broadly ovate, smooth, with the regions but faintly defined; the front usually trilobed, and the processes never of great length. Chelipedes broad and often flattened, the ambulatory limbs robust and of moderate length. Antennules concealed; the antennal peduncle directed backwards. Eyes always pigmented and partially concealed in orbits. External maxillipedes with the ischium broad, and the merus provided with a prominent internal lobe. Abdomen bent under the thorax; females

with two (or three) pairs of slender uniramous appendages borne on the fourth, fifth (and third) segments; males with a single genital pair on the second segment.

The members of this well-defined group are not confined to any special geographical area, but occur in all seas, and are found under stones between tide-marks, a situation for which their flattened body and chelipedes are peculiarly adapted, or in shallow water living among Corals, Sponges, or stones. Stimpson in his useful Synopsis of the Anomura has arranged the genera in two divisions, which form, however, but a single family; in the first of these the basal joint of the antennal peduncle is of small size and partially concealed in the orbital cavity, whereas in the second this joint forms an acute and somewhat flattened projection placed externally to the orbit. They may be arranged as follows:—

I. First joint of the antennal peduncle short, not reaching the superior margin of the carapace—

<i>Petrolisthes</i> , Stimpson.	|	<i>Pisosoma</i> , Stimpson.
		<i>Petrochcles</i> , Miers.

II. First joint of the antennal peduncle more or less produced, and joined to the margin of the carapace, the second joint placed at a distance from the orbit—

<i>Porcellana</i> , Lamarck (<i>restrictum</i>).	|	<i>Pachycheles</i> , Stimpson.
<i>Porcellanella</i> , White.		<i>Megalobrachium</i> , Stimpson.
<i>Raphidopus</i> , Stimpson.		<i>Minyocerus</i> , Stimpson.
		<i>Polyonyx</i> , Stimpson.

Family PORCELLANIDÆ.

Genus *Petrolisthes*, Stimpson.

- Petrolisthes*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 65, 1858.
 „ Miers, Catal. New Zealand Crust., p. 59, 1876.
 „ Haswell, Catal. Austral. Crust., p. 145, 1882.

Carapace subovate, depressed, the length usually slightly greater than the breadth. Frontal region triangular, usually depressed, with the margin more or less undulated. Eyes of rather large size. First joint of the antennal peduncle remarkably short. Chelipedes broad and flattened, the carpus of moderate length and often provided with teeth on the inner margin. Ambulatory limbs with the dactyli short and robust, terminating in a single claw.

The species, many of which live between tide-marks, are distinguished from those of the genus *Porcellana*, in addition to the important difference in the antennal peduncle, by the form of the chelipedes and front. They appear to be scarcely represented in the temperate and colder seas of the northern hemisphere.

Petrolisthes violaceus (Guérin).

- Porcellana violacea*, Guérin, Voy. "Coquille," Crust., p. 33, pl. iii. fig. 2, 1830; Bull. Soc. Sci. Nat. de France, p. 115, 1835; Mag. de Zool., p. 5, pl. xxv. fig. 2, 1838.
- „ „ Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 250, 1837.
- „ „ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 416, pl. xxvi. fig. 6, 1852.
- „ *macrocheles*, Poeppig, Crust. Chili, Wieg. Arch. f. Naturgesch., Jahrg. ii. Bd. i. p. 142, pl. iv. fig. 1, 1836.
- Petrolisthes violaceus*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 65, 1858.
- „ „ Targioni Tozzetti, Crost. "Magenta," p. 219, tav. xiii. fig. 2, 1877.

Habitat.—Valparaiso beach, November 1875. Four specimens, three of which are females.

This species is a well-known inhabitant of the Chilean coast.

Petrolisthes validus (Dana).

- Porcellana valida*, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 415, pl. xxvi. fig. 5, 1852.
- Petrolisthes validus*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 65, 1858.

Habitat.—Valparaiso beach, November 1875. Several specimens, male and female, one of the latter bearing ova, taken along with the last species.

Messier Channel, South America, January 1876. A male specimen.

This species is rather closely allied to the preceding. Dana's types were probably from Valparaiso.

Petrolisthes armatus (Gibbes).

- Porcellana armata*, Gibbes, Proc. Amer. Assoc., p. 190, 1850.
- Petrolisthes armatus*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 65, 1858; Ann. Lyc. Nat. Hist. New York, vol. vii. p. 73, 1859.

Habitat.—Bermuda; shallow water. A female with ova.

The single specimen taken agrees with Gibbes' brief description. The carpus of the right chelipede has, however, four acute spines, and that of the left side but three (the normal number). The outer edge of the hand is distinctly serrated as described by Gibbes, though Stimpson expressly states that these marginal spinules are rarely present. The spine on the anterior edge and distal end of the merus is present on the second and third legs, but absent from the fourth. It is a Floridan and West Indian species.

Petrolisthes annulipes (White), Miers.

Porcellana annulipes, White, List. Crust. Brit. Mus., p. 63, 1847 (*sine descr.*).

Petrolisthes annulipes, Miers, Crust. in Zool. H.M.S. "Alert," pp. 270, 558, pl. xxix. fig. B, 1884.

Habitat.—Station 186, Flinders Passage, North Australia; depth, 8 fathoms; bottom, coral mud. Two females, one with ova.

Miers has described this species from specimens collected by Dr. Coppinger in the Australian Seas, and at Ile des Neufs, Indian Ocean. He suggests that it may prove synonymous with *Petrolisthes scabricula* (Dana) from the Sooloo Sea, and *Petrolisthes militaris*, Heller, from the Nicobars, but it is at least a very distinct variety. White's specimen in the British Museum came from the Philippine Islands.

Petrolisthes unilobatus, n. sp. (Pl. XI. fig. 3).

Characters.—The carapace is ovate and smooth, though minutely punctate, the length considerably greater than the breadth, with a few faintly marked rugosities, especially towards the branchial regions. The front is broad, and depressed towards the apex which is obtuse, with a rounded excavation on each side for the ocular peduncle, while in front of the latter the margin slightly dips down. The lateral border is convex and entire, with a slight bulging in the anterior branchial region. The posterior border is raised, with a double outline, and presents a broad posterior concavity. The cervical grooves are well marked, uniting in front of the cardiac area to form a broad V-shaped marking. The gastric area possesses two slight elevations situated opposite the posterior border of the eye-stalks, separated by a shallow median groove which passes forwards to the apex of the rostrum; in front of these elevations the surface gradually slopes downwards. The cardiac area is distinctly circumscribed. The branchial area is of considerable extent and crossed transversely by a V-shaped impression, one limb of which passes to the posterior part of the cervical groove, while the other reaches the outer boundary of the cardiac area. The ocular peduncles are short and stout, with the corneae deeply pigmented; the antennal flagellum is almost twice the length of the carapace. The pterygostomial area possesses a series of well-marked elevated lines.

The ischium of the external maxillipedes has the inner margin broadly rounded, and the outer and distal border prolonged into a subacute lobe, the external surface is crossed by a few faint lines; the merus has a large subacute lobe projecting from its inner margin, and the external surface is traversed by a few oblique rugosities, especially towards the outer border.

The chelipedes are of moderate size and finely granular. The anterior border of the

merus is produced into a rounded tooth; the carpus is about equal in length to the hand, and slightly more than half the length of the carapace, its anterior border bears a single lobe of small size (hence the specific name) near the proximal end, the posterior border is raised, and the surface immediately behind is marked by numerous slight vertical rugosities, a faint median elevation runs along the upper surface of the joint, and the border overhanging the insertion of the propodus bears four unequal teeth; the propodus is narrow proximally but dilates somewhat towards its distal end, the anterior margin is raised and has a double outline, while a median elevation runs along the upper surface, in some specimens there is a small rounded lobe on the under surface fitting into a depression at the end of the merus; the fingers are somewhat curved, with their apices subacute and bent, the tip of the dactylus being folded under that of the immobile finger. The ambulatory limbs are comparatively smooth, a few slight transverse lines being present on the meral joints, and the carpi have their upper surface faintly carinated; the dactyli are acute and curved, with a few horny spines on their posterior margin; a few hairs and minute horny spinules are also present on the posterior margin of the propodi.

The abdominal segments are smooth and polished externally.

Breadth of carapace of a male 6 mm., length of carapace 7 mm., of extended abdomen 5.5 mm., of chelipede 12 mm., of third ambulatory leg 8 mm. The female is apparently of much smaller size.

This species is allied to *Petrolisthes japonicus* (De Haan), and *Petrolisthes elongatus* (Milne-Edwards). In the former the chelipedes are longer, and the carpus is equal in length to the carapace, with one or two teeth on its inner border, and two on the outer border. In *Petrolisthes elongatus* the outer border of the carpus is armed with from two to three teeth.

Habitat.—Station 172, off Nukalofa, Tongatabu; depth, 18 fathoms; bottom, coral mud. Two males and two females, the latter with ova.

Petrolisthes serratus, n. sp. (Pl. XI. fig. 2).

Characters.—The carapace is ovate and smooth, with numerous short transverse lines most conspicuous on the branchial and gastric areas, a few slight granulations are also present on the mid-branchial and frontal regions. The front is broad and slightly depressed, with the margin faintly crenated, and the apex rounded; a small fissure is present opposite the anterior border of the eye-stalk, bounded posteriorly by a short acute tooth. A small slightly convex lobe is placed between the antero-lateral angle and the point where the cervical groove passes on to the carapace, immediately behind this the lateral border commences in an acute spinule, and a slight carina is continued backwards for some distance but loses itself opposite the mid-branchial area; the postero-lateral border is not sharply defined, being represented simply by a rounded surface. The posterior

border has an obscure double outline. The cervical grooves are but slightly indicated and they unite in front of the cardiac area. The gastric area possesses two faintly curved transverse ridges situated behind a point opposite the posterior border of the eye-stalks, and separated by a shallow median groove which is continued forwards on the frontal lobe; the surface gradually slopes downwards in front of these ridges. The branchial area bears a faint transverse V-shaped marking as in the last species. The ocular peduncles are short and stout, with the corneæ deeply pigmented. The first free joint of the antennal peduncle bears a small acute tooth on its upper surface, the penultimate joint is not twice the length of the ultimate; the flagellum is more than twice the length of the carapace. The pterygostomial area is separated from the carapace by a well-marked fissure, its surface projects somewhat and bears a series of elevated lines with a slight granular concavity above.

The external maxillipedes have the ischium broadly rounded on the inner margin, with its outer surface as well as that of the merus traversed by faint wavy lines; the merus has a conical subacute lobe projecting from its inner margin.

The chelipedes are of large size and finely granular, with the carpus distinctly serrated on both margins. The merus has its inner and distal margin produced into an obtuse tooth, a few minute tubercles are present on the outer surface, and an acute spinule occurs on the distal and inferior margin; the carpus is armed with five or six pointed teeth on its internal border, the proximal four of which are separated from one another by distinct fissures, the external border is slightly raised and bears about six pointed teeth of small size, the lower surface is smooth and polished, with a deep concavity along the inner margin; the propodus when folded has its articulation with the dactylus situated opposite the proximal end of the carpus, the upper surface is convex, with a decided slope towards the outer border which is also convex and moderately sharp, a few hairs and minute tubercles are present on the proximal half of the margin, while the lower surface is glabrous and comparatively free from granules; the dactylus is considerably twisted, and almost equal in length to the hand, the inner portion is distinctly raised; the fingers of the right chelipede are in contact, while a tolerably large hiatus exists between those of the left side and their opposed margins are devoid of teeth. The ambulatory limbs are slightly pubescent, a few minute spinules are present on the anterior borders of the meral joints, and in the first two pairs of legs one or two also on the posterior border near the distal end; the dactyli terminate in a black horny claw, and each bears three horny spinules on its posterior margin.

The abdominal segments are smooth and polished externally.

Breadth of carapace of a male 8.8 mm., length of carapace 9.5 mm., of extended abdomen 8 mm., of chelipede 27 mm., of second ambulatory leg 18 mm.

I have had considerable hesitation in separating this species from *Petrolisthes similis*, Stimpson, with which it is closely allied; possibly the examination of a larger series of

specimens may show that *Petrolisthes serratus* is only a well-marked variety of the latter. In *Petrolisthes similis* (of which typical specimens named by Stimpson exist in the collection of the Paris Natural History Museum) the chelipedes have a shallow groove on the upper surface of the carpus near its inner margin, the propodus is proportionately longer, with its outer border and the whole upper surface less convex, and the granulations are of larger size; the transverse ridges on the gastric region of the carapace are more strongly developed, and the frontal lobe is narrower, with a more pronounced median concavity.

Habitat.—Off Bahia, 7 to 20 fathoms. An adult male specimen.

Genus *Porcellana*, Lamarek.

- Porcellana*, Lamarek, Syst. des anim. sans vert., p. 153, 1801 (*in part*).
 „ Latreille, Gen. Crust. et Insect., t. i. p. 48, 1806 (*in part*).
 „ Desmarest, Consid. sur les Crust., p. 199, 1825 (*in part*).
 „ Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 247, 1837 (*in part*).
 „ De Haan, Crust. Japon., p. 199, 1850 (*in part*).
 „ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 410, 1852 (*in part*).
 „ Bell, Brit. Crust., p. 188, 1853 (*in part*).
 „ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 66, 1858.
 „ Heller, Crust. südlichen Europa, p. 181, 1863.
 „ Targioni Tozzetti, Crust. "Magenta," p. 210, 1877.
 „ Haswell, Catal. Austral. Crust., p. 147, 1883.
Pisidia, Leach, Dict. d. Sci. Nat., t. xviii. p. 53, 1820 (*in part*).

Carapace suborbicular or subovate, the length usually greater than the breadth. Frontal region prominent and dentate, the teeth usually well developed. Eyes of moderate size, the orbits deep. Chelipedes moderately flattened, the carpus short and usually provided with a single projecting lobe near the proximal end of the internal margin; the digits frequently contorted. Ambulatory limbs with the dactyli short and robust, terminating in a single claw.

Porcellana sayana (Leach).

- Porcellana galathina*, Say, Journ. Acad. Nat. Sci. Philad., vol. i. p. 56, 1817 (not *Porcellana galathina* of Bosc).
Pisidia sayana, Leach, Dict. d. Sci. Nat., t. xviii. p. 54, 1820.
 „ „ Desmarest, Consid. sur les Crust., p. 199, 1825.
 ? *Porcellana sayii*, Gray, Zool. Miscell., p. 15, 1831.
 „ *ocellata*, Gibbes, Proc. Amer. Assoc., p. 190, 1850.
 „ „ Stimpson, Ann. Lyc. Nat. Hist. New York, vol. vii. p. 77, 1859.
 „ *sayana*, Kingsley, Proc. Acad. Nat. Sci. Philad., p. 407, 1879.

Habitat.—St. Thomas, West Indies; shallow water. Several specimens, including two females with ova. The colour markings have faded to a great extent, though circular spots of light colour can still be recognised on the carapace and chelipedes.

This species inhabits the West Indies and the southern shores of the United States. It has been previously recorded from St. Thomas by Stimpson.

Porcellana streptocheles, Stimpson.

Porcellana streptocheles, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 81, 1858.

Habitat.—Simon's Bay, Cape of Good Hope; depth, 5 to 18 fathoms. Two females with ova, the carapace of the larger measuring only 4.5 mm. in length and 4.2 mm. in breadth.

In this species the front is of moderate size, and composed of three acute teeth with denticulate margins, of which the median is deflexed and obscurely tridentate, while the lateral teeth are scarcely less prominent; the lateral margins of the carapace are also denticulate. The chelipedes are unequal, with the carpi armed by two or three teeth on each lateral margin, of which those on the outer border are minute; the propodus is granulated above, and bears a median carina, its outer margin is obscurely denticulate. According to Stimpson the carapace is smooth, but in the Challenger specimens short stout hairs arranged in tufts are noticeable on the gastric, cardiac, and branchial areas. *Porcellana streptocheles* is closely allied to *Porcellana dehaanii* described by Krauss from the coast of Natal,¹ in which, however, the chelipedes are smooth and the carpi unarmed, the median frontal tooth is conical and prominent, and the antero-lateral margin of the carapace is denticulate over the insertion of the antennal peduncle.

The type specimens were dredged in Simon's Bay, at a depth of from 6 to 12 fathoms.

Porcellana serratifrons, Stimpson (Pl. XI. fig. 5).

Porcellana serratifrons, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 80, 1858.

Habitat.—Hong Kong; depth, 10 fathoms. An adult male (from which the figures are taken).

Arafura Sea. A male specimen.

The types of this species were taken at Hong Kong. The front is composed of three serrated lobes, of which the median is large and rounded, while the two lateral are subacute and scarcely less prominent. The antero-lateral margin of the carapace bears two or three acute spinules immediately over the insertion of the antennal peduncle, and the lateral margin is also provided with from one to three similar processes of slightly larger size. The chelipedes are smooth and punctate, the inner angle of the merus is prominent, and either smooth or armed with from one to two spinules; the inner margin

¹ Krauss, Südafrik. Crust., p. 59, tab. iv. fig. 2, 1843.

of the carpus bears three indistinct teeth, and two or three spinules are present on the outer margin; the propodus bears a median rounded carina on the upper surface, and on the smaller chelipede a row of minute spinules on the outer margin (not represented in the figure). Five segments are distinctly visible in the antennal peduncle, and of these the first, third, and fourth are spinose.

Porcellana robertsoni, n. sp. (Pl. XI. fig. 6).

Characters.—The carapace is ovate, and smooth though minutely punctate, numerous transverse lines occur on the posterior branchial areas, and a few hairs are present on the gastric region. The front is broad and tridentate, with the apices of the three projections subacute, the median tooth is considerably broader and more prominent than the two lateral teeth, slightly deflexed, and with a shallow median groove on the upper surface. The antero-lateral tooth placed immediately external to the orbit is subacute. The lateral border is convex and unarmed, with the exception of a rounded projection behind the point where the ill-defined cervical groove passes on to the carapace; the anterior portion of this border is sharply defined, the posterior third is simply rounded. The posterior border has a double outline and is almost straight. The eyes are of small size, with the corneae deeply pigmented. The first joint of the antennal peduncle is prominent and acute, forming a flattened process below the orbit; the flagellum is of moderate length. The pterygostomial area bears a series of well-defined longitudinal lines below, while the upper part is slightly concave.

The external maxillipedes have the ischium and merus subequal in length, with their outer surfaces crossed by a few indistinct lines; the inner margin of the former is convex, while that of the latter is concave above and below, with a large rounded projection situated somewhat nearer the proximal than the distal end.

The chelipedes are of moderate size, and their upper surface is densely pubescent. The merus has its inner and distal margin produced into a small flattened lobe which overlaps the carpus; both the carpus and propodus have the upper surface crossed by numerous short and ill-defined lines, while the outer margin bears a fringe of long hairs; the inner border of the carpus is armed with a single acute tooth of large size situated near the proximal end, the inner surface is hollowed out, and the lower and internal margin is also provided with a tooth, which, however, is of small size; the inner border of the propodus is short and strongly curved; the lower surface of both carpus and propodus is glabrous and crossed by fine oblique lines, and the outer margin of the propodus is seen from this point of view to be finely crenated; the fingers are more than half the total length of the propodus and but slightly tortuous, the inner margin of the dactylus is carinated. The ambulatory limbs are short and slightly pubescent, with the posterior surface of the meral joints crossed by faint transverse

lines; the dactyli are short and moderately curved, each terminating in a yellow horny claw.

The abdominal segments are smooth and polished externally.

Breadth of carapace 4.5 mm., length of carapace 5 mm., of extended abdomen 5 mm., of chelipede 6.5 mm., of second ambulatory leg 6 mm.

This small species owes its chief interest to the depth at which it occurred—one which is quite exceptional among the members of this group. Apart from the difference in size it bears some resemblance to the common European *Porcellana platycheles* (Pennant), a young specimen of which from Millport, Firth of Clyde, is figured beside it (Pl. XI, fig. 7); the Challenger species, however, possesses a less prominent frontal region, shorter chelipedes and ambulatory limbs, and the lobe on the inner margin of the carpus is larger and less pointed. I have pleasure in naming it after my friend Mr. David Robertson, the veteran naturalist of the Clyde district.

Habitat.—Station 24, off Culebra Island, West Indies; depth, 390 fathoms; bottom, Pteropod ooze. A female specimen.

Genus *Porcellanella*, White.

Porcellanella, White, in Macgillivray's Voyage of H.M.S. "Rattlesnake," vol. ii., Appendix, p. 395, 1852 (*sine descr.*).

„ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 67, 1858.

Carapace oblong, the length considerably greater than the breadth, with the lateral borders almost parallel, and the gastric elevations obsolete. Front prominent, composed of three flattened horizontal teeth. First joint of the antennal peduncle elongated and acute. Chelipedes smooth, with the carpus short and the propodus elongated. Ambulatory limbs of small size, with the meral joints robust, the dactyli short, compressed, and multiunguiculate.

This genus approaches *Porcellana* somewhat closely in its characters. Stimpson described a second species, *Porcellanella picta*, from the Chinese Seas.

Porcellanella triloba, White.

Porcellanella triloba, White, in Macgillivray's Voyage of H.M.S. "Rattlesnake," vol. ii., Appendix, p. 394, pl. v. fig. 2, 1852.

Porcellana triloba, Haswell, Catal. Austral. Crust., p. 149, 1882.

Habitat.—Station 212, Celebes Sea; depth, 10 to 20 fathoms; bottom, sand. Several specimens, two of which are females with ova.

Station 315, Port William, Falkland Islands; depth, 5 to 12 fathoms; bottom, sand, gravel. A male specimen.

This species has hitherto been recorded only from the Australian coasts; it has,

however, probably an extended distribution in the Indo-Pacific region. I have examined fresh specimens taken recently by Mr. E. Thurston, the Superintendent of the Madras Government Museum at Ráméswarem, South India, on the carapace and chelipedes of which circular patches of a brownish hue with a lighter centre were apparent. Immersion in spirit appears to have the effect of rapidly removing these colour markings.

Genus *Raphidopus*, Stimpson.

Raphidopus, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 66, 1858.

Carapace suborbicular, the breadth greater than the length. Frontal region not prominent and almost straight, armed with three minute teeth. Eyes of small size. Antennal peduncle elongated. Chelipedes elongated, with narrow curved digits; ambulatory limbs slender, the dactyli flattened and ciliated, almost straight, with the apex acute.

The form of the carapace, chelipedes, and ambulatory limbs, render this one of the most distinct genera in the group. Only a single species has hitherto been described, but the writer has recently taken a second with well-marked points of difference in the Indian Seas at Madras.

Raphidopus ciliatus, Stimpson.

Raphidopus ciliatus, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 79, 1858.

„ „ Targioni Tozzetti, Crost. "Magenta," p. 222, tav. xiii. fig. 4, 1877.

Habitat.—Hong Kong; depth, 10 fathoms. An adult male with the carapace measuring 9 mm. in length, by 11.5 mm. in breadth, and the right chelipede (unstretched) with a length of 31 mm.

The type was dredged off Hong Kong at a depth of 6 fathoms. No locality is assigned to the specimens taken by the "Magenta."

Genus *Pachycheles*, Stimpson.

Pachycheles, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 66, 1858.

Carapace suborbicular, the length not exceeding the breadth, with the posterior part of the branchiostegite quadrate, and separated by a slight membranous interval from the larger anterior portion. Front but little produced, without distinct teeth. First joint of the antennal peduncle slightly elongated. Chelipedes massive and rugose, the carpus short. Dactyli of the ambulatory limbs normal.

The majority of the species inhabit the Indo-Pacific area.

Pachycheles barbatus, A. Milne-Edwards (Pl. XI. fig. 4).

Pachycheles barbatus, A. Milne-Edwards, Bull. Soc. Philom. Paris, sér. 7, t. ii. p. 228, 1878.

Habitat.—St. Vincent, Cape Verde Islands.

The carapace of the single specimen, a young male referred with some hesitation to this species, measures 4·5 mm. in length and 4 mm. in breadth. The carapace is flattened, with the front depressed; a few slight granulations are seen towards the lateral borders on the gastric and hepatic areas, and a series of transverse lines occurs on the branchial areas. The front is pubescent and obscurely trilobed, bounded posteriorly by two transverse ridges on the gastric area, at the point where the carapace becomes level. The chelipedes are granulated and pubescent above, the hairs with which they are clothed being short and stiff; the anterior border of the carpus bears from three to five acute teeth, and the lower surface of the propodus is glabrous, with numerous rounded granulations towards the outer border. The ambulatory limbs are moderately pubescent.

The type-specimen came from the Cape Verde Islands.

Pachycheles pulchellus (Haswell).

Porcellana pulchella, Haswell, Proc. Linn. Soc. N.S.W., vol. vi. p. 758, 1881; Catal. Austral. Crust., p. 148, 1882.

Pachycheles pulchellus, Miers, Crust. in Zool. H.M.S. "Alert," p. 273, pl. xxx. fig. A, 1884.

Habitat.—Station 186, Flinders Passage, North Australia; depth, 8 fathoms; bottom, coral mud. A female with ova.

Station 188, Arafura Sea, South of Papua; depth, 28 fathoms; bottom, green mud. A female with ova.

The specimens described by Haswell and Miers were taken at various localities on the northern coasts of Australia.

Genus *Polyonyx*, Stimpson.

Polyonyx, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 67, 1858.

Carapace suborbicular, smoothly convex, the breadth slightly greater than the length. Front but little produced, with an almost straight margin. First joint of the antennular peduncle smooth; the corresponding joint of the antennal peduncle greatly elongated. Eyes of small size. Chelipedes smooth, with the merus broad. Daetyli of the ambulatory limbs short, and furnished with two or more well-developed claws.

The form of the ambulatory dactyli distinguishes *Polyonyx* from all other genera of Porcellanidæ; in other respects it appears scarcely to differ from *Megalobrachium*, founded by Stimpson for the reception of a West Indian species, and Miers has lately expressed a doubt as to the distinctness of the two genera. The ambulatory claws are merely special developments of the horny spines met with on the posterior surface of the dactyli in many other Porcellanids.

Polyonyx obesulus (White), Miers.

Porcellana obesula, White, List Crust. Brit. Mus., p. 130, 1847 (*sine descr.*).

Polyonyx obesulus, Miers, Crust. in Zool. H.M.S. "Alert," p. 272, pl. xxix. fig. D, 1884.

Habitat.—Station 186, Flinders Passage, North Australia; depth, 8 fathoms; bottom, coral mud. Three specimens, one of which is a female with ova, taken from the interior of a sponge (*Hippospongia anomala*, Poléjaeff); a female with ova also occurred in a free state at the same locality.

The types in the British Museum came from the Madgica-Sima group, and those described by Miers were taken on the Australian coasts.

Section B. GALATHODEA.

Galatheidæ, Leach, Dict. d. Sci. Nat., t. xviii. p. 52, 1820.

Galathéides, Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 270, 1837.

Galatheidæ, De Haan, Crust. Japon., pp. xxii, 198, 1850.

„ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 401, 1852.

„ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 76, 1858.

„ Miers, Catal. New Zealand Crust., p. 68, 1876.

„ Haswell, Catal. Austral. Crust., p. 161, 1882.

Carapace elongate, the regions well defined and usually rugose, with the front produced into a prominent and acute rostrum. Chelipedes and ambulatory limbs elongated and frequently slender. Abdomen broad and well developed, simply bent, or folded on itself, never closely applied to the under surface of the thorax, terminating in a powerful swimming fan formed by the telson and the appendages of the sixth segment. Females with four pairs of simple and slender ovigerous appendages on the second, third, fourth, and fifth segments (those of the second and fourth segments may be rudimentary); males furnished with two pairs of well-developed accessory genital organs on the first and second segments (those of the first segment may be rudimentary or absent), and three pairs of short, usually flattened appendages on the third, fourth, and fifth segments, all of which may, however, be rudimentary. Antennules exposed; the antennal peduncle

directed forwards. External maxillipedes subpediform, with the ischium and merus narrow and frequently spinose internally. Eyes placed in very incomplete orbits.

The representatives of this section occur in all seas, but only the two genera *Galathea* and *Munida* are found in shallow water. So slight and at the same time so numerous are the modifications met with in those parts of the body from which the generic characters are derived, that it is questionable whether many of the deep-water (so-called) genera should not be united; the examination of a number of species shows at least that in otherwise closely allied forms there is considerable variation in the form and armature of the rostrum, carapace, chelipedes, and external maxillipedes. The number of gills in most if not all the genera¹ agrees with that of the Porcellanodea, viz., fourteen on each side, arranged as follows:—

Segment.	VIII.	IX.	X.	XI.	XII.	XIII.	Totals.
Pleurobranchiæ,	...	...	1	1	1	1	4
Arthrobranchiæ,	2	2	2	2	2	...	10
Podobranchiæ,	...	...	...	...	...	...	0

The genera as at present constituted may be arranged in two divisions, forming a single family:—

I. Abdomen simply bent.

a. Eyes normal. Many of the species inhabiting shallow water.

Galathea, Fabricius. | ? *Grimothea*, Leach.
Munida, Leach.

b. Eyes non-pigmented. Species confined to deep water.

Munidopsis, Whiteaves. | ? *Anoplnotus*, S. I. Smith.
Elasmonotus, A. Milne-Edwards. | *Galacantha*, A. Milne-Edwards.

II. Abdomen folded on itself. Species confined to deep water.

Eumunida, S. I. Smith. | *Ptychogaster*, A. Milne-Edwards.
Uroptychus, Henderson.

Family GALATHEIDÆ.

Galatheidæ, Dana, U.S. Explor. Exped., vol. xiv., Crust., part ii. p. 1431, 1852.

¹ I have examined the branchiæ in various species of *Galathea*, *Munida*, *Munidopsis*, *Elasmonotus*, *Galacantha*, and *Uroptychus*.

Genus *Galathea*, Fabricius.

- Galathea*, Fabricius, Suppl. Ent. Syst., p. 414, 1798.
Galatea, Leach, Dict. d. Sci. Nat., t. xviii. p. 50, 1820.
Galathée, Desmarest, Consid. sur les Crust., p. 188, 1825.
Galathea, Latreille, Fam. Nat. du Règne Anim., p. 278, 1826.
 „ Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 273, 1837.
 „ De Haan, Crust. Japon., p. 198, 1850.
 „ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 478, 1852.
 „ Bell, Brit. Crust., p. 195, 1853.
 „ Stimpson, Proc. Acad. Nat. Sci. Philad., p. 76, 1858.
 „ Heller, Crust. südlichen Europa, p. 188, 1863.
 „ Haswell, Catal. Austral. Crust., p. 161, 1882.

Rostrum flattened and of moderate breadth, with the margins usually spinose. Carapace with pubescent transverse striæ; the surface usually unarmed, with the exception of the anterior gastric area; the cardiac area not prominent. Abdominal segments unarmed.

The members of this genus occur chiefly in shallow water, but certain species are found at considerable depths; they live commonly on rocky ground, or among Corals and Sponges, and swim backwards in the water by a rapid jerking movement of the tail. The distinctive characters are in many cases so slightly marked that it is extremely difficult to decide whether the specimen in question is entitled to rank as a species or merely as a variety. The fact that in some species the merus of the external maxillipedes is shorter than the ischium, while in others it is longer, serves to show that generic characters based on the form of this joint must, in the Galathodea at least, be regarded with suspicion. The supraorbital spines so prominent in the genus *Munida* are visible at the base of the rostrum in most of the *Galatheæ*, but they are of small size, and in most cases are associated with other lateral rostral spines.

Galathea elegans, White.

- Galathea elegans*, White, List Crust. Brit. Mus., p. 66, 1847 (*sine descr.*).
 „ „ Adams and White, Crust. Voyage of H.M.S. "Samarang," pp. i, ii, pl. xii.
 fig. 7, 1848.
 „ „ Haswell, Catal. Austral. Crust., p. 163, 1882.
 „ „ Miers, Crust. in Zool. H.M.S. "Alert," p. 278, 1884.

Habitat.—Station 212, in the Celebes Sea; depth, 10 to 20 fathoms; bottom, sand. Two males, and a female with ova.

This species is characterised by the length of its rostrum and the brilliancy of its colour markings, which are arranged in the form of purplish longitudinal bands on the trunk and chelipedes. The rostrum is more than half the length of the remaining

part of the carapace, and its lateral margin is armed with seven or eight minute denticles; the lateral border of the carapace bears from eight to nine spinules. The merus of the external maxillipedes is short, with the inner margin bispinose. In the female the chelipedes are more slender than in males. This species appears to be widely distributed; it has been recorded from the Philippines and the Australian coast, and I have recently examined specimens which were taken by Mr. E. Thurston off the Pearl Banks at Tuticorin, South India.

Galathea longirostris, Dana, from the Fiji Islands, is a closely allied species, but the rostrum is apparently narrower, the spinules on the margins of the carapace are less distinct, and the second abdominal segment is acute on either side.

Galathea australiensis, Stimpson (Pl. XII. fig. 5).

Galathea australiensis, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 89, 1858.

„ „ Haswell, Catal. Austral. Crust., p. 161, 1882.

Habitat.—Station 190, Arafura Sea; depth, 49 fathoms; bottom, green mud. A female without chelipedes or legs.

This agrees on the whole with Stimpson's brief diagnosis. The ischium of the external maxillipedes has a median curved ridge on its outer surface; the merus is slightly shorter than the ischium, with two well-marked spines on the inner margin, one of which is situated near the distal end. The types were taken at Port Jackson. Haswell is of opinion that it may have to be united with *Galathea spinosirostris*, Dana.

Galathea subsquamata, Stimpson (Pl. XII. fig. 4).

Galathea subsquamata, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 90, 1858.

Habitat.—Stations 204A or 204B, off Tablas Island, Philippines; depth, 100 to 115 fathoms; bottom, green mud. A female (bearing ova) without chelipedes or legs.

This specimen is apparently closely allied to or identical with Stimpson's species. The striæ on the anterior gastric and hepatic areas are short, wavy, and scale-like, those on the hepatic area and the front row of the gastric area being tipped by spinules. The rostrum bears four well-marked acute spines on each side, and its upper surface is provided with numerous indistinct scales of small size; each lateral spine is separated by a rounded notch from the base of the one immediately in front. The ischium of the external maxillipedes has its outer margin produced into a strong spine; the inner border of the merus is trispinose—the third or distal spine being of small size—and the outer border is provided with two small spines near the distal end; the outer surface of both merus and carpus is obscurely squamose. The basal joint of the antennular peduncle is

armed with somewhat larger spines than is usual in species of *Galathea*. The carapace measures 10.5 mm. in length, and the rostrum 4 mm.; Stimpson's type-specimen came from Ousima Island and was of smaller size.

Galathea grandirostris, Stimpson (Pl. XII. fig. 3).

Galathea grandirostris, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 90, 1858.

? *Galathea deflexifrons*, Haswell, Catal. Austral. Crust., p. 163, 1882.

Habitat.—Station 209, off Zebu, Philippines, January 19, 1875; depth, 95 to 100 fathoms; bottom, blue mud. A male without chelipedes or limbs.

As in the case of the two preceding species this identification must be held to be somewhat doubtful. The rostrum is broad, triangular, and deflexed, with five or six minute teeth on each lateral border, and the upper surface pubescent. The striæ on the carapace are numerous and strongly ciliated; the gastric region is unarmed. The merus of the external maxillipedes is slightly shorter than the ischium, its inner margin is bispinose, and the outer surface is obscurely squamose; a few minute dentations are present on the outer margin of both merus and carpus. The sculpture of the abdominal segments is more strongly marked than usual. I believe that *Galathea deflexifrons*, Haswell, will prove to be identical with this species and not with *Galathea elegans*, White, as suggested by Miers, for Stimpson expressly states that his types are allied to the latter. The carapace of the Challenger specimen measures 7 mm. in length.

Galathea dispersa, Spence Bate.

Galathea dispersa, Spence Bate, Proc. Linn. Soc. Lond. (Zool.), vol. iii. p. 3, 1859.

„ „ Kinahan, Trans. Irish Acad., vol. xxiv. p. 99, woodcut, 1871.

? *Galathea labidolepta*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 89, 1858.

Habitat.—Station VIIp, off Tenerife, Canaries, February 10, 1873; depth, 75 fathoms; bottom, volcanic sand. Two specimens, male and female, the latter with ova.

The rostrum is armed with four spines on each side which increase in size from behind forwards, and its upper surface is pubescent. The first striated ridge on the gastric area, situated at the base of the rostrum, bears from two to six spinules, but in some cases they are obsolete; the number of spines on the lateral border of the carapace varies considerably and one or two spinules may be present on the hepatic area. The ischium of the external maxillipedes bears an elevated longitudinal line near the middle of its outer surface, and the lateral margins are prolonged distally into two acute spines, of which the external is more prominent; the merus is shorter than the ischium, and an acute spine always exists near the middle of its inner margin, the two lateral margins are usually prolonged distally into minute spinules, and one or two spinules are frequently

present on the inner margin between the central spine and the distal end. The merus and carpus of the chelipedes are spinose internally, the propodus usually bears a row of short spinules on its outer border, and the upper surface is pubescent and somewhat flattened; the fingers are as a rule straight and in close contact, but in old males those of the right side become bent, the dactylus is provided with a prominent tubercular tooth on the inner margin, and there is a considerable intervening hiatus; a slight hiatus may also exist between the fingers of the left side.

The foregoing characters are furnished by specimens taken in the British seas, where this species occurs commonly in shallow water. After careful examination I am unable to find any points of difference in the Challenger examples.

Two species of *Galathea* were taken in Simon's Bay, South Africa, at a depth of 5 to 18 fathoms, from which locality the type of *Galathea labidolepta*, Stimpson, was procured. The first of these, represented by a single male specimen (figured twice the natural size on Pl. XII.), which I refer with considerable hesitation to Stimpson's species, is either very closely allied to or identical with *Galathea dispersa*. The second species, represented by three imperfect specimens, is of much smaller size, the body of a male measuring 17.5 mm. in length, while a female with ova measures only 11 mm. In these the merus of the external maxillipedes is considerably longer and narrower than the ischium (a character in which it agrees with the common European *Galathea squamifera*, Leach), the inner margin bears two acute spinules near its distal end, and a few minute spinules are present on the outer margin. The chelipedes in the single specimen in which they are still present (a female) are very slender, and the fingers exceed the palm in length. It is impossible to say which of these species, or indeed whether either of them, is referable to *Galathea labidolepta*. The original description of the latter is very incomplete and the size is not recorded; the brief diagnosis would indeed apply to either of the Challenger species in most respects, but as regards the external maxillipedes, in the form of which they differ to a marked extent, Stimpson has furnished no account.

Galathea aculeata, Haswell.

Galathea aculeata, Haswell, Proc. Linn. Soc. N.S.W., vol. vi. p. 761, 1882; Catal. Austral. Crust., p. 162, 1882.

Habitat.—Station 172, off Nukalofa, Tongatabu; depth, 18 fathoms; bottom, coral mud. A male specimen.

Station 208, off Manila; depth, 18 fathoms; bottom, blue mud. Several specimens, including a female with ova.

The brevity of Haswell's description renders the identification of this species very uncertain. It is apparently allied to *Galathea australiensis*, Stimpson, but the gastric

spinules are absent, the lateral rostral denticles are less markedly spinulose and of smaller size; while the median rostral spine is very long, narrow, and acute. The striæ on the carapace are well marked, and fringed with tolerably long hairs. The merus of the external maxillipedes is much shorter than the ischium, and its inner margin bears two or three slender spinules, while, in some specimens at least, one or two obscure dentations are present on the outer margin. In the single specimen which still retains the chelipedes (a male) the fingers are separated by a hiatus, whereas Haswell states that they do not gape; this cannot, however, be considered a difference of much importance. The largest specimen measures about 12 mm. in length. The types came from the coast of Queensland.

Galathea pusilla, Henderson (Pl. XII. fig. 1).

Galathea pusilla, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 407, 1885.

Characters.—The carapace is comparatively smooth, only about eight transverse striæ being present, and these are fringed with very short hairs; the regions are ill defined, and each lateral border bears eight or nine spinules. The gastric area is armed anteriorly with two pairs of spinules separated by a rather wide median interval. The rostrum is broadly triangular¹ and slightly depressed, a prominent spine is placed at either side of the base immediately over the ocular peduncle, and a minute spinule is situated on either side near the apex (in one specimen this spinule is absent); the apex is narrow and acute.

The ischium of the external maxillipedes has its outer border prolonged distally into an acute spine; the merus is much shorter than the ischium, the inner border is armed near its middle with a curved acute spinule, and a similar projection is present at the distal end of the outer border. The anterior prolongation of the first antennal peduncular joint present in most (if not all) species of *Galathea* is very long, slender, and acute, indeed, it is visible from above as a spine lying outside the eye-stalk.

The chelipedes (which have become detached) are pubescent, and the lateral margins and upper surface of the merus, carpus, and propodus bear a few curved spinules; the fingers do not equal the palm in length, and their opposed edges are irregularly toothed. The ambulatory limbs have the anterior borders of the meri and carpi armed with short spinules; the dactyli are more than half the length of the propodi and almost straight, with the posterior margin bearing a series of minute horny spines.

The abdominal segments are comparatively smooth, the striæ being almost devoid of hairs.

Length of body of a male 10 mm., of chelipede (detached) 11 mm., of carapace 5 mm., of rostrum 1·8 mm.

¹ In the figure it is represented as rather narrower than it actually is, and the size of the lateral apical spinules is exaggerated.

This species is at once distinguished by the form and armature of the rostrum, and the comparative smoothness of the carapace, in addition to its small size.

Habitat.—Station 163A, off Twofold Bay, Australia; depth, 150 fathoms; bottom, green mud. A male and two female specimens; both of the latter have a curious parasite (apparently belonging to the Rhizocephala) adhering to the under surface of the abdomen.

Galathea inconspicua, Henderson (Pl. XII. fig. 2).

Galathea inconspicua, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 408, 1885.

Characters.—The transverse striæ on the carapace are well developed and fairly numerous (about fourteen can be made out). They form raised lines and are apparently devoid of setæ; the regions are not circumscribed, and the lateral borders are indistinctly spinulose, about eight dentations being visible. The gastric area is armed anteriorly with six minute spines. The rostrum is narrow, but not twice the length of the ocular peduncles, which are of rather large size, and the upper surface is excavated towards the base, while the lateral border possesses four minute spinules which diminish in size as they pass forwards; the apex is narrow and acute.

The ischium of the external maxillipedes is slightly longer than the merus, the inner border of the latter is armed with three minute spines of which the second is most prominent, while the outer border terminates distally in a single spinule.

The chelipedes and ambulatory limbs are wanting in the single specimen.

The striæ on the abdominal segments are somewhat pronounced but apparently devoid of hairs.

Breadth of carapace 2·5 mm., length of body 8 mm., of carapace 4 mm., of rostrum 1·5 mm.

The specimen which has furnished the above description is unfortunately in a very imperfect state of preservation. The species is, however, distinguished by its small size, the armature of the gastric region, the prominent striæ, and the narrow rostrum.

Habitat.—Station 194, off Banda Island; depth, 360 fathoms; bottom, volcanic mud. The single specimen is apparently an adult male.

Galathea sp.

The collection contains specimens of a *Galathea* taken at Station 75, off the Azores; depth, 50 to 90 fathoms; bottom, volcanic mud; and at St. Vincent, Cape Verde Islands, which I had hitherto referred to *Galathea intermedia*, Lilljeborg, a Scandinavian and British species. It agrees with this species in the following respects:—The carapace is comparatively smooth, about eight transverse striæ being present, the first of these (on the gastric area) short, curved, and armed with two spinules; the rostrum possesses four

acute teeth on each side, the first of which is slightly smaller than the others; the merus of the external maxillipedes is longer than the ischium, and its inner border is armed with two acute and subequal spines near the distal end. All the specimens are imperfect, but several detached chelipedes preserved in the same bottle, which I believe belong to this species, induce me to regard it as distinct from *Galathea intermedia*. The hand is somewhat swollen, and in all cases the immobile finger is bent, so that a hiatus often of considerable size exists between the fingers, whereas in *Galathea intermedia* the whole chelipede is extremely slender, and the fingers are in contact along the whole of their inner margins. A closer examination also shows that in the Challenger specimens the rostrum is slightly broader, the lateral teeth are of larger size, and the terminal acute spine is shorter than in *Galathea intermedia*. I do not, however, feel justified in assigning a new name to the species, but regret at the same time that the lateness of this discovery prevents me from figuring any of the specimens.

Genus *Munida*, Leach.

- Munida*, Leach, Dict. d. Sci. Nat., t. xviii. p. 52, 1820.
 ,, Desmarest, Consid. sur les Crust., p. 190, 1825.
 ,, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 478, 1852.
 ,, Bell, Brit. Crust., p. 206, 1853.
 ,, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 76, 1858.
 ,, Heller, Crust. südlichen Europa, p. 192, 1863.
 ,, Miers, Catal. New Zealand Crust., p. 68, 1876.

Rostrum slender and styliform, with a well-developed supraorbital spine on either side of its base. Carapace with the surface usually spinulose and the cardiac area as a rule distinctly circumscribed. Chelipedes and ambulatory limbs elongated and slender. One or more of the abdominal segments usually with a series of spinules on the anterior dorsal margin.

At the date of publication of the *Histoire Naturelle des Crustacés* only a single species, the common European *Munida rugosa* (Fabricius), was known to science, which Milne-Edwards, following the example of many of the older writers, placed in the genus *Galathea*. With the exception of the striking difference in the form of the rostrum and supraorbital spines, it is evident that the two genera share many features in common. Recent deep-sea investigations have increased the number of species from about half a dozen to upwards of thirty, and have shown at the same time that the genus has an extended bathymetrical distribution, some at least of the species reaching a depth of over 1000 fathoms, while the majority are found most abundantly at depths varying from 100 to 300 fathoms. The appendages of the first abdominal segment are occasionally absent in the male.¹

¹ They are absent in the following species:—*Munida normani*, Henderson, *Munida squamosa*, Henderson, *Munida granulata*, Henderson, and *Munida scabra*, Henderson.

Munida subrugosa (White).

- Galathea subrugosa*, White, List Crust. Brit. Mus., p. 66, 1847 (*sine descr.*).
 „ „ Cunningham, Trans. Linn. Soc. Lond. (Zool.), vol. xxvii. p. 495, 1871.
Munida subrugosa, Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 479, pl. xxx. fig. 7, 1852.
 „ „ Miers, Zool. "Erebus" and "Terror," Crust., p. 3, pl. iii. fig. 2, 1874; Catal. New Zealand Crust., p. 68, 1876.
 „ „ Targioni Tozzetti, Crust. "Magenta," p. 234, pl. xiii. fig. 5, 1877.
 „ *gregaria*, Miers, "Alert," Crust., Proc. Zool. Soc. Lond., p. 73, 1881.
juv. (?) Galathea gregaria, Fabricius, Ent. Syst., t. ii. p. 473, 1793.
juv. (?) Grimothea gregaria, Leach, Dict. d. Sci. Nat., t. xviii. p. 50, 1820.
 „ „ Desmarest, Consid. sur les Crust., p. 188, 1825.
 „ „ Guerin,¹ Voy. "Coquille," Crust., pl. iii. fig. 1, 1830.
 „ „ Milne-Edwards, Hist. Nat. des Crust., t. ii. p. 277, 1837; in Cuvier, Règne Anim., éd. 3, Crust., pl. xlvi. fig. 2, no date.
 „ „ Dana, U.S. Explor. Exped., vol. xiii., Crust., part i. p. 483, pl. xxxi. fig. 1, 1852.
 „ „ Cunningham, Trans. Linn. Soc. Lond. (Zool.), vol. xxvii. p. 496, 1871.

Habitat.—Station 304, Port Otway, Patagonia; depth, 45 fathoms; bottom, green sand. Several young specimens with the total length of body varying from 10 mm. to 14 mm.

Station 305A, Messier Channel, Patagonia; depth, 125 fathoms; bottom, blue mud. An adult male and a young female.

Station 312, Port Famine, Patagonia; depth, 10 to 15 fathoms; bottom, blue mud. A large series of adult specimens.

Gray's Harbour, Patagonia. Several specimens from the stomach of a fish.

Station 315, Port William, Falkland Islands; depth, 5 to 12 fathoms; bottom, sand and gravel. Two adult males and a female, the latter with ova, also a young specimen measuring 13 mm. in total length.

Station 320, off Monte Video; depth, 600 fathoms; bottom, green sand. A male specimen in a very imperfect state of preservation.

Munida subrugosa is abundant in the Patagonian region; it occurs also at the Auckland Islands (White), in the New Zealand seas (Miers), and I am enabled to record the species from the South Atlantic and a variety from South Australia. It may be said, indeed, to represent *Munida rugosa* in the southern hemisphere. In the Catalogue of New Zealand Crustacea, and subsequently in a more recent work, Mr. E. J. Miers states his conviction that the so-called *Grimothea gregaria* is merely an immature stage of this species, a belief based on the facts that the two exhibit many points of similarity and occur in the same localities. The *Grimothea* is moreover apparently pelagic in habit, and it may be added that its general appearance favours the theory of immaturity. In spite

¹ Milne-Edwards regarded Guerin's figure as that of a distinct species, and applied the name *Grimothea "Duperreii"* to it.

of the considerable attention paid to surface netting, and the fact that the *Grimothea* is known to be a common form, no specimens appear to have been taken by the Challenger, though two examples, presumably from New Zealand—labelled “Wellington Museum,”—are preserved in the collection. An examination of the material at my disposal in no way enables me to confirm Mr. Miers’ theory, for a number of young specimens, undoubtedly belonging to *Munida subrugosa*, and taken on the bottom along with that species, have all the general characters of the adult, and are yet not more than one-third the size of ordinary specimens of *Grimothea*; nor have I been able to discover in these any great variation in the length of the external maxillipedes. It may, however, be possible that some of the newly hatched young pass to the surface and exist for a longer or shorter period in the *Grimothea* state; an examination of fresh specimens of the latter can alone decide the question.

In *Munida subrugosa* a certain amount of variation is noticeable as regards the number and size of the spines on the carapace, chelipedes, and abdominal segments, also as regards the length of the rostrum. In all the specimens which I have examined there is considerable uniformity in regard to the external maxillipedes; the ischium and merus are subequal in length, and their outer surface is as a rule grooved longitudinally, the lateral margins of the former joint terminate distally in spines, and the latter has usually a single spine on the inner margin and one at the distal end of the outer margin; the carpus is without a prominent lobe. In *Grimothea gregaria* the whole body is soft and adapted for a pelagic life, the abdomen is proportionately narrower, the eyes are of larger size, and the spines everywhere less strongly developed. The external maxillipedes are of great length (about two-thirds the length of the body), and the various joints are smooth and flattened; the merus is considerably longer than the ischium, and the carpus and propodus are each provided with a prominent lobe on the inner margin, while the dactylus is subovate in shape; the hairs which clothe the four terminal joints are of considerable length. It cannot, however, be denied that the external maxillipedes furnish the only important difference between the two forms, and there can be little doubt that these organs are specially adapted for the pelagic life of their owners.

Munida subrugosa (White), var. *australiensis*, nov. (Pl. XIII. fig. 3).

Characters.—The median rostral spine appears to be longer than usual, a character probably common to young specimens of the species. The spinules on the carapace are more numerous than in the typical form, and arranged as follows:—A row of four spinules stretches across the carapace, two being situated on the anterior margin of the cardiac area, and one on the anterior margin of each branchial region; a single spinule is placed on the inner aspect of the area formed by a splitting of the cervical groove, and a single spinule is placed on each hepatic region immediately external to the anterior gastric spine

(which lies behind the supraorbital). In other respects this variety cannot be distinguished from the typical form of *Munida subrugosa*; indeed, on examining a series of the latter nearly all the above-mentioned spinules can be made out in different specimens, though I have failed to see any in which so many were present at the same time.

Habitat.—Station 162, off East Moncœur Island, Bass Strait; depth, 38 to 40 fathoms; bottom, sand. Several specimens, the majority of which are females; the body of the largest measures only 25 mm. in length.

Munida stimpsoni, A. Milne-Edwards (Pl. XIV. fig. 1).

Munida Stimpsoni, A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 47, 1880.

Habitat.—Station 122, off Pernambuco; depth, 350 fathoms; bottom, red mud. A male specimen measuring as follows:—Length of body 36 mm., of rostrum 5.6 mm., of chelipede 73 mm.

The chelipedes are extremely long and slender, somewhat scaly, and armed with spines; the propodus is more than twice the length of the carpus, and the fingers are long, slender, and straight. The eyes are slightly compressed. The rostrum is not twice the length of the supraorbital spines, and all three are slender. The gastric region of the carapace is armed with two pairs of spinules placed posterior to the supra-orbitals, and a single spinule is present on its lateral aspect; the cardiac area is slightly elevated and bears a median and two lateral spines, these last being situated on the confines of the branchial regions. The lateral margin of the carapace is but slightly spinose, though the first or postorbital spine is well developed; two spinules are placed near the middle of the posterior margin, which is marked by a line of considerable width. The hairs on the carapace are slightly iridescent. The merus of the external maxillipedes possesses a single spine on its inner margin. The ambulatory limbs are slender and slightly flattened. The second, third, and fourth abdominal segments are armed with spinules on the anterior margin.

This species appears to be abundant in moderately deep water throughout the West Indies. It was taken by the "Blake" at no less than twenty stations, in depths varying from 62 to 1105 fathoms.

Munida miles, A. Milne-Edwards.

Munida miles, A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 51, 1880.

„ *valida*, S. I. Smith, Proc. U.S. Nat. Mus., vol. vi. No. 1, p. 42, pl. i. 1883.

Habitat.—Station 122, off Pernambuco; depth, 350 fathoms; bottom, red mud. Four males and three females, one of the latter with ova. The body of the largest specimen (a male) measures 70 mm. in length, and the chelipede 83 mm.

Two forms of chelipede are met with in the males of this species. In the one the chela is narrow, while the fingers are slender and elongated, with their opposed margins in contact throughout; in the other the chela is slightly dilated, the fingers are broad, and a distinct hiatus exists between their opposed edges towards the proximal end. There is reason to believe that this sexual dimorphism is of not uncommon occurrence among the Galatheids generally. The Challenger specimens differ from those taken by the "Blake" in having the chelipedes longer, the carapace slightly narrower, and the eyes of larger size, but there is no reason to suppose that they belong to a different species.

The types were taken in the West Indies at depths varying from 37 to 320 fathoms, and the species was afterwards carefully described and figured by Professor S. I. Smith, from specimens taken in deep water off the south coast of New England by the U. S. Fish Commission.

Munida microphthalma, A. Milne-Edwards (Pl. III. fig. 4).

Munida microphthalma, A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 51, 1880.

Habitat.—Station 24, off Culebra Island, West Indies; depth, 390 fathoms; bottom, Pteropod ooze. An adult male (figured), the body of which measures 32 mm. in length, and the chelipede 42 mm.

Station 171, north of the Kermadec Islands; depth, 600 fathoms; bottom, hard ground. A young male.

Station 343, near Ascension Island; depth, 425 fathoms; bottom, volcanic sand. A male of small size.

This species is distinguished at once by the small size of its eyes, the corneæ of which are but slightly dilated and of a light-brown hue. The gastric area of the carapace is armed in front with a transverse row of spinules, two of which situated behind the supraorbitals are of rather large size, while the others vary in number and size in different specimens. The rostrum is about half the length of the carapace and is slightly upturned towards the apex, while the supraorbitals have a more obvious elevation. The lateral margins of the carapace are distinctly spinose, the first two spines being of large size. The chelipedes are of moderate length, and the various joints (especially the merus) are spinose; the upper surface of the hand is somewhat flattened, and no hiatus exists between the fingers. The merus of the external maxillipedes has a well-marked spine on the inner margin, situated nearer the proximal than the distal end. The second abdominal segment bears a transverse row of spinules on its anterior margin (these are obsolete in the specimen taken at Station 171).

This species was taken by the "Blake" at four stations in the West Indies, the

depths varying from 573 to 1030 fathoms; its occurrence in the Pacific is a matter of extreme interest.

Munida spinulifera, Miers.

Munida spinulifera, Miers, Crust. in Zool. H.M.S. "Alert," p. 279, pl. xxxi. fig. A, 1884.

Habitat.—Amboina; depth, 15 fathoms. An imperfect male specimen (without chelipedes) measuring 16 mm. in length.

This species is allied to *Munida japonica*, Stimpson, as well as to *Munida militaris*, Henderson. The rostrum is arcuate and more than twice the length of the supraorbital spines. The gastric area of the carapace is armed in front with a transverse row of spinules, about twelve or thirteen in number; a spinule is also present on each branchial area immediately behind the cervical groove. The external maxillipedes are somewhat pubescent, and the merus is armed with a single spine near the proximal end of its inner margin. The second abdominal segment has several spinules on its anterior margin, and a few of very small size also occur on the third segment.

The types were dredged by the "Alert" in the Arafura Sea at a depth of from 32 to 36 fathoms.

Munida spinosa, Henderson (Pl. III. fig. 3).

Munida spinosa, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 408, 1885.

Characters.—The rostrum is about half the length of the carapace and slightly upturned towards the apex; the supraorbital spines are distinctly elevated, with a slight divergence, and extend a little beyond the middle of the rostrum. The striæ on the surface of the carapace are strongly developed, and as a rule without hairs; the gastric area is distinctly circumscribed, and bears in front from six to ten spines arranged in a semilunar-shaped row, of which the two largest are situated behind the supra-orbitals, a single spinule (occasionally absent) is found on each branchial region immediately behind the cervical groove, and a spine occurs in front of this on the area formed by the splitting of the cervical groove. The lateral margin of the carapace is armed with about seven well-marked spines, two of which are placed in front of the anterior division of the cervical groove; the first or postorbital is longer than any of the others.

The chelipedes are long and of moderate width, with all the joints strongly spinose, the largest spines being, however, situated on the merus; the spines on the upper surface of the propodus are more curved than usual and arranged in three rows; the fingers are

scarcely equal in length to the palm, slightly bent and comparatively smooth, with their opposed edges finely dentate, in contact almost throughout, and fringed with hairs. The ambulatory limbs have the meral and carpal joints strongly spinose, the former on both margins, the latter merely in front.

The eyes are of large size and somewhat rounded. The various joints of the antennal peduncle are spinose, the anterior prolongation of the first joint being of moderate length. The ischium of the external maxillipedes has its inner margin terminating distally in one or two short stout spinules, and the merus is armed with three spines on its inner margin, the first of large size, the second of small size, and the third placed at the distal end; the outer surface of the merus is obscurely tubercular.

The abdominal segments are comparatively smooth, the second is, however, provided with six prominent spines on its anterior margin.

Breadth of carapace (of an adult male) 17 mm., length of body¹ 43 mm., of carapace (not including rostrum) 20 mm., of rostrum 9.5 mm., of chelipede 81 mm., of chela 33 mm., of first ambulatory leg 50 mm.

The strongly developed spiny armature of this species distinguishes it from all other members of the genus. Females are of slightly smaller size, with the spines less strongly developed, the chelipedes narrower, and the rostrum apparently slightly longer than in males. In young specimens most of the adult characters can be recognised.

Habitat.—Station 145A, off Prince Edward Island; depth, 310 fathoms; bottom, volcanic sand. Many specimens, including adults of both sexes and young; some of the females are with ova.

Station 320, off Rio de la Plata; depth, 600 fathoms; bottom, green sand. Several specimens, the majority of which are young.

Munida normani, Henderson (Pl. XIII. fig. 5).

Munida Normani, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 408, 1885.

Characters.—The rostrum is little more than one-third the length of the carapace and horizontal in direction; the supraorbital spines are about two-thirds the length of the rostrum, with a very slight upward inclination. The striæ on the surface of the carapace are well marked, and but slightly pubescent; the gastric area is moderately convex, with two spines in front placed immediately behind the supraorbitals; the cardiac area is distinctly elevated, and its front margin, which is separated by a depression from the gastric area, bears a transverse row of minute spinules (not figured); four or five spines are placed in a longitudinal row on the boundary between each branchial region and the cardiac area. The lateral margin of the carapace is armed with about six spines of moderate size; two of these, including the first or postorbital which exceeds the others

¹ In all the species of *Munida* I take this to exclude the rostrum.

in size, are situated in front of the anterior division of the cervical groove. The posterior margin of the carapace is usually provided with two spines.

The chelipedes are narrow and subcylindrical, with the joints squamose and slightly spiny, the spines being most strongly developed on the merus; the propodus (including the immobile finger) is about three times the length of the carpus, and the spines are confined to its inner surface; the fingers are remarkably slender, and slightly curved, their length being almost equal to that of the palm, the opposed edges are finely dentate and in contact throughout, though three or four slightly more obvious teeth can be made out on the immobile finger. The ambulatory limbs are flattened; the upper surface of the meral, carpal, and propodal joints is squamose, while the two former have their anterior and posterior margins in addition spinose; the dactyli are short and their front margins are finely crenated.

The eyes are of moderate size and slightly compressed. The anterior prolongation of the first antennal peduncular joint is short, not exceeding the second joint. The ischium and to a slight extent also the merus of the external maxillipedes are squamose externally, the inner border of the first of these joints terminates distally in a spine, and a slightly larger one is placed near the middle of the corresponding border of the merus.

The second, third, and fourth abdominal segments bear four spines each on the anterior margin, the two lateral of these are almost obsolete on the fourth segment, but a prominent median spine occurs near the posterior margin: the dorsal surface of the fifth and sixth segments is squamose.

Breadth of carapace (of an adult male) 14 mm., length of body 35 mm., of carapace 15 mm., of rostrum 6 mm., of chelipede 62 mm., of chela 26 mm., of first ambulatory leg 44 mm.

The subcylindrical and scaly chelipedes, along with the armature of the carapace, characterise this species. Females are of slightly smaller size than males, and they along with young individuals have the various spines less strongly developed; in some cases the transverse cardiac spinules may even be absent.

I have pleasure in dedicating this species to the Rev. Canon Norman, well known for his labours among the North Atlantic Crustacea, to whom I am personally much indebted for assistance and advice, rendered when the collection was first placed in my hands.

Habitat.—Station 173, off Matuku, Fiji Islands; depth, 315 fathoms; bottom, coral mud. Eleven specimens, eight of which are males.

Munida incerta, n. sp. (Pl. XIII. fig. 4).

Characters.—The rostrum is about half the length of the carapace and slightly depressed; the supraorbital spines are about two-thirds the length of the rostrum and

somewhat bent. The striæ on the surface of the carapace are numerous and pubescent; the gastric area is moderately convex, with two spines in front placed immediately behind the supraorbitals; the cardiac area is unarmed and almost flat; three spines placed in a longitudinal row are present on the boundary between each branchial region and the cardiac area. The lateral margin of the carapace bears five or six spines, but with the exception of the first none are of large size; the posterior margin is unarmed.

The chelipedes are wanting in the single specimen. The ambulatory limbs are flattened; the upper surface of the merus, carpus, and propodus is covered with hair-clad scales of small size, and the lateral margins of the two former joints are spinose; the dactyli are more than half the length of the propodi.

The eyes are of large size and strongly compressed, with a fringe of long hairs passing over the upper surface of each cornea. The anterior prolongation of the first antennal peduncular joint is long, slightly curved, and freely movable, forming a spine visible from above which lies external to the eyes. The ischium and merus of the external maxillipedes are finely squamose externally, the former has a short conical spine at the distal end of its inner border, while the latter has a single well-marked spine near the middle of the same border, and a spine of smaller size at the distal end of the outer border.

The second, third, and fourth abdominal segments are armed precisely as in the last species; the dorsal surface of the fifth and sixth segments, telson, and last pair of appendages is covered with minute ciliated scales.

Breadth of carapace (of a female) 17 mm., length of body 39 mm., of carapace 16 mm., of rostrum 8 mm., of first ambulatory leg 46 mm.

This species, inadvertently omitted from the diagnoses of the new species of Galathodea taken by the Challenger, is allied to *Munida normani*, from which, however, it is distinguished by its longer rostrum, the different form of the cardiac area of the carapace, the smaller and pubescent scales on the ambulatory limbs and last abdominal segments, but above all by the great development of the antennal spine.

Habitat.—Station 200, off Sibago Island, Philippines; depth, 250 fathoms; bottom, green mud. An imperfect female specimen.

Munida squamosa, Henderson (Pl. XIII. fig. 1).

Munida squamosa, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 409, 1885.

Characters.—The rostrum is almost horizontal and a little more than one-third the length of the carapace; the supraorbital spines are slightly curved and about three-fourths the length of the rostrum. The striæ on the surface of the carapace are finely granulated and slightly pubescent; the gastric area is convex, with a pair of spines placed immediately behind the supraorbitals; the cardiac area is distinctly circumscribed, and triangular in outline, with a well-developed median spine on the anterior margin which

overhangs a narrow area posterior to the united cervical grooves; a single spinule (occasionally absent) is present on each branchial region, placed behind the cervical groove and near the confines of the cardiac area. The lateral margin of the carapace is armed with about six spines, only the first of which reaches any considerable size, two being situated in front of the anterior division of the cervical groove. The posterior margin of the carapace is raised, and bears two spines.

The chelipedes are moderately long, and the merus, carpus, and propodus are covered with large almost smooth scales, some of which, on the inner surface of the same joints, more especially the merus, are produced into spines; in females and young males the chelipedes are narrow and cylindrical, whereas in adult males the hand is slightly dilated; the propodus is about two and a half times the length of the carpus (in adult males it is somewhat longer) and comparatively few spines are present on the inner surface; the fingers are long and slender, being about two-thirds the length of the palm, and the tip of the dactylus fits in between two small teeth at the apex of the immobile finger; in females the fingers are straight and in contact throughout, with their opposed edges finely crenated, while in adult males both—but especially the immobile finger—show a prominent bulging which gives rise to a basal hiatus, and a single tubercular tooth is present on the inner margin of each along with a dense clothing of stiff hairs. The ambulatory limbs are similar to those of *Munida normani*, but the scales are more strongly developed and the dactyli are slightly longer.

The eyes are of large size, and somewhat compressed, and as in the last two species distinctly reniform in shape. The antennal peduncle is pubescent, and the anterior prolongation of the first joint is short. The ischium and merus of the external maxillipedes are both squamose externally and strongly pubescent; the inner margin of the former is prolonged distally into a slender acute spine, while the latter joint has a slightly larger spine situated near the middle of the same margin.

The second, third, and fourth abdominal segments are armed as in *Munida normani*, the two lateral spinules on the fourth segment being occasionally obsolete; the dorsal surface of the fifth and sixth segments, telson, and last pair of appendages, is covered with scales which are of smaller size and more numerous than in *Munida normani*.

This species is nearly related to *Munida normani*, from which it is distinguished by the different armature of the cardiac and branchial areas of the carapace, the greater development of the striæ, the form of the chelipedes, and other less important distinctions. The cardiac spine is uniformly well developed even in very young individuals. The most important sexual difference has already been referred to in treating of the chela.

Breadth of carapace (of an adult male) 17 mm., length of body 45 mm., of carapace 16.5 mm., of rostrum 6.3 mm., of chelipede 85 mm., of chela 36 mm., of first ambulatory leg 58 mm. Females are apparently of slightly smaller size than males.

Habitat.—Station 219, north of Papua; depth, 150 fathoms; bottom, coral mud.

About twenty specimens were taken, two of which are females with ova; one has the carapace swollen laterally from the presence of a Bopyrid in the branchial chamber, and another has a Sacculinid attached to the under surface of its abdomen.

Munida granulata, Henderson (Pl. XIV. fig. 3).

Munida granulata, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 409, 1885.

Characters.—The rostrum is slightly more than one-fourth the length of the carapace and twice the length of the supraorbital spines; all three are distinctly upturned. The carapace is covered everywhere with granulations, some of which are compound, and with hairs, but transverse striæ are not defined; the gastric area is moderately convex, with a pair of spines placed behind the supraorbitals, though separated by a slightly wider interval, and a median spine of larger size near the posterior limit of the area, while a few spinules occur on the lateral surfaces; the cardiac area is triangular in outline, and somewhat elevated, with a median row of three spinules, the first of which, situated on the anterior margin, is most prominent; several spinules are found on the branchial regions, the best marked being three or four which occur near the confines of the cardiac area. The lateral border of the carapace bears five or six spines, none of which are of large size, with the exception of the postorbital, which from its position can scarcely be included in this border; the posterior margin is distinctly raised, with a number of equidistant spinules, all of which may be obsolete, though the central one is slightly larger than the others and usually present.

The chelipedes are long and subcylindrical, and the merus, carpus, and propodus are covered with flattened granulations which tend to become squamose on the last of these joints, while the merus and carpus, especially the former, are slightly spinose on the inner surface. The chela is slightly more than twice the length of the carpus; the fingers are slender and almost equal in length to the palm, with a slight incurvation, their outer and inner surfaces are faintly carinated, and the opposed edges finely crenated; the dactylus extends beyond the tip of the immobile finger, and its slender apex fits in between two minute teeth at the end of the latter. In male specimens the fingers are somewhat bent, the dactylus being slightly curved upwards, and a narrow hiatus is left between the two, at either end. The ambulatory limbs are remarkably slender, and the meral, carpal, and propodal joints are granulated, the first of these also has a series of spines on the anterior border; the dactyli are long, slender, and somewhat curved.

The eyes are of moderate size and considerably flattened, a series of hairy "lashes," extending over the corneæ from both the upper and lower margins of the peduncle. The antennal spine is pubescent and remarkably long, exceeding the whole peduncle in length, while the second joint is prolonged into a similar spine of almost equal length; both spines are visible from above lying internal to the antenna. The antennal flagellum

is pubescent and extremely short, not exceeding the carapace in length. The ischium and merus of the external maxillipedes are tuberculate externally, the inner margin of the former is prolonged distally into an acute spine, while the latter is armed with a small spine near the middle of its inner border, and a few minute spinules on the outer border.

The second and third abdominal segments bear six spinules each, four of which are arranged on the anterior and two near the posterior margin, the third segment bears five spinules, a mesial one being present on the posterior margin, which is somewhat prominent. A considerable variation is seen in the number of these abdominal spinules, though in no case are all obsolete. The fifth and sixth segments, and to a certain extent the telson also, are covered externally with small setigerous scales.

This species is characterised by the short rostrum, the absence of striæ from the carapace, the extremely short antennal flagellum, the two prominent antennal spines, and certain less striking features, as the armature of the carapace, chelipede, and other parts.

Breadth of carapace (of an adult male) 11·5 mm., length of body 32 mm., of carapace 12 mm., of rostrum 3 mm., of chelipede 65 mm., of chela 27·5 mm., of first ambulatory leg 42 mm.

Habitat.—Station 173, off Matuku, Fiji Islands; depth, 315 fathoms; bottom, coral mud. Six males and three females, one of the latter with ova; two specimens have Sacculinids adhering to the under surface of the abdomen.

Munida scabra, Henderson (Pl. XV. fig. 1).

Munida scabra, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 409, 1885.

Characters.—The rostrum is less than one-fourth the length of the carapace, and not twice the length of the supraorbital spines; all three are distinctly upturned. The carapace is slightly pubescent, and covered everywhere with minute spinules which tend to be arranged in transverse rows; the gastric area is well defined, and bears a pair of spines behind the supraorbitals and a median spine near the posterior margin; the cardiac area is somewhat triangular in outline, with three rather prominent curved spines arranged in the median line; the branchial area bears three or four spines near the branchio-cardiac boundary. The lateral border of the carapace is armed with nine spines, only the first two of which reach any considerable size; the posterior border is distinctly raised, with a median spine and numerous spinules on either side.

The chelipedes are shorter but in other respects similar to those of the last species; the joints are, however, covered with well-marked flattened and glabrous scales, the anterior margins of which are pubescent. The fingers are slender and cross one another at the tips, the dactylus is slightly bent upwards in male specimens, but no hiatus exists

between the two; the opposed edges are finely dentate, and the dactylus bears in addition three or four equidistant tubercular teeth of small size. The ambulatory limbs are slender, and the meral, carpal, and propodal joints are squamose, the two first of these also with their margins spinose; the dactyli are moderately long, and but slightly curved.

The eyes are similar to those of the last species, though separated by a wider interval. The antennal spine is pubescent and extremely long, projecting for a considerable distance in front of the eyes; the anterior prolongation of the second joint is short, not exceeding the joint itself in length; the antennal flagellum is slender and of moderate length. The ischium and merus of the external maxillipedes are squamose externally, and in other respects similar to those of *Munida granulata*, though the spine on the inner margin of the merus is slightly larger than in the last species.

The second, third, and fourth abdominal segments are armed as in *Munida granulata*; the spines are, however, more strongly developed. The fifth and sixth segments are glabrous externally, and crossed by curved concentric lines.

This species is in many respects closely allied to the last; it can, however, be at once distinguished from *Munida granulata*, which is a smaller species, by the substitution of spinules for granules on its carapace, the shorter chelipedes, the absence of a second lengthy antennal prolongation, and the peculiar markings on the fifth and sixth abdominal segments.

Breadth of carapace (of an adult male) 14 mm., length of body 36 mm., of carapace 14 mm., of rostrum 3 mm., of chelipede 59 mm., of chela 24.5 mm., of first ambulatory leg 44 mm. Female specimens appear to be very slightly inferior in size to males.

Habitat.—Station 192, off Little Ki Island; depth, 140 fathoms; bottom, blue mud. Nine females, one with ova, and six males; one specimen has a Sacculinid attached to the abdomen.

Munida proxima, Henderson (Pl. XIII. fig. 2).

Munida proxima, Henderson. Ann. and Mag. Nat. Hist., ser. 5, vol. xvi, p. 410, 1885.

Characters.—The rostrum is less than one-fourth the length of the carapace, and not twice the length of the supraorbital spines, with its basal portion broad and the terminal part slightly upturned; the supraorbitals are horizontal in direction. The carapace is slightly pubescent and covered everywhere with minute spinules, arising from short transverse ridges on the posterior half, which do not, however, form striæ passing from side to side; the gastric area is well defined, and its surface is clothed with small though distinct scales which are slightly pubescent and give off a median spinule in front, a pair of spines are placed behind the supraorbitals, but there is no trace of a posterior median spine; the cardiac area is distinctly triangular in outline and armed

as in the last species, but the spines are in some specimens at least more bluntly tuberculate; the branchial area has one or two small spines in front near its junction with the cardiac area, and some of the ordinary spinules of the carapace in this vicinity are slightly enlarged. The lateral border of the carapace bears a row of spinules continued back almost to the posterior margin, and of which the first eight or nine are of moderate size, the first or postorbital greatly exceeds all the others; the posterior border is distinctly raised but with the exception of a very minute median spinule is unarmed.

The chelipedes bear a general resemblance to those of *Munida granulata*, but the joints are covered with distinct overlapping scales, the margins of which are ciliated. The fingers are slender and straight in the female, agreeing closely with those of *Munida scabra*. The ambulatory limbs are slender, with the meral, carpal, and propodal joints subsquamose, and the first of these with both margins spiny, the spines being more strongly developed anteriorly; the dactyli are moderately curved, and more slender than in either of the preceding species.

The eyes are flattened, with the corneae overhung by long iridescent "lashes." The antennal spine is long and pubescent as in the last species, projecting considerably beyond the eyes; the anterior prolongation of the second joint is bent forwards but does not exceed the joint itself in length. The ischium and merus of the external maxillipedes are distinctly squamose externally, and armed as in *Munida scabra*.

The second, third, and fourth abdominal segments are armed as in the two preceding species. The fifth and sixth segments agree as to the markings on their dorsal surface with *Munida scabra*.

This species is distinguished from *Munida scabra*, to which it is in many respects closely related, by its smaller size, the less upturned rostrum, the presence of scales on the gastric area, and the absence of a posterior median spine from this region, the rudimentary state of the spinules on the posterior margin of the carapace, and the more slender dactyli of the ambulatory limbs.

Breadth of carapace (of an adult female) 9 mm., length of body 24 mm., of carapace 9 mm., of rostrum 2.3 mm., of chelipede 41 mm., of chela 17 mm., of first ambulatory leg 30 mm.

Habitat.—Station 219, north of Papua; depth, 150 fathoms; bottom, coral mud. Three adult female specimens, one with ova.

The three preceding species agree with one another in the possession of certain somewhat abnormal features, such, for instance, as the flattened ciliated eyes, the short acuminate rostrum, the replacement of the striæ on the carapace by short rows of granules or spinules, and the great elongation of the antennal spines. Not one of these characters is, however, peculiar to the three species in question.

Munida militaris, Henderson (Pl. XIV. figs. 2, 5).

Munida militaris, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 410, 1885.

„ *vitiensis*, Henderson, *loc. cit.*, p. 410, 1885.

Characters.—The rostrum is usually about half the length of the carapace (but shows considerable variation in this respect), with a slight double curve, the basal half being slightly convex above, while the apical half is distinctly upturned; the supraorbital spines are usually about half the length of the rostrum. The transverse striæ of the carapace vary greatly in different specimens, but are as a rule well developed, and fringed with short hairs; in some cases they are even granulated. The gastric area is armed in front with a prominent curved row of spinules, two of which placed behind the supraorbitals are somewhat larger than the others, and the posterior spinule at each end of the row is also somewhat conspicuous, and situated nearly halfway back on the area, near the confines of the hepatic region; the rostrum is itself continued backwards for some distance, and a minute spinule is found on either side near its posterior termination, and internal to the largest spinule of the gastric row; occasionally also there is a third spinule of very small size, placed in the median line. The area enclosed by the bifurcation of the cervical groove bears two or three spinules, one of which is somewhat prominent, while the others may be absent, and a single spinule is also often present on the anterior margin of each branchial area immediately behind the posterior branch of the cervical groove, and near the anterior and outer limit of the cardiac region; the cardiac area is but slightly marked and completely unarmed. The antero-lateral or orbital border of the carapace is straight and slightly oblique, as in *Munida miles*, A. Milne-Edwards; the lateral border bears from six to nine spines, the first of which is of considerable length and directed forwards; the posterior border is unarmed.

The eyes are of large size and but slightly flattened, with the upper fringe of cilia frequently well marked; the pigmentation of the corneæ shows considerable variation in intensity. The antennal spine is of moderate length; the second joint of the peduncle bears two lateral distal spines, the inner of which is considerably produced. The ischium and merus of the external maxillipedes are granulated externally, the inner margin of the latter bears two spines, one of large size situated near the proximal end, the other (of small size and not always present) at the distal end, with frequently a few minute irregularities between the two.

The chelipedes are of moderate length, but in some males are even elongated. The merus and carpus are pubescent, and armed with spines—some of considerable size—on their upper and inner surfaces, two spines at the distal end and on the upper surface of the merus being larger than the others; the propodus is slightly pubescent on its upper surface, and three rows of short spines are present, arranged in median and marginal series; the fingers are straight and about equal in length to the palm, with their opposed

edges minutely dentate and in close contact; the dactylus has a short curved apex, which folds over a corresponding process on the immobile finger, and the latter has a spine on its outer margin near the proximal end. The meri and carpi of the ambulatory limbs are pubescent and spiny, the spines placed at the distal ends of these joints being of considerable size; the posterior margin of the propodi bears a row of horny spinules, and the dactyli are but slightly curved, each terminating in a short, yellow, horny claw.

The second abdominal segment bears a transverse row of spinules (usually ten in number) on its anterior margin, the two nearest the middle line being separated by a considerable interval; the remaining abdominal segments are comparatively smooth and glabrous, with but few transverse impressions.

Breadth of carapace (of an adult male) 12 mm., length of body 31 mm., of carapace 14 mm., of rostrum 6 mm., of chelipede 47.5 mm., of chela 21 mm., of first ambulatory leg 32 mm.

The close similarity of this species to *Munida miles*, A. Milne-Edwards, is at once apparent. It is distinguished from the above-named Atlantic species by its smaller size and the stronger development of the gastric row of spinules, though in *Munida miles* the two spines situated behind the supraorbitals are of much larger size; in the latter species also the chelipedes are more elongated, and armed with a greater number of spines, while spinules are present on the second and third abdominal segments, and in some cases even on the fourth. In *Munida spinulifera*, Miers, a small species, which is also characterised by the presence of a gastric row of spinules, the supraorbitals are much shorter, the striæ on the carapace are more densely pubescent, and the second and third abdominal segments are spinulose. A closer examination of the specimens, and a wider knowledge of the individual variations to which certain species of *Munida* are subject, has shown that the form which I designated *Munida vitiensis* must be united with the species in question. I have also deemed it safer to rank *Munida curvirostris* as a variety rather than as a distinct species.

Habitat.—Station 173, off Matuku, Fiji; depth, 315 fathoms; bottom, coral mud. Five specimens, two of which are females with ova.

Station 192, off Little Ki Island; depth, 140 fathoms; bottom, blue mud. A female with ova and a young female; in these the following somewhat abnormal characters are noticeable:—The rostrum is longer than usual, the carapace is comparatively smooth and glabrous (though the various spinules are present), the chelipedes are short and slim, and the spinules on the second abdominal segment are almost obsolete. The specimens are, I think, in spite of these differences, undoubtedly referable to this species.

Amboina, 100 fathoms. An adult male.

Munida militaris, Henderson, var. *curvirostris*, Henderson (Pl. III. fig. 7).

Munida curvirostris, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 412, 1885.

Characters.—The rostrum is more than half the length of the carapace, above the level of which it is distinctly curved, with the proximal half not convex above; the supraorbitals are about half the length of the rostrum and but slightly upturned. The spines of the gastric row are fewer in number than in the typical form, and the pair behind the supraorbitals are of larger size; the lateral gastric spinule is of small size, and the remainder of the carapace is unarmed.

The eyes are of large size, with the corneæ of a light brown colour. The chelipedes are short, with the spines strongly developed, especially the pair at the distal end of each merus.

The spinules on the second abdominal segment are few in number, and the submedian pair considerably larger than the others.

Habitat.—Station 200, off Sibago, Philippines; depth, 250 fathoms; bottom, green mud. An adult male measuring 25 mm. in length (not including the rostrum).

Station 210, off Zebu, Philippines; depth, 375 fathoms; bottom, blue mud. An adult female measuring 20 mm. in length.

Munida haswelli, Henderson (Pl. III. figs. 5, 5*b*).¹

Munida Haswelli, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 411, 1885.

Characters.—The rostrum is about half the length of the carapace and twice the length of the supraorbital spines; all three are slightly curved, and the rostrum is upturned towards its apex. The striæ on the carapace are well marked, and finely granulated, the hairs with which they are fringed being somewhat numerous; the gastric area possesses a pair of spines immediately behind the supraorbitals, as well as a second pair placed behind the former, several spinules are present towards the lateral margins, and two of very small size are situated between the first pair of spines; the cardiac area is unarmed and but poorly defined; a few spinules, including one of rather large size, are present on the branchial region, behind the cervical groove and near the outer border of the cardiac area, while one or two spinules occur on the space between the two branches of the cervical groove, in which part the striæ have assumed a squamose appearance. The lateral border of the carapace bears six or seven spines, which decrease in size from before backwards; the posterior margin is unarmed, but distinctly granulated.

The chelipedes are absent in the single adult specimen;² in young individuals they are

¹ Fig. 5*a* represents the chela of a specimen from Station 173, which must, I think, be ranked with *Munida militaris*.

² They are represented in the figure and were doubtless lost when the drawing was being executed.

slender and moderately spiny, with the fingers narrow, scarcely equal in length to the palm, and in contact throughout. The ambulatory limbs are slightly flattened, and pubescent above, the meral joints being in addition somewhat sealy; the dactyli are moderately curved towards their apices, and a few horny spinules are present on the posterior margin.

The eyes are of moderate size and slightly flattened, while a series of long and prominent hairy "lashes" extend over the corneæ from both the upper and lower margins. The antennal spine is of moderate length, not exceeding the second joint of the peduncle, which last is armed with two prominent spines on its inner border, and one on the outer. The ischium and merus of the external maxillipedes are clothed externally with pubescent scales, the inner margin of the former joint terminates distally in a short obtuse spine, while the latter possesses three spines on its inner margin, one being situated at the distal end, another near the middle, and a third of smaller size between the two, in addition to an acute spine of small size at the distal end of the outer margin.

The second abdominal segment bears from six to eight spinules on the anterior dorsal margin. The transverse striæ are smooth and polished, though fringed with hairs; on the sixth segment they are somewhat broken up.

This species is closely allied to *Munida militaris*, Henderson, from which it may be distinguished by the presence of a second pair of gastric spines, and the pronounced "lashes" overhanging the corneæ. I have named it after Mr. W. A. Haswell, in recognition of the assistance I have derived from his work on the Australian Crustacea.

Breadth of carapace (of an adult male) 9 mm., length of body 25 mm., of carapace 11 mm., of rostrum 6 mm., of first ambulatory leg 28 mm.

Habitat.—Station 163A, off Twofold Bay, Australia; depth, 150 fathoms; bottom, green mud. One male and three young specimens.

Munida inornata, Henderson (Pl. XIV. fig. 6).

Munida inornata, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 411, 1885.

Characters.—The rostrum is more than half the length of the carapace, and three times the length of the supraorbital spines; all three are slightly upturned, and the rostrum is somewhat flattened from side to side. The carapace is crossed by fairly numerous and prominent granulated pubescent striæ; the gastric area is moderately convex, and is armed in front with a transverse row of spinules—ten or twelve in number—of which only the two placed behind the supraorbitals attain any considerable size; the posterior part of the gastric area is mapped out as an oval patch, circumscribed in front by a line passing between the two cervical grooves, and posteriorly by the grooves themselves at the point where they unite; the cardiac area is not defined, and it, as well as the remaining surface of the carapace, is unarmed. The lateral border of the

carapace is deeply notched near its anterior end by the cervical groove, in front of which there is the well-marked postorbital spine, while behind about five minute spinules can be made out; the posterior margin is unarmed.

The chelipedes are slender and elongated, more especially in the male, in which they are about one and a half times the length of the body, whereas in females they about equal that length; the joints are covered with raised pubescent scales, most prominent on the upper surface, and several spinules are present on the inner margin, and, to a lesser extent, on the upper surface of the merus, carpus, and propodus. The chela is about twice the length of the carpus, and, in addition to three spinules present on the inner margin, there is a fourth on the outer border, near the base of the immobile finger. The fingers are slender, more particularly in the male, and their opposed edges, which are densely clothed with short hairs, are in contact; the apices cross one another, and that of the dactylus is bispinose, while the immobile finger is trispinose. The ambulatory limbs are moderately slender, and the meral, carpal, and propodal joints are subsquamose; the first two of these joints also have a series of spines on their anterior border, and a row of delicate spinules is present on the posterior margin of the propodi. The dactyli are slender, and but slightly curved.

The eyes are of moderate size and considerably flattened, with well-developed "lashes"; and there are also, in addition, two distinct rows of cilia on the upper surface of the peduncle. The antennal spine does not extend beyond the distal end of the second joint of the peduncle, and the latter joint is provided with two spines, on either side of the distal end, and a spinule on the inner margin. The ischium and merus of the external maxillipedes are comparatively smooth externally, and the latter is pubescent; the merus bears a spinule on either side at the distal end, and a prominent acute spine near the middle of its inner border.

The second abdominal segment bears two minute spinules, both of which may in some cases be obsolete. The striæ are smooth and glabrous, with the hairs short, but there is a tendency towards a scale-like arrangement on the last two segments.

This species is allied to *Munida militaris*, from which it is separated by the short supraorbitals, the form of the eyes, the armature of the carapace and first abdominal segment, and the more slender chelipedes. The two approach one another in so many respects that it is possible a larger series of specimens from different localities might show *Munida inornata* to be only a variety of the former. It also bears some resemblance to *Munida constricta*, A. Milne-Edwards, a species in which there are, however, only two gastric spines.

Breadth of carapace (of an adult male) 8 mm., length of body 19 mm., of carapace 9 mm., of rostrum 5 mm., of chelipede 40 mm., of chela 15.5 mm., of first ambulatory leg 22.5 mm.

Habitat.—Station 219, north of Papua; depth, 150 fathoms; bottom, coral mud.

A male and two females, one of the latter with similar parasites to those occurring on *Galathea pusilla*, Henderson.

Munida sancti-pauli, Henderson (Pl. III. fig. 6).

Munida sancti-pauli, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 411, 1885.

Characters.—The rostrum is about half the length of the carapace, and more than twice the length of the supraorbitals, which are slightly upturned and situated close together. The carapace is glabrous, and the striæ comparatively few in number, though fringed with short hairs; the gastric area exhibits but little convexity, and is armed with a transverse row of from six to eight spinules placed parallel to the frontal margin, of which the second on either side (counting from the middle line) slightly exceeds the others in size; the cardiac area is unarmed and scarcely defined; three small spinules occur on the branchial area, two of these being situated on the portion immediately posterior to the anterior division of the cervical groove. The lateral margin of the carapace is armed with seven comparatively large spines, of which the two in front of the cervical groove are specially prominent; the posterior margin is unarmed.

The chelipedes are of moderate size, with the joints strongly spinose, the spines being most strongly developed on the merus; the propodus is somewhat narrower than the carpus, and its upper surface carries a median and two lateral rows of short curved spines; the fingers are about equal in length to the palm and in contact throughout, while two or three short spines are present on the outer border of the immobile finger. The ambulatory limbs are of moderate length; the upper surface of the meral, carpal, and propodal joints is faintly granular, while the two former have a series of well-marked spines on their anterior and posterior margins, those at the distal end of the merus exceeding any of the others in size; the dactyli are curved only towards the apex, and a few horny spinules are present on their posterior margin.

The eyes are of comparatively large size, and but slightly flattened, with the corneæ deeply pigmented. The anterior prolongation of the first antennal peduncular joint is short, not exceeding the second joint. The ischium and merus of the external maxillipedes are almost smooth externally; the inner margin of the latter gives rise to two prominent spines, the larger of which is situated near the middle of the joint, and the other, which is slightly less pronounced, at the distal end, while a minute spine is placed opposite the last on the outer margin.

The second abdominal segment bears from eight to ten minute spinules on the anterior margin; the remaining segments are glabrous, and the striæ almost obsolete.

Breadth of carapace (of a female with ova) 8.8 mm., length of body 22.5 mm., of carapace 10 mm., of rostrum 5.8 mm., of chelipede 28 mm., of chela 12 mm.

This species is nearly related to *Munida miles*, A. Milne-Edwards, and it is not

without considerable hesitation that I have ventured to separate the two; it is distinguished by its smaller size, the broader and flatter carapace, the non-diverging supra-orbital spines, the presence of spinules on only the second abdominal segment, and the shallow-water habitat.

Habitat.—St. Paul's Rocks; depth, 10 to 60 fathoms. A female with ova and a young male.

Munida gracilis, Henderson (Pl. XIV. fig. 4).

Munida gracilis, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 412, 1885.

Characters.—The rostrum is about two-thirds the total length of the carapace, and more than twice the length of the supraorbital spines; all three are distinctly upturned, but especially the rostrum, which reaches a considerably higher level than the carapace itself. The transverse striæ on the carapace are granulated, and comparatively few in number, the fringing hairs being poorly developed; the gastric area is somewhat swollen, and is armed in front with a transverse row of spinules from eight to ten in number, two of which, placed behind the supraorbitals, greatly exceed the others in size, a second, but very much smaller, pair of gastric spines is placed immediately behind the first pair, and there is a single spinule on each side towards the lateral boundary of the area; the cardiac area is unarmed, and indistinctly circumscribed; a prominent spinule is placed on each branchial region behind the cervical groove, and in close proximity to the outer border of the cardiac area; a minute spinule may also exist on the anterior branchial region. The lateral border of the carapace bears seven spines, only two of which, situated in front of the cervical groove, attain any great size; the posterior margin is almost straight and distinctly elevated, but unarmed.

The chelipedes are subcylindrical and remarkably long and slender; the upper surface of the merus, carpus, and propodus is armed with prominent spinules, which are most strongly developed on the first of these joints. The chela is narrower than, and slightly more than twice the length of, the carpus; the fingers are slender and almost straight, with their length considerably less than that of the palm, and the opposed edges finely toothed; the dactylus is bispinose at the apex, and the immobile finger trispinose. The ambulatory limbs are slender, and provided with a pair of prominent spinules at the distal end of the meri and carpi, both margins of the meri also are armed with spinules, and the anterior is in addition pubescent; the dactyli are about two-thirds the length of the propodi, and moderately curved.

The eyes are of moderate size and slightly flattened, while the corneæ in both the specimens examined are of a light brown colour. The antennal spine scarcely reaches the middle of the second peduncular joint, and the latter is provided with a pair of prominent spines at its distal end. The ischium and merus of the external maxillipedes

are almost smooth externally; the lateral margins of the former joint are prolonged distally into short conical spines, while the latter is armed with a single prominent spine near the middle of its inner border, and in one of the specimens there is a minute spinule at the distal end of the same border.

The second abdominal segment is armed with eight spinules on its anterior margin, of which the submedian pair are most pronounced; the third segment bears four spinules in the same position, the two lateral of which are of very small size. The remaining segments are glabrous, with comparatively few transverse striæ present.

This species finds its nearest ally in *Munida tenuimana*, G. O. Sars, a form common in the deeper water of the North Atlantic; the latter attains a larger size, its rostrum is less elevated, the posterior margin of the carapace is armed with a row of spinules, the eyes are rounder and more deeply pigmented, and the fourth abdominal segment carries two spines on its anterior dorsal margin.

Breadth of carapace (of an apparently adult female) 6 mm., length of body 17 mm., of carapace 7·8 mm., of rostrum 6 mm., of chelipede 36 mm., of chela 16·5 mm., of ambulatory leg (detached) 18·5 mm.

Habitat.—Station 166, west of New Zealand; depth, 275 fathoms; bottom, Globigerina ooze. A female and a young male specimen.

Munida spinifrons, Henderson (Pl. XV. fig. 1).

Munida spinifrons, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 412, 1885.

Characters.—The rostrum is about three and a half times the length of the supra-orbital spines, and almost equal to that of the carapace, with its apical half decidedly upturned and furnished on each side with about six distinct spinules; the supraorbitals are horizontal in direction, and of small size. The striæ are fairly numerous on the carapace, and fringed with short iridescent hairs; the gastric area is armed with a pair of small spines situated behind the supraorbitals, and a few minute spinules are present on either side of these; the cardiac area is indistinctly circumscribed, and it, as well as the remainder of the carapace, is unarmed. The lateral border of the carapace is provided with seven small spines, and the portion in front of the cervical groove is placed at a very slight angle to the orbital margin; the posterior border is smooth and unarmed.

The chelipedes are somewhat elongated, with the joints minutely squamose, and spinulose on the inner margin; the fingers are remarkably slender. The right chela has, in addition to the spines on the inner margin of the propodus, two or three also present on its upper surface in the median line; the fingers are finely toothed, and their opposed margins are in contact; the tip of the dactylus is bent over that of the immobile finger.

The left chela has the propodus almost devoid of spines, and the fingers are longer than those of the right chela, exceeding the palm in length; a few minute spinules are present at the apices of both fingers. The ambulatory limbs are slender, with the meral and carpal joints spinose on the anterior margin; the dactyli are of moderate length and comparatively broad, though the apices are acute.

The eyes are of moderate size and but slightly flattened, with the peduncles tolerably elongated. In place of the four segments met with in the antennal peduncle of Galatheids generally, five distinct segments can be distinguished in this species, a result apparently due to a splitting of the first segment, and the anterior portion probably in part represents the antennal spine, which is otherwise almost obsolete. The external maxillipedes are more slender than usual; the ischium and merus are smooth externally, and a few very minute denticles are present on the inner margin of the latter.

Two minute spinules separated by a rather wide interval are present on the anterior dorsal margin of the second abdominal segment; the terminal segments are glabrous, with the striæ but faintly marked.

This interesting species is distinguished from all the other known members of the genus by its upturned serrated rostrum, and the presence of five separate segments in the antennal peduncle.

Breadth of carapace (of a female with ova) 4.7 mm., length of body 16 mm., of carapace 6.5 mm., of rostrum 5.3 mm., of left chelipede 22 mm., of chela 9.5 mm., of ambulatory leg (detached) 14 mm.

Habitat.—Station 113A, anchorage off Fernando Noronha; depth, 7 to 25 fathoms; bottom, volcanic sand and gravel. A single specimen.

Munida tuberculata, Henderson (Pl. XV. fig. 2).

Munida tuberculata, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 413, 1885.

Characters.—The rostrum is slightly more than half the length of the carapace, and about four times the length of the supraorbital spines; all three are somewhat broad and flattened, almost horizontal in direction, and the rostrum has a median carina on its upper surface. The striæ on the surface of the carapace are granulated and very prominent; the gastric area is armed anteriorly with a transverse band of short irregular tubercles, arranged in two or three rows, and a few similar, though less distinct, elevations are present on the hepatic and anterior branchial regions; the cardiac area is fairly well defined, and one of the striæ crossing it near its middle is specially prominent. The lateral margin of the carapace bears a few minute teeth; the posterior margin is raised and prominent, but unarmed.

The chelipedes are of moderate size, and the various joints are armed with short

conical spines, a few of larger size being situated at the distal end of the merus. The chela is slightly broader than the carpus and about three times its length, and the upper surface of the propodus is somewhat densely covered with short spinules; the fingers are broad and slightly overlap towards their apices, while their opposed edges are almost devoid of teeth, and in contact throughout. The upper surface of the meral joints of the ambulatory limbs is obscurely tubercular, and a crowded series of short denticles is present on the anterior margin of the same joints; the dactyli are comparatively long, and exhibit a faint sigmoid curve.

The eyes are of moderate size, and considerably flattened. The antennal spine is fairly prominent, but does not extend beyond the second joint of the peduncle. The ischium and merus of the external maxillipedes are obscurely tubercular externally, and the inner margin of the latter joint is provided with four or five irregularly conical teeth, the largest of which is situated towards the centre.

The second abdominal segment bears a submedian pair of short curved spines, and in some specimens one or two minute spinules can be detected towards the lateral margin of the same segment. The second, third, and fourth segments have the anterior dorsal margin elevated, and the upper surface carinated transversely towards the posterior margin; the remaining segments are almost smooth.

Breadth of carapace of the largest specimen (a male from Station 173) 5 mm., length of body 13 mm., of carapace 5·8 mm., of rostrum 3·2 mm. In this specimen the chelipedes and ambulatory legs are wanting, but in another example of much smaller size, from Station 172, the body of which measures only 8 mm. in length, the chelipedes attain a length of 11·5 mm., and the chela 5 mm.

This small species is distinguished by the presence of a crowded transverse row of tubercles on the gastric area of the carapace, and by the form of the rostrum, chelipedes, and other parts.

Habitat.—Station 172A, off Nukalofa, Tongatabu; depth, 240 fathoms; bottom, coral mud. A young male.

Station 173, off Matuku, Fiji; depth, 315 fathoms; bottom, coral mud. A male specimen apparently adult, and a young female.

Munida spinicordata, Henderson (Pl. XV. fig. 3).

Munida spinicordata, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 413, 1885.

Characters.—The rostrum is about half the length of the carapace, and nearly one-third longer than the supraorbital spines; all three are horizontal in direction, though they have a slight downward inclination towards their apices, and the rostrum is more slender than the lateral processes. The striæ on the surface of the carapace are fairly numerous and faintly granulated, with short fringing hairs; the gastric area is moderately convex,

and bears in front two small spines placed immediately behind the supraorbitals on a raised transverse elevation which overhangs the bases of the frontal processes; the cardiac area is distinctly circumscribed, somewhat swollen, and triangular in outline, with a median curved spine of small size placed on the anterior margin, which is considerably elevated; the branchial and hepatic regions are unarmed. The lateral margin of the carapace is provided with five or six spinules, all of which, with the exception of the first or postorbital, are very minute; the posterior margin is fairly prominent, but unarmed.

The chelipeds are long and slender, with a few curved spinules on the merus, and on the inner margin of the carpus and propodus; the same joints are also covered with slightly marked tubercular scales. The chela is more than twice the length of the carpus; the propodus has a row of spinules on its inner margin, and two spinules are present on the outer margin near the base of the immobile finger; the upper surface is faintly tubercular, and bears a single spinule at the base of the dactylus. The fingers are slender and almost straight, with their opposed edges in contact and their apices overlapping; a few minute teeth are present on the inner margin of the immobile finger. The ambulatory limbs are slender and elongated; two prominent spinules are placed at the distal end of the merus, and a few of smaller size along both its margins; the dactyli are long and moderately curved.

The eyes are of large size, and somewhat compressed. The anterior prolongation of the first antennal peduncular joint is of moderate length, scarcely exceeding the second joint. The ischium of the external maxillipedes is finely tubercular externally, and its lateral margins terminate distally in short spines; the merus is of relatively small size, and a single spinule is present near the middle of its inner margin.

The second and third abdominal segments bear four spines each on the anterior dorsal margin, of which the submedian pair are slightly larger than the lateral. The fourth segment bears three spines, two on the anterior margin, and one in the median line near the posterior margin. The outer surface of the terminal segments is glabrous, and the striae are arranged in short concentric lines.

Breadth of carapace (of a male) 4.5 mm., length of body 11 mm., of carapace 5 mm., of rostrum 2 mm., of chelipede (detached) 19 mm., of chela 7.8 mm., of ambulatory leg (detached) 15 mm.

This small and distinct species is characterized by the length of its supraorbital spines, the form and armature of the cardiac area of the carapace, and the arrangement of the abdominal spinules.

Habitat.—Station 174D, off Kandavu, Fiji; depth, 210 fathoms; bottom, coral mud. A male specimen.

Munida sp.

A single imperfect specimen of a *Munida* from Station 23, off Sombrero Island, West Indies; depth, 450 fathoms; bottom, Pteropod ooze, is preserved in the collection. It is apparently a young individual, and probably belongs to one of the numerous species described by Professor Alphonse Milne-Edwards from the West Indies. The body is smooth and glabrous, the striæ being faintly granular; the gastric area of the carapace is armed in front with a transverse row of spinules, only two of which (placed behind the supraorbitals) attain any considerable size; the rostrum is almost half the length of the carapace, and twice the length of the supraorbital spines, while the latter are somewhat flattened. The second, third, and fourth abdominal segments are armed with a pair of submedian spines each, and the first of these segments bears in addition three lateral spinules on each side. The eyes are of a light brown hue. The merus of the external maxillipedes is elongated, and provided with two spinules on the inner margin,—one at the distal end, the other near the proximal end.

Genus *Munidopsis*, Whiteaves.

Munidopsis, Whiteaves, Amer. Journ. Sci., ser. 3, vol. vii. p. 212, 1874.

Galathodes, A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 53, 1880.

Orophorhynchus, A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 58, 1880.

Rostrum spinulose, and usually more or less triangular, with its margins rarely dentate or spinose. Carapace rugose, or spinose, and in most cases glabrous. Chelipedes and ambulatory limbs of variable length, and frequently spinose, the dactyli of the latter with their posterior margins often dentate. Eyes devoid of pigment, with the peduncle frequently prolonged beyond the cornea in the form of a spine or spines. Antennal peduncle usually stout. Eggs few in number and of large size.

The members of this genus have been taken in almost all seas the deep water of which has been explored by the dredge, and they are found at depths varying from about 100 to upwards of 2000 fathoms. The species differ widely among themselves in the form of those parts which in other Crustacea afford generic characters; and yet it is impossible to effect a natural subdivision, or one which is not founded on a single character to the exclusion of others. It is probable that the loss of sight is compensated by a greater development of the tactile sense, and in some species this is evidenced by the great length of the antennal flagella, which in all probability enable the animal to grope its way about on the bottom.

Munidopsis erinacea (A. Milne-Edwards) (Pl. XVI. fig. 4).*Galathodes erinaccus*, A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 53, 1880.

Habitat.—Station 122, off Pernambuco; depth, 350 fathoms; bottom, red mud. A male, and a female with ova; the latter, which is the larger, measuring as follows:—Breadth of carapace 7 mm., length of body 25 mm., of carapace (including rostrum) 14 mm., of chelipede 23·5 mm., of first ambulatory leg 18 mm., diameter of ova 1·1 mm.

The carapace is pubescent, and armed with slender curved spines, of which there are four on the gastric area, four on the cardiac area, and three on the branchial area; the first gastric pair exceed the others in size, and the second cardiac pair are smallest. The rostrum is upturned, and trispinose, a single curved spine being present on either side near its middle. Three well-marked spines are situated on the lateral border of the carapace, two being placed in front of the cervical groove, and a smaller spine is present on the antero-lateral margin behind the eye-stalk; the posterior margin is unarmed. The eyes are well developed, and the corneal surfaces extensive, but the peduncle is not prolonged into a spine. The merus of the external maxillipedes is provided with three spines, two on the inner margin (of which the first or proximal is larger), and one at the distal end of the outer border. The chelipedes are of moderate length, and the merus and carpus are both pubescent and spiny; the propodus is smooth, and the fingers are excavated inferiorly. The ambulatory limbs are pubescent and somewhat spiny, with the dactyli dentate on the posterior margin, and only curved towards their apices. The second, third, and fourth abdominal segments are pubescent, and each bears from four to six spines placed on a transverse ridge, while the second and third segments have the lateral margin produced backwards into a short spine.

This very distinct species was taken by the "Blake" at five stations in the West Indies, in depths varying from 151 to 451 fathoms. The Challenger specimens differ only in being more pubescent.

Munidopsis serratifrons (A. Milne-Edwards) (Pl. XVI. fig. 3).*Galathodes serratifrons*, A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 55, 1880.

Habitat.—Station 56, off Bermuda; depth, 1075 fathoms; bottom, coral mud. Two males, and a female with ova; one of the former gives the following measurements:—Breadth of carapace 7 mm., length of body 19 mm., of carapace (including rostrum) 11 mm., of chelipede 25 mm., of first ambulatory leg 15 mm. The eggs measure 0·8 mm. in diameter.

The surface of the carapace is granulated. The gastric area is extremely swollen, and

is armed with a pair of short spines placed behind the base of the rostrum.¹ The cardiac area is somewhat triangular in outline, and considerably elevated, with its highest point surmounted by a broad conical spine, while a second spine of smaller size is occasionally present behind the first; a few spinules are present on the posterior branchial region, near the lateral border. The rostrum is acuminate and carinated superiorly, with its lateral margins minutely serrated towards the apex, and a slight concavity, into which the eye-stalk fits, exists on either side near the base. The lateral border of the carapace is provided with a spine at the antero-lateral angle, and a second of smaller size is placed behind the prominent cervical groove; the posterior margin is armed with two spinules. The eyes are ovate, and almost immobile, while each peduncle terminates in a very minute spinule. The merus of the external maxillipedes is short and broad, with three spines on its inner margin, which decrease in size towards the distal end. The chelipedes are slender and elongated, with the joints slightly granulated, and several spines are present on the inner surface of the merus and carpus, while the inner border of the propodus is provided with a row of short spinules; the fingers are not equal in length to the palm. The ambulatory limbs are granulated, and the margins of the meri and carpi are fringed with short spinules; the dactyli are strongly curved, and their edges are entire. The second, third, and fourth abdominal segments are transversely carinated, and provided with curved spines, of which three are present on the second segment, four on the third (arranged in two rows), and one on the fourth.

This species was taken by the "Blake," off Dominica, at a depth of 333 fathoms.

Munidopsis sigsbei (A. Milne-Edwards) (Pl. XVIII. fig. 2).

Galathodes sigsbei, A. Milne-Edwards, Bull. Mus. Comp. Zool., vol. viii. No. 1, p. 56, 1880.

Habitat.—Station 23, off Sombrero, West Indies; depth, 450 fathoms; bottom, Pteropod ooze. A female with ova, measuring as follows:—Breadth of carapace 9.8 mm., length of body 36 mm., of carapace (including rostrum) 20 mm., of chelipede 51 mm., of first ambulatory leg 25 mm., diameter of ova 1.5 mm.

The carapace is unarmed and comparatively smooth, the surface being merely crossed by short indistinct striæ. The gastric area is moderately convex, and the cardiac area is triangular in outline, the two being separated by a rather wide space. The rostrum is narrow, acute, and horizontal, its length being about half that of the carapace, and the upper surface is faintly carinated. The lateral borders of the carapace are parallel and unarmed, with the exception of a small spine at the antero-lateral angle. The posterior margin bears five or six spinules (three according to Milne-Edwards) situated close

¹ According to Professor Milne-Edwards, "La région gastrique porte trois petites épines disposées transversalement, l'une sur la ligne médiane, les autres latéralement." I can find no trace of this median spine in the Challenger specimens.

together. The eye-stalks are somewhat elongated, and freely movable, without terminal spines. The merus of the external maxillipedes possesses a prominent angular lobe at the proximal end of its inner margin. The chelipedes are long and slender, with several well-marked spines on the inner surface of the merus, and at the distal end of both merus and carpus. The fingers are remarkably long and slender, exceeding the palm in length, and their opposed margins are finely denticulate; there is a slight basal hiatus, and the apices have a downward curve. The ambulatory limbs are granulated, but comparatively free from spines; the dactyli are of large size, and each terminates in a yellow curved claw, while a series of spinules, gradually increasing in size towards the apex, is present on the posterior margin. The abdominal segments are smooth, though the second is carinated transversely.

This species was taken by the "Blake" at eight West Indian localities, the depths at which varied from 472 to 878 fathoms.

Munidopsis antonii (A. Milne-Edwards, MS.) (Pl. XVIII. fig. 1).

Galathodes Antonii, Filhol, La Nature, vol. xii. p. 231, fig. 2 (*sine descr.*), 1884.

Habitat.—Station 158, south-west of Australia; depth, 1800 fathoms; bottom, Globigerina ooze. A female with ova, and a young female.

Station 300, west of Valparaiso; depth, 1375 fathoms; bottom, Globigerina ooze. A young female.

The single adult specimen measures as follows:—Greatest breadth of carapace 33 mm., length of body 95 mm., of carapace (including rostrum) 50 mm., of chelipede 62 mm., of first ambulatory leg 73 mm., diameter of ova 3.5 mm.

The carapace is covered everywhere with irregular granulations, which tend to become spiny on the anterior half, more especially on the gastric area, while posteriorly they become somewhat oblong, and reach their greatest size on the cardiac area; the last-named region is lozenge-shaped and fairly convex, with a smaller area of similar shape on either side immediately behind the cervical groove. The rostrum is narrow and acute, with a decided upward inclination. The lateral margin of the carapace is armed near the antero-lateral angle with two spines of large size (including the postorbital), and a few spinules are also present; the posterior margin is raised and prominent, but unarmed. The eyes are immovably united together in the middle line beneath the rostrum, and each peduncle is prolonged into a pointed spine, continued some distance beyond the cornea, which is somewhat circular in outline, and placed on the antero-external surface. The merus of the external maxillipedes is comparatively narrow, and bears three spiniform teeth on the inner margin, in addition to a more prominent spine at the distal end of the outer border; the outer surface is granulated. The chelipedes are of moderate size, with the joints granular, and the merus and carpus are also somewhat spiny; the fingers are long,

and excavated inferiorly. The ambulatory limbs are granular, and the anterior margin of the meri is spiny; the dactyli are narrow, slightly tortuous, and almost smooth. The abdominal segments are transversely carinated, and granulated towards the lateral margins; the posterior margin of the sixth segment gives rise to two prominent rounded lobes.

This species was taken by the "Talisman" in the Atlantic, off the north-west coast of Africa, at a depth of 4000 metres (2187 fathoms).

Munidopsis subsquamosa, Henderson (Pl. XVII. fig. 4).

Munidopsis subsquamosa, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 414, 1885.

Characters.—The carapace is slightly pubescent, and covered with flattened scale-like tubercles, which on the posterior half are elongated to form short transverse ridges. The gastric area is convex and distinctly circumscribed, with its rounded lateral margins formed by the cervical grooves, which pass unusually far forwards; the scale-like tubercles are well marked, and a few of those near the base of the rostrum terminate in short stout spines; the hepatic areas are flattened and depressed; the cardiac area is indistinctly mapped out, and a somewhat deep groove crosses it transversely near its middle, the short ridge-like elevations are well seen on the posterior part of this area as well as on the branchial regions. The rostrum is almost horizontal, and a little more than one-third the length of the carapace, with the upper surface granular and carinated, and the lower surface smooth; the apex is narrow and acute, but a considerable widening out takes place near the base. The lateral margin of the carapace is armed with two broadly conical yet acute spines, the second of which is almost horizontal in direction, and separated from the first (placed at the antero-lateral angle) by the cervical groove; a few spinules are situated further back on the border, and a short spine occurs on the antero-lateral margin immediately behind the antennal peduncle; the posterior margin is broad and transversely grooved, with a narrow and smooth strip of carapace in front.

The chelipeds are comparatively short, and the joints are covered with small rounded tubercles, many of which are pubescent; a few short spines also occur on the upper surface of the merus and carpus. The propodus is slightly dilated, while the fingers exceed the palm in length, and their inner surfaces are deeply excavated towards the apices. The ambulatory limbs are moderately long, the meral, carpal, and propodal joints are tuberculate, and a series of short spines occurs on their front margin; the dactyli are smooth and fairly well curved, with the lower margin denticulate, the denticulations increasing in size towards the apex.

The eyes are of moderate size and possess but slight mobility, a small free rectangular plate occurs on the ventral surface between the two; each peduncle beyond the inner margin of the cornea has a narrow acute spine. The antennal flagellum is apparently of great length though deficient in the single specimen. The merus of the external maxilli-

pedes is rather narrow, its outer surface is faintly granular, and the inner margin is armed with a series of short irregular teeth.

The abdominal segments are granulated externally, and the second, third, and fourth are each crossed transversely by a deep central groove. The male genital organs are of large size.

This species is allied to *Munidopsis antonii* (A. Milne-Edwards), but the latter is of larger size, the elevations all over the body are granular rather than tubercular, the rostrum rises considerably above the level of the carapace, the eyes are immovably united together and to the carapace, and the ambulatory daetyli are not denticulate.

Breadth of carapace (of an adult male) 21.5 mm., length of body (including rostrum) 71 mm., of carapace (including rostrum) 39 mm., of rostrum 10 mm., of chelipede 47 mm., of first ambulatory leg 58 mm.

Habitat.—Station 237, off Yokohama; depth, 1875 fathoms; bottom, blue mud. A male specimen, and the softened remains of a second example.

Munidopsis subsquamosa, Henderson, var. *aculeata*, nov. (Pl. XVI. fig. 1).

Characters.—This variety differs from the typical form in the following respects:—The markings on the posterior half of the carapace are slightly less crowded, and show a decided tendency to become flattened; scales are absent from the gastric area, being replaced by scattered tubercles, many of which end in short conical spines. The rostrum is decidedly upturned. The eyes are less mobile, and a certain amount of fusion with the carapace has taken place. The spines on the chelipedes and ambulatory limbs are more strongly developed.

The most important feature in this variety is the absence of flattened tubercles from the gastric area of the carapace, and their replacement by short spines, though it must be borne in mind that the latter are present to a certain extent in the typical form. In some of its characters, as the elevation of the rostrum, and the partial fusion of the eyes, it approaches *Munidopsis antonii*, from which, in other respects, it is widely separated. The body (including rostrum) of the larger specimen, from Station 302, measures 89 mm. in length.

Habitat.—Station 146, between Marion Island and the Crozets; depth, 1375 fathoms; bottom, Globigerina ooze. A single specimen.

Station 302, west of Patagonia; depth, 1450 fathoms; bottom, Globigerina ooze. An adult male.

Munidopsis brevimana, Henderson (Pl. XVII. figs. 1, 2).

Munidopsis brevimana, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 414, 1885.

Characters.—The carapace is glabrous and covered with short transverse ridge-like elevations, which exist in greatest number on the posterior half; in some specimens also short hairs are sparingly met with. The gastric area is swollen, and armed in front with two prominent spines placed behind the base of the rostrum, while the short transverse ridges are comparatively few in number; the cardiae area is circumscribed, and a deep furrow crosses it transversely near the middle; the ridges are strongly marked, and lengthen out somewhat on the branchial regions. The rostrum is narrow and acute, slightly elevated towards the apex, and earinated superiorly, its length being less than half that of the carapace. The lateral margin of the carapace is armed with five spines, three of which are situated between the two divisions of the cervical groove, and the first of this trio reaches the greatest size; a single spine is placed on the antero-lateral margin behind the antennal peduncle; the posterior margin is prominent, but unarmed.

The chelipedes are stout and remarkably short, with the joints pubescent, and the merus and carpus somewhat spiny above. The lower surface of the ischium is produced anteriorly, and a spinule is present near the apex of this process; the propodus is almost smooth, and dilated both from side to side and from above downwards; the fingers are short and stout, with their opposed surfaces deeply excavated, and the apical margins finely toothed; numerous short tufted hairs are present towards the apices, and the outer surface of the immobile finger carries a denticulate carina. The ambulatory limbs are of moderate length, and the posterior surfaces of the meri and carpi are tuberculate, while their anterior margins are strongly spinose; the posterior surface of the propodi is carinated; the daetyli are only curved towards the apex, and their posterior margins are denticulate, the teeth increasing in size towards the terminal claw.

The eyes still retain a certain amount of mobility, and are separated ventrally by from one to three small calcified pieces; the cornea is rounded, and the peduncle is prolonged into two slender lateral spines, the inner of which is about twice the length of the other. The antennal flagellum is more than twice the length of the body. The merus of the external maxillipedes has its inner margin irregularly dentate.

The abdominal segments are comparatively smooth, a few granulations being present merely on the posterior ones; the second, third, and fourth each bear a curved transverse sulcus, the convexity of which is directed forwards.

This species is allied to *Munidopsis reynoldsi* (A. Milne-Edwards), dredged by the "Blake" off Frederickstadt, West Indies, at the great depth of 2376 fathoms. The latter is of small size, its chelipedes are considerably shorter, and more than two spines are situated on the gastric region of the carapace.

The largest specimen (a female with ova) measures as follows:—Breadth of carapace 17·5 mm., length of body (including rostrum) 63 mm., of carapace (including rostrum) 33·5 mm., of chelipede 34 mm., of first ambulatory leg 50·5 mm., diameter of ova 2 mm. The body of the largest male specimen measures 49 mm. in length.

Habitat.—Station 191, off the Arrou Islands; depth, 800 fathoms; bottom, green mud. A young specimen (Pl. XVI. fig. 2), which differs from the adult in having the body smoother and the spines less strongly developed.

Station 218, between Papua and the Admiralty Islands; depth, 1070 fathoms; bottom, blue mud. Seven adult females, four of which bear ova; three adult males, and a number of young individuals.

Munidopsis milleri, Henderson (Pl. XVII. fig. 3).

Munidopsis Milleri, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 414, 1885.

Characters.—The carapace is glabrous, and covered, more especially the posterior half, by short transverse ridges, which give it a rugose appearance. The gastric area is swollen, and armed with two pairs of spinules; the first pair situated behind the rostrum, the second, of smaller size (occasionally absent), placed behind the first pair and nearer the middle line. The cardiac area is crossed transversely by a moderately deep sulcus, and immediately behind the well-marked gastro-cardiac groove there are three pairs of spinules, of which the two lateral pairs are situated on the boundary of the branchial area; the short transverse ridges are well developed on the posterior cardiac and branchial regions. The rostrum is short and spinulose, not exceeding the antennal peduncle; it is almost horizontal in direction, and its upper surface is carinated. The lateral margin of the carapace is armed with four spines, of which the first is of large size and placed at the antero-lateral angle, the second and third are placed on a somewhat dilated part between the two divisions of the cervical groove, and the fourth occurs about halfway back on the margin; a single spinule is also present on the antero-lateral border behind the antennal peduncle. The posterior margin of the carapace is prominent, and bears six small spinules separated by narrow intervals.

The chelipedes are narrow and elongated, with the merus and carpus spinose. The merus is faintly granulated, while two rows of spines are found on its inner surface, and one on the dorsal median line. The spines on the carpus are arranged in two dorsal rows, and a few scattered granules are also present. The propodus is more than twice the length of the carpus, and its upper surface is smooth and glabrous. The fingers are in close contact, and slightly excavated below, each being provided with a prominent angular tooth, which fits into a corresponding depression in its fellow, and numerous silky hairs are present, especially towards the apices. The ambulatory limbs are remark-

ably long and slender; the meri are obscurely granulated, and a few spinules are present at their distal end, and on their anterior margins, while a single spinule also occurs at the distal anterior end of the carpi. The ambulatory dactyli are almost straight, each terminating in a curved, horny claw, and a series of delicate horny spinules is present on their posterior margin.

The eyes are rounded, and firmly fused together on the ventral aspect; the peduncles are not prolonged into spines. The antennal flagellum is of moderate length. The merus of the external maxillipedes bears two prominent and subequal spines on the proximal half of its inner margin.

The second and third abdominal segments are each provided with a transverse sulcus; the remaining segments are smooth and glabrous. The size of the abdomen as a whole is unusually small, when compared with that of the cephalothorax.

I have dedicated this well-marked species to my friend and colleague, the Rev. Dr. Miller, C.I.E., Principal of the Madras Christian College.

Breadth of carapace (of a female with ova) 11 mm., length of body (including rostrum) 31 mm., of carapace (including rostrum) 16 mm., of chelipede 39.5 mm., of first ambulatory leg 33.5 mm., diameter of ova 1.3 mm. The body of the largest male specimen measures only 27 mm. in length.

Habitat.—Station 207, off Tablas Island, Philippines; depth, 700 fathoms; bottom, blue mud. A female with ova, and two males.

Munidopsis trifida, Henderson (Pl. XVI. fig. 2).

Munidopsis trifida, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 415, 1885.

Characters.—The carapace is covered with short transverse rugosities of no great size, which are best seen on the postero-lateral surface; a few short hairs are also scattered over the surface. The gastric area is moderately convex, and armed with two prominent spines placed behind the base of the rostrum, while the tubercular rugosities are somewhat rounded, and comparatively few in number; the cardiac area is indistinctly circumscribed, and a broad shallow groove crosses it transversely near the middle. The rostrum is about half the length of the carapace, with a proximal broad and flattened portion which is traversed by a median dorsal carina, and a laterally compressed, and distinctly upturned terminal spine; the margins of the flattened part are prolonged into two short spinules which, in the single specimen, are not placed in the same transverse line. The lateral border of the carapace is armed with four subequal and equidistant spines, and a spinule occurs on the oblique antero-lateral margin immediately behind the antennal peduncle; the posterior margin is prominent though unarmed, and a rather wide, smooth, band-like area occurs on the carapace in front of it.

The chelipedes are long and sub-cylindrical, with the joints spinose and faintly

pubescent. The merus is armed with three conspicuous rows of spines, two on the inner surface and one on the upper surface, while the outer surface is finely tubercular; the spines on the carpus are most pronounced at the distal end; the margins of the propodus, especially the inner, are fringed with short spines, and the upper surface is smooth and glabrous. The fingers are almost straight and not equal in length to the palm, with their opposed margins minutely dentate and in contact throughout; a few teeth of larger size are, however, noticeable at the apices, and their lower surfaces, especially towards the distal end, are somewhat excavated. The ambulatory limbs are moderately long and slightly pubescent, with the merus, carpus, and propodus finely tubercular, and the first two of these joints are spinose on the anterior margin; the dactyli are almost straight, and each ends in a curved, horny claw, while a series of well-marked horny spines are present on the posterior margin, arising separately from distinct teeth.

The eyes are freely movable, and the peduncles are not prolonged into spines. The antennal flagellum is of moderate length. The merus of the external maxillipedes is tuberculate externally, and two well-marked spines are present on the proximal half of the inner margin, the first of which is considerably stouter than the second; a small spine is also present at the distal end of the outer border.

The second and third abdominal segments are crossed transversely by a sulcus, which is somewhat deeper on the former; the remaining segments are comparatively smooth.

This species is allied to *Munidopsis latifrons* (A. Milne-Edwards) and *Munidopsis tridens* (A. Milne-Edwards), in both of which the rostrum has a somewhat similar conformation, but the former is without a pair of gastric spines, and the carapace of the latter is broader, smoother, and entirely glabrous, while fewer spines are met with on its chelipedes and ambulatory legs.

Breadth of carapace 12 mm., length of body (including rostrum) 40 mm., of carapace (including rostrum) 23 mm., of chelipede 47 mm., of first ambulatory leg 32 mm.

Habitat.—Station 310, in the Sarmiento Channel, Patagonia; depth, 400 fathoms; bottom, blue mud. A female specimen.

Munidopsis pilosa, Henderson (Pl. XVII. fig. 5).

Munidopsis pilosa, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 415, 1885.

Characters.—The whole body, but especially the carapace, is covered with a short, dense pubescence. The gastric area is less convex than usual, and, like the remainder of the carapace, unarmed; a moderately deep groove passes transversely across the cardiac area. The rostrum is of moderate width and about one-third the total length of the carapace, with its apex acute and slightly upturned, and the upper surface carinated. A single spine occurs on the lateral border of the carapace at the antero-

lateral angle, and a second is found on the orbital border behind the antennal peduncle; the posterior margin is prominent, but unarmed.

The chelipedes¹ are wanting in the single specimen. The ambulatory limbs are short and robust, with the various joints pubescent; both margins of the meri are armed with prominent curved spines, and three or four spines also occur on the anterior margin of the carpi; the daetyli are short and almost straight, with a well-marked, curved, horny, apical claw, and a series of minute dentations on the posterior margin.

The eyes are firmly fused with the carapace, and the corneæ are extremely rudimentary; the ocular peduncle is prolonged dorsally into a long, acute, pubescent spine, more than half the length of the rostrum, and a short prolongation occurs underneath the cornea. The antennal flagella are wanting in the single specimen. The external maxillipedes are of small size, and the inner margin of the merus is provided with a few irregular dentations.

The abdominal segments are pubescent, and the second, third, and fourth are each provided with a short transverse groove; the terminal segments are less hairy than those in front.

This very distinct species is characterised by the dense pubescence met with on its trunk and limbs, the short chelipedes, and, above all, by the rudimentary state of the eyes and the length of the ocular spine. I am unacquainted with any other Galatheid in which the eyes have become so reduced.

Breadth of carapace 7 mm., length of body (including rostrum) 23 mm., of carapace (including rostrum) 13 mm., of ambulatory leg (detached) 16 mm.

Habitat.—Station 196, near the Philippines; depth, 825 fathoms; bottom, hard ground. A male specimen.

Genus *Elasmonotus*, A. Milne-Edwards.

Elasmonotus, A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 60, 1880.

Galathopsis, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 417, 1885.

? *Anoplomotus*, S. I. Smith, Proc. U.S. Nat. Mus., vol. vi. No. 1, p. 50, 1883.

Rostrum flattened and triangular, usually of moderate length. Carapace unarmed, with the lateral margins parallel and entire. Orbito-antennal border short and transverse. Chelipedes and ambulatory limbs frequently robust, with or without spines. Eyes devoid of pigment, with the peduncle in some cases prolonged beyond the cornea. Antennal peduncle of moderate width. Anterior abdominal segments, as a rule, transversely carinated. Eggs few in number, and of large size.

The characters which separate *Elasmonotus* from *Munidopsis* are few in number, of slight importance, and liable to variation in different species, so much so that I cannot

¹ Represented in the figure, but lost while the species was being drawn. I find from my notes that they measured only 10 mm. in length.

regard the institution of the former genus as other than questionable. The two occur in similar localities and at corresponding depths. The two species which I previously placed in a separate subgenus intermediate between *Elasmonotus* and *Munidopsis*, although in some respects peculiar (as in the form of the rostrum), I have now, on second thought, referred to *Elasmonotus*; at the same time, I cannot see sufficient reason for the separation of the form which Professor S. I. Smith has designated *Anoplomotus*.

Elasmonotus armatus, A. Milne-Edwards (Pl. XIX. fig. 5).

Elasmonotus armatus, A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 61, 1880.

Habitat.—Station 23, off Sombrero Island, West Indies; depth, 450 fathoms; bottom, Pteropod ooze. A female with ova, and a young individual.

Station 24, off Culebra Island, West Indies; depth, 390 fathoms; bottom, Pteropod ooze. Two females, one of which bears ova, and a male. The largest specimen (a female) measures as follows:—Length of body 23 mm., of carapace (including rostrum) 13.3 mm., of chelipede 26 mm., of first ambulatory leg 20 mm.

The surface of the carapace is faintly rugose, and two minute tubercles are present on the rather convex gastric area; the cardiac area is circumscribed, and a shallow groove passes transversely across its surface. The lateral margins of the carapace are raised, and form a prominent rounded rim on each side, which terminates anteriorly in a short acute spine. The rostrum is long, narrow, and slightly upturned, with its apex acuminate, and a slight constriction is present towards the base. The ocular peduncles are slightly elongated, but do not terminate in spines. The merus of the external maxillipedes is armed with two long and subequal spines on the proximal half of the inner margin, and the inner margin of the ischium is prolonged distally into a spine. The chelipedes are slender and elongated, with only a few short spinules present at the distal ends of the merus and carpus, and one or two on the inner surface of the merus; the fingers are stout, and excavated inferiorly, with a slight thickening towards the apices. The ambulatory limbs are slender, and provided with a single spinule at the anterior and distal end of the merus; the dactyli are of large size, and a series of horny spinules is articulated to the posterior margin. The second and third abdominal segments are strongly carinated transversely.

The "Blake" specimens were taken off Frederickstadt, West Indies, at a depth of 625 fathoms.

Elasmonotus latifrons, Henderson (Pl. XIX. fig. 1).

Elasmonotus latifrons, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 416, 1885.

Characters.—The carapace is strongly arched from side to side, and covered everywhere with tubercular granules, many of which are compound. The gastric area is convex, and provided in front with two slightly-rounded elevations which overhang the base of the rostrum; the cardiac area is circumscribed, and a moderately deep transverse groove separates a posterior triangular portion from two lozenge-shaped portions in front. The rostrum is broad, flattened, and horizontal, with the apex acute, and a notch occurs on either side of the base, into which the eye-stalk fits; the upper surface is finely granular and traversed by a faint median carina; the lower surface is smooth, and faintly earinated towards the apex, while the lateral margins are finely serrated, especially towards the apex. The lateral margin of the carapace is notched by the two divisions of the cervical groove, and a slight projection is present on the orbital border behind the antennal peduncle; the posterior margin is raised and granular.

The chelipedes are short and stout, with the joints granulated; a spine is present at the distal end of the merus on both its inner and outer surfaces, and a third exists on the inner margin near the distal end of the carpus. The propodus is rather finely granulated, but devoid of spines; the fingers are scarcely equal in length to the palm, and their surface is pubescent, while each is deeply excavated on its inner aspect towards the apex, and the apical margin is finely dentate externally. The ambulatory limbs are short and robust, with the joints granulated, and a few short blunt spines are present on the anterior margins of the meri, carpi, and propodi; the dactyli are short, and each ends in a curved, horny claw, while a few short teeth occur on their posterior margins.

The eyes are of small size, but slightly movable, and partially concealed by the sides of the rostrum; the peduncle is granulated, and prolonged a short distance beyond the rudimentary cornea in the form of a blunt spine. The basal joint of the antennular peduncle is granulated. The merus of the external maxillipedes has its inner margin armed with minute teeth, which are somewhat closely arranged on the proximal half.

The second, third, and fourth abdominal segments are transversely sulcate, with a granulated carina on either side of the groove; the lateral margins are granulated, as is also the whole surface of the posterior segments.

This species is characterised by the form of its rostrum, and the presence of tubercular granulations on most parts of the body.

Breadth of carapace (of an adult male) 11 mm., length of body (including rostrum) 34 mm., of carapace (including rostrum) 17.5 mm., of chelipede 22 mm., of first ambulatory leg 20 mm.

Habitat.—Station 218, between Papua and the Admiralty Islands; depth, 1070 fathoms; bottom, blue mud. A single specimen.

Elasmonotus marginatus, Henderson (Pl. XIX. fig. 2).

Elasmonotus marginatus, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 416, 1885.

Characters.—The carapace is moderately convex, and covered everywhere with granulations, which are slightly pubescent and in large specimens show a distinct tendency to become tubercular. The gastric area is circumscribed, and excavated towards the lateral margins, with two somewhat prominent tubercular elevations on the front margin overhanging the base of the rostrum; the cardiac area is traversed by a shallow transverse groove which separates two lozenge-shaped spaces in front from a similar one behind. The rostrum is broad and flattened, with the apex acute (in the larger specimen it is also acuminate) and bent upwards; the upper surface is granular and provided with a median carina which occurs also on the lower surface, the lateral margins are finely serrated towards the apex, and hollowed out for the ocular peduncle on either side towards the base. The lateral margin of the carapace bears in front a prominent triangular lobe, and projects considerably between the two divisions of the cervical groove to form a thin lamina, which is distinctly bent upwards; the posterior margin is raised and granular.

The chelipedes are short and stout, with the joints pubescent and spinose. The merus is trigonal, its outer surface is granulated, and the margins are armed with short stout spines; the carpus is granulated above, and the spines are most numerous on the inner margin; the propodus is more than twice the length of the carpus, its lateral margins are spinose, and a few scattered granules and spines occur on the upper surface; the fingers are deeply excavated towards the apices, and the margins of the latter are finely dentate. The ambulatory limbs are robust, with the surfaces of the joints granular, and their margins both pubescent and spinose, the spines being somewhat strongly developed on the anterior margins of the meri, carpi, and propodi; the dactyli are moderately long, and each terminates in a curved horny claw, while their posterior margins are strongly pubescent, and armed with short horny spines.

The eyes are immovably fused with the sides of the rostrum; the peduncle is granulated and prolonged both in front of and behind the rudimentary cornea. The second joint of the antennal peduncle bears a rather prominent external spine; the flagellum is of moderate length. The merus of the external maxillipedes is granulated externally, and the inner margin is irregularly dentate.

The abdominal segments are granulated externally, and the second, third, and fourth are transversely bicarinate, the anterior of the two carinae being the more prominent. The penultimate segment has two rather well marked rounded lobes on its posterior margin.

This species bears some resemblance to the preceding, but is easily distinguished by

the prominent lateral margins of the carapace, and by the armature of the chelipedes and ambulatory limbs. Two specimens are present in the collection, both females with ova, yet differing considerably in size; in the larger also the rostrum is acuminate, the granulations on the carapace are more strongly developed, and the limbs are more pubescent.

Breadth of carapace 16.5 mm., length of body (including rostrum) 50 mm., of carapace (including rostrum) 26.5 mm., of chelipede 32 mm., of first ambulatory leg 33 mm., diameter of ova 1.5 mm. The body of the smaller specimen measures 35 mm. in length.

Habitat.—Station 168, off New Zealand; depth, 1100 fathoms; bottom, blue mud.

Elasmonotus miersii, Henderson (Pl. XIX. fig. 3).

Elasmonotus Miersii, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 416, 1885.

Characters.—The surface of the carapace is finely granulated, and the regions are fairly distinct. The gastric area is convex and distinctly raised anteriorly above the level of the rostrum, where it forms two rounded elevations, each surmounted by a nipple-like projection; the cervical groove is well marked on the carapace, and forms a distinct boundary between the cardiac and gastric areas; the cardiac area is crossed by a shallow groove, and the posterior triangular portion is circumscribed, while a pitted depression is formed by the cervical groove on either side at the antero-external angle of the area. The rostrum is flattened, depressed, and of moderate width, narrowing somewhat abruptly towards the apex which is subacute; the upper surface is granulated and faintly carinated on the proximal half. The lateral margin of the carapace terminates anteriorly in a short blunt spine, and a rather deep notch is present at the point where the cervical groove passes on to the carapace, a second, though much less strongly marked one, is placed about halfway back; the posterior margin is raised and granular.

The chelipedes are elongated and of moderate width, with the joints finely granulated, though appearing smooth to the naked eye; a few short blunt spines are met with on the inner margin of the merus and at its distal end. The propodus is slightly dilated, and more than twice the length of the carpus, with its lateral margins rounded; the fingers are excavated below, and their apices are minutely dentate, some hairs also, are met with on their opposed edges. The ambulatory limbs are of moderate length, a few short blunt spines are present on both margins of the meri, and a single spine is present at the anterior and distal end of each carpus; the dactyli are slender, and the apical horny claw is but slightly curved, while a series of minute horny spinules are present on the posterior margin.

The eyes are slightly movable, and partially concealed by the sides of the rostrum; the peduncle does not appear to be prolonged beyond the cornea. A somewhat prominent spine is present on the second joint of the antennal peduncle at its outer distal

end. The ischium and merus of the external maxillipedes are finely granulated externally, and the latter joint is armed with two large triangular teeth on its inner margin, one of which is placed near the distal end, while a third is present at the distal end of the outer margin.

The abdominal segments are finely granular externally, and the second, third, and fourth are each provided with two faint transverse carinæ.

This species is characterised by the comparative smoothness of its carapace and limbs, and by the form of the meral joint of the external maxillipedes. I have associated it with the name of my friend Mr. E. J. Miers, late of the British Museum staff, well known as the author of a large number of carcinological memoirs.

Breadth of carapace 5 mm., length of body (including rostrum) 15 mm., of carapace (including rostrum) 8.2 mm., of chelipede 17 mm., of first ambulatory leg 11 mm. The single specimen is a male, probably not fully grown.

Habitat.—Station 173, off Matuku Island, Fiji; depth, 315 fathoms; bottom, coral mud.

Elasmonotus asper, Henderson (Pl. XIX. fig. 4).

Elasmonotus asper, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 416, 1885.

Characters.—The carapace is remarkably flattened, and the regions are not clearly defined; the surface is dotted with irregular tubercles, some of which are subacute, and the intervening spaces are finely granular. The gastric area is but slightly raised above the surrounding level, and the tubercles are prominent (some are even compound) towards the median line; the tubercles are most numerous elsewhere towards the lateral and posterior margins of the carapace, and two of large size are situated on the cardiac area, overhanging a shallow transverse groove. The rostrum is moderately narrow, and usually about twice the length of the eye-stalks, though in some male specimens it scarcely exceeds these in length; the apex is slightly upturned, and bidentate, the upper and larger of the two teeth being in most cases again subdivided; the upper surface is finely tubercular, and in some cases a few serrations are present on the lateral margins towards the apex. The lateral margin of the carapace is irregular in outline, but without any spines of importance; a small serrated lobe is present on the orbital border behind the ocular peduncle; the posterior margin is narrow and finely tuberculate.

The chelipedes are narrow and elongated, while the joints, more particularly the meri, are armed with short tubercular spines. The propodus is about three times the length of the carpus, and its upper surface bears a median row of tubercles; the fingers are not equal in length to the palm, and slightly pubescent, their opposed margins are dentate (the dentations being more strongly marked towards the apices) and a slight basal hiatus is usually present between the two. The ambulatory limbs are of

moderate length, with the joints finely tubercular above; the meri are dilated, and their anterior margins are pubescent; the daetyli are short and strongly curved, with their posterior margins entire.

The eyes are freely movable, with the corneæ subglobose and terminal in position; the peduncle is slightly elongated, but not prolonged into a spine. The antennal flagellum is not equal in length to the carapace. The ischium and merus of the external maxillipedes are faintly granular externally; the outer margin of the former is prolonged distally into an acute spine, while the inner margin of the latter is irregularly dentate, and a curved acute spine is placed at the distal end and outer border of the same joint.

The second and third abdominal segments are each provided with a prominent median tubercular elevation, the surface of which is roughened, and scattered tubercles of small size are present towards the lateral margins of the same segments. The posterior segments are perfectly smooth.

Several of the distinctive features of this species are peculiar, as for instance the flattened carapace, the bidentate rostrum, the short curved ambulatory daetyli, and the median abdominal tubercles; but they are not, in my opinion, sufficient to separate it from the genus *Elasmonotus*. Females are apparently slightly larger than males, their rostrum is more strongly developed, and their chelipedes are shorter.

Breadth of carapace (of an adult male) 8 mm., length of body (including rostrum) 24 mm., of carapace (including rostrum) 13 mm., of chelipede 31 mm., of first ambulatory leg 18 mm. The ova measure about 1 mm. in diameter. The body of the largest female measures 29 mm. in length.

*Habitat.*¹—Station 311, off Port Churruca, Patagonia; depth, 245 fathoms; bottom, blue mud. Upwards of a dozen specimens, the majority of which are females with ova.

Elasmonotus lævigatus, Henderson (Pl. XVIII. fig. 3).

Galathopsis lævigata, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 417, 1885.

Characters.—The carapace is comparatively smooth, only a few very slight rugosities being present on the gastric, cardiac, and posterior branchial regions, while a slight pubescence occurs on the upper surface of the rostrum, and towards the lateral margins in front. The gastric area is strongly convex, and rises considerably above the level of the rostrum, but there is no sharply defined ridge between the two; the cardiac area is crossed by a moderately deep transverse groove. The rostrum is flattened and depressed on the whole, though the acute apex is slightly upturned; its lateral margins are thin and entire. The lateral margin of the carapace is armed with two small acute teeth, one placed at the commencement of the border, the other immediately behind the cervical groove, and a single acute triangular tooth of slightly larger size occurs on the antero-

¹ This species is erroneously recorded from Station No. 107 in my preliminary account, an error due to a mistake in the labelling of one of the specimens.

lateral margin behind the antennal peduncle; the posterior margin is raised and prominent, but unarmed.

The chelipedes are short and robust, with the joints pubescent and finely granulated; a few short conical spines are also present at the distal end of the ischium, merus, and carpus. The propodus is about twice the length of the carpus; the fingers are deeply excavated inferiorly, and their apices are broad and dentate; the immobile finger is broader than the dactylus, while its outer border is sharp and regularly serrated. The ambulatory limbs are short and stout, with the joints granulated, and their anterior margins pubescent; the distal end of the meri and carpi terminates both above and below in an acute spine, and the posterior surface of the latter joints is provided with a short median carina; the dactyli are short and broad, terminating in a strongly curved claw, with a series of acute teeth on the posterior margin, the last of which so nearly equals the terminal claw that the joint has a biunguiculate appearance.

The ocular peduncles are slightly elongated, with the corneæ rounded, and terminal in position. The merus of the external maxillipedes is short and broad, with two narrow and acute subequal spines on the inner margin.

The abdominal segments are comparatively smooth, but the second, third, and fourth are each faintly bicarinate transversely, and a transverse impression is met with on the fifth segment; the posterior segments are slightly pubescent.

This species is distinguished by its flattened acute rostrum, and the form of its carapace, ambulatory limbs, and other parts, characters which on the whole are those of the genus *Elasmonotus*, as at present constituted; at the same time the chelipedes bear a close resemblance to those of certain species of *Munidopsis* (*Munidopsis brevimana*, Henderson, and *Munidopsis pilosa*, Henderson). I do not now feel justified in placing it, as I formerly did, in a subgenus intermediate between these two genera, but refer it (as well as the next species) to the former, though I may be allowed once more to express a doubt as to whether *Elasmonotus* itself may not have to be united with *Munidopsis*.

Breadth of carapace (of a female with ova) 11 mm., length of body (including rostrum) 33 mm., of carapace (including rostrum) 17 mm., of chelipede 19 mm., of first ambulatory leg 18 mm., diameter of ova 0·9 mm.

Habitat.—Station 219, north of Papua; depth, 150 fathoms; bottom, coral mud. A single specimen.

Elasmonotus debilis, Henderson (Pl. XVIII. fig. 4).

Galathopsis debilis, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 417, 1885.

Characters.—This species is closely allied to the preceding, and as the two specimens are both in too fragmentary a condition to admit of a detailed description, I shall endeavour merely to point out its distinguishing features. The carapace is slightly more

rugose than in the preceding species, and a few granulations are met with on the anterior gastric region. The denticles on the lateral margin of the carapace are obsolete, and a rounded finely serrated lobe occurs on the orbital margin behind the antennal peduncle.

The chelipedes are wanting in both specimens.¹ The ambulatory limbs are very similar to those of the last species, but the dactyli have a less obvious biunguiculate appearance.

The eyes are of small size, and partly hidden by the sides of the rostrum. The merus of the external maxillipedes is finely granulated externally, and the inner margin is bispinose; a minute spine is also present at the distal end of the outer margin.

The transverse carinæ on the second, third, and fourth abdominal segments are somewhat strongly marked (they are not represented in the figure).

Length of body (of a male) 18 mm., of carapace 10.5 mm., of chelipede 11 mm., of ambulatory leg (detached) 8 mm.

Habitat.—Station 173, off Matuku Island, Fiji; depth, 315 fathoms; bottom, coral mud. A male specimen.

Station 210, among the Philippine Islands; depth, 375 fathoms; bottom, blue mud. A male specimen.

Genus *Galacantha*, A. Milne-Edwards.

Galacantha, A. Milne-Edwards, Bull. Mus. Comp. Zool., vol. viii. No. 1, p. 52, 1880.

Rostrum long and spinulose, the proximal part horizontal, the apical portion upturned. Carapace broad, and convex from side to side, armed with a median spine of large size, placed near the posterior limit of the gastric area, and with an anterior gastric pair of spines and a cardiac spine of smaller size. Lateral margin of the carapace provided with two prominent flattened spines in front. Chelipedes rather stout, and exceeded in length by the ambulatory limbs. Eyes devoid of pigment, with the corneæ terminal in position. Antennal peduncle stout, the flagellum of moderate length. Second, third, and fourth abdominal segments strongly bicarinate transversely, and armed each with a prominent median spine. Male reproductive appendages of large size. Eggs few in number and of large size.

The characters of this genus as constituted above are so distinct that I cannot agree with Professor S. I. Smith's remark that it should perhaps be united with *Munidopsis*; judging from the description² it appears extremely doubtful whether the species which he

¹ These were apparently lost after my departure from Scotland and while the specimens were in the hands of the draughtsman, for I find from the diagnosis of the species that they measured 11 mm. in length in an individual measuring 18 mm. The chelipedes, as represented in the figure, must be regarded with suspicion, as their length (in proportion to that of the body) greatly exceeds the above measurement.

² "Albatross" Crustacea, Report United States Fishery Commission, 1882, p. 356.

terms *Galacantha bairdii*, upon an examination of which this belief is chiefly based, should really be included in the genus in question. Three species—all from great depths—have been recorded by Professor A. Milne-Edwards, one of which, *Galacantha rostrata*, is apparently not uncommon in deep water off the east coast of the United States.

Galacantha talismanii, A. Milne-Edwards, MS. (Pl. XX. fig. 1).

Habitat.—Station 195, off Banda; depth, 1425 fathoms; bottom, blue mud. A very young male specimen, measuring 25 mm. in total length, is referred with some uncertainty to this species.

The minute elevations on the surface of the carapace are tubercular, and scarcely tend to become spinulose. The posterior gastric spine is but slightly compressed, and is almost perpendicular; the anterior gastric spinules are more slender than the cardiac spinule, but of nearly equal length. The distal half of the rostrum is very slightly upturned, though long and slender, while the lower and distal margin of the proximal part is finely dentate. The spines on the lateral border of the carapace are of equal width, but the second is a little shorter than the first. The chelipedes and ambulatory limbs are finely granulated and almost destitute of spines. The first two abdominal spines are slender and strongly curved.

The types at Paris were taken during the voyage of the "Talisman."

Galacantha bellis, Henderson (Pl. XIX. fig. 6).

Galacantha bellis, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 418, 1885.

Characters.—The carapace is covered everywhere with small spiniform tubercles, which are more densely crowded together on the posterior half. The median gastric spine is broad and flattened, exceeding the apical portion of the rostrum in length, and placed at an angle of about fifty degrees to the carapace. The anterior gastric spinules are more slender than the cardiac spinule, and scarcely equal it in size; the latter overhangs a shallow transverse groove on the surface of which the pointed tubercles are somewhat deficient. The rostrum is comparatively short, and the apical portion is decidedly upturned, so as to be placed parallel to the median gastric spine, than which it is narrower and less flattened, while the proximal part is bidentate inferiorly and distally (occasionally unidentate); a distinct carina is continued backwards on the carapace from the base of the rostrum to the gastric spine. The lateral spines of the carapace are separated by a considerable interval, and diverge slightly; they are of almost equal width, and the second is slightly longer than the first. The orbital margin exhibits a faint raised line which is continued along the lateral margin of the first part of the

rostrum; the posterior margin of the carapace is distinctly elevated, and bounded in front by a narrow transverse strip which is perfectly smooth.

The chelipedes are armed with blunt tubercular granulations, and a few short spines are placed at the distal ends of the meral and carpal joints respectively, as well as on the under surface of the ischia and meri. The fingers are broad, flattened, and considerably longer than the palm, with their apices depressed, and the lower surfaces deeply excavated; their opposed margins are furnished with short interlocking teeth, which increase in size towards the apices. The ambulatory limbs are coarsely granulated, the granules showing a tendency towards linear arrangement, and two short spines are placed, one on either side, at the distal ends of the meri. The dactyli are moderately long and fairly well curved, with a series of five dentations on the posterior margin.

The eyes are freely movable, and the corneæ are rounded, though slightly deficient internally. The joints of the antennal peduncle are devoid of spines. The merus of the external maxillipedes is granulated externally, and two spines are present on the inner proximal margin, the first of which is considerably swollen towards its base; in some cases a third spine is present, placed slightly above the middle of the margin.

The second, third, and fourth abdominal segments are strongly granulated towards their lateral margins, whereas the fifth and sixth are almost devoid of granulations. The first and second abdominal spinules are well developed and rather strongly curved.

This species is very closely allied to *Galacantha rostrata*, A. Milne-Edwards, but a careful comparison with the types of the latter has convinced me that it is distinct. In the Challenger species, the tubercles on the carapace are of larger size, and more strongly marked on the anterior half; the gastric spine is shorter and broader at its base; the rostrum also is shorter and slightly more oblique; the lateral spines are of smaller size, more nearly equal, and separated by a wider interval; the carina at the base of the rostrum is more strongly developed; and the chelipedes are decidedly more spiny.

Breadth of carapace (of an adult male) 22 mm., length of body (including rostrum) 65 mm., of carapace (including rostrum) 35 mm., of gastric spine 6.5 mm., of apical portion of rostrum 5 mm., of second lateral spine 5 mm., of chelipede 48.5 mm., of first ambulatory leg 51 mm. The largest female specimen measures 67 mm. in length, and its chelipedes only 42 mm., while the ova are about 2.8 mm. in diameter.

Habitat.—Station 300, west of Valparaiso; depth, 1375 fathoms; bottom, Globigerina ooze. Four males and two females, both of the latter with ova.

Genus *Eumunida*, S. I. Smith.

Eumunida, S. I. Smith, Proc. U.S. Nat. Mus., vol. vi. No. 1, p. 44, 1883.

Rostrum slender and styliform, with a pair of well-developed supraorbital spines on either side of its base. Chelipedes and ambulatory limbs elongated and slender.

Antennal peduncle narrow and elongated, placed under the eye-stalk, and composed of five joints, the second of which is provided with a slender movable acicle. Second abdominal segment with its lateral margin prolonged into anteriorly directed spines; all the appendages except the penultimate pair absent in the male. Telson comparatively small in size, transversely segmented, and folded under the preceding abdominal segments. Branchiæ absent from the bases of the external maxillipedes.

This remarkable genus apparently forms a connecting link between *Munida* and the genera *Ptychogaster* and *Uropytchus*; it agrees closely with the first of these in the arrangement of the frontal spines (with the exception that there is an additional pair of supraorbitals), the presence of pubescent striæ on the carapace, and the shape of the chelipedes and ambulatory limbs, while it resembles the two last in having the swimming fan somewhat rudimentary and folded under the remainder of the abdomen. In some respects it occupies a unique position among Galathodea, for, as has been pointed out by Professor Smith, the pair of rudimentary arthrobranchiæ usually present on the eighth body segment are absent, and the first five abdominal segments are without appendages in the male, while an examination of the Challenger species shows some peculiarities in the arrangement of the antennal peduncle, which I take to be of generic value.¹ The only previously described species, *Eumunida picta*, S. I. Smith, was taken by the United States Fish Commission off the south coast of New England, at a depth of from 115 to 158 fathoms.

Eumunida smithii, Henderson (Pl. XV. fig. 5).

Eumunida Smithii, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 413, 1885.

Characters.—The carapace is very slightly arched from side to side, with its surface glabrous, and crossed by about a dozen sparingly ciliated transverse striæ. The frontal spines are all slender and deflexed, but especially the rostrum, which is about one-third longer than the first supraorbital, and nearly twice the length of the second. The gastric area is flattened and circumscribed, with a slight hollowing out towards the base of the rostrum, and the transverse striæ have a tendency to become squamose, more particularly in front; the hepatic area is deeply concave, and on its upper boundary three small spinules pass in an oblique line from the base of the second supraorbital spine, the first being very minute, and the third or most posterior being slightly larger than the second; the cardiac area is circumscribed anteriorly, but like the remainder of the carapace is unarmed. The lateral margin of the carapace is armed with six curved spinules, gradually decreasing in size from before backwards, of which one is placed in front of the

¹ The presence of an additional segment may possibly be a specific and not a generic character, for I have already noticed the occurrence of a similar number in a species of *Porcellana* (*Porcellana serratifrons*, Stimpson), in which genus the normal number is four.

cervical groove, and one between its two branches; the posterior margin is unarmed, and not specially prominent.

The chelipedes are wanting in the single specimen. The ambulatory limbs are very similar to those of *Eumunida picta*, S. I. Smith; the meri are subsquamose externally, and their anterior margin as well as that of the carpi is fringed with short curved spinules, one of slightly larger size being present on either side of the distal end of the former joints; the daetyli are flattened and but slightly curved, with a well-marked series of horny spinules present on the posterior margin, a few occurring also on the same margin of the propodi.

The eyes are of moderate size and the corneæ are distinctly rounded. The ischium and merus of the external maxillipedes are subequal, and both are unarmed.

The abdominal segments are glabrous, and each is crossed by two sparingly pubescent striae. The lateral spines of the second segment are stout and show a tendency to bifurcate.

This small species in most of its characters closely approaches *Eumunida picta*, S. I. Smith, from which it may, however, be distinguished at once by the relative size of the hepatic spinules, for in the North Atlantic form these decrease in size from before backwards, the first being considerably larger than either of the other two. I have dedicated it to the founder of the genus.

Breadth of carapace (of a male) 5 mm., length of body (including rostrum) 15 mm., of carapace (including rostrum) 9 mm., of rostrum 3.5 mm., of ambulatory leg (detached) 11.5 mm.

Habitat.—Station 192, off Little Ki Island; depth, 140 fathoms; bottom, blue mud. A single specimen.

Genus *Ptychogaster*, A. Milne-Edwards.

Ptychogaster, A. Milne-Edwards, Bull. Mus. Comp. Zool., vol. viii. No. 1, p. 63, 1880.

Rostrum slender and spiniform, usually upturned. Carapace narrow and somewhat ovate in shape, with its surface glabrous and usually spinose. Chelipedes and ambulatory limbs slender and greatly elongated, the basal joints of the latter not hidden by the sides of the carapace. Eye-stalks with the corneæ dilated. Antennal peduncle slender, the flagellum short. External maxillipedes narrow, the terminal joints elongated. Abdomen folded on itself, the telson (which is transversely segmented) and the last pair of appendages bent under the preceding segments, and applied to the thoracic sternae; males with the first two pairs of appendages (genital) well developed, those of the third, fourth, and fifth segments rudimentary. Eggs comparatively few in number, and of large size.

Two species belonging to this interesting deep-water genus have been previously

described, viz., *Ptychogaster spinifer*, A. Milne-Edwards, taken by the "Blake" at seven stations in the West Indies, at depths varying from 123 to 183 fathoms, and *Ptychogaster formosus*, A. Milne-Edwards, dredged by the "Talisman" off the Canaries, at the great depth of 4000 mètres (2187 fathoms). The Challenger dredgings have added two new and interesting forms to the list.

Ptychogaster milne-edwardsi, Henderson (Pl. XX. fig. 2).

Ptychogaster milne-edwardsi, Henderson, Narr. Chall. Exp., vol. i. p. 900, fig. 330, 1885; Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 418, 1885.

Characters.—The carapace is narrow in front though widening out posteriorly, with its surface glabrous and covered by slender acute spines, which attain their largest size towards the middle line. The gastric area is moderately convex, and is armed with a lateral and two submedian pairs of spines, as well as with two unpaired spines which are situated in the middle line; the cardiac area is circumscribed and remarkably convex, with a pair of prominent spines placed in front of three smaller spinules; at each antero-lateral angle of the cardiac area there is a small convex elevation surmounted by a spine of large size. The spines on the branchial regions are of small size, and closely grouped together; there are, however, two submedian pairs placed behind the cardiac area which attain a considerable size. The rostrum is narrow, acute, and strongly upturned, with its length equal to more than one-third that of the carapace. The lateral margin of the carapace bears three almost equidistant spines on its anterior half, the first of which is placed at the antero-lateral angle, while the posterior half is armed with a number of closely set spinules; the epimeral suture is very distinct and situated a little below the lateral margin; the branchiostegite has considerable vertical extent and its surface is spinulose. The posterior margin of the carapace is slightly raised, and bears a number of minute spinules.

The chelipedes are narrow, subcylindrical, and of great length, with the joints uniformly covered by short slightly curved spinules, which are arranged in six or seven distinct rows on each joint; the right chelipede is considerably shorter than the left, a result perhaps due to accident. The carpus and palm are subequal in length, but both are exceeded by the merus; the fingers are nearly two-thirds the length of the palm, and are slightly curved, they are subcylindrical in shape, and gradually taper towards the pointed apices, while their opposed margins are densely setose and armed with conical teeth, which gradually decrease in size from behind forwards, and two of which near the proximal end of the fingers are considerably larger than the others. The ambulatory limbs are slender, subcylindrical, and greatly elongated, with the joints armed in a similar way to the chelipedes; the dactyli are short and flattened, being only about one-fourth the length of the propodi, and a series of long horny spines is present on their posterior margin.

The eye-stalks are slightly elongated, while the corneæ are terminal in position, globular in shape, and deeply pigmented. The basal joint of the antennular peduncle is of small size, but the two succeeding joints are elongated and subcylindrical. A small spine is present on the outer margin of the first free joint of the antennal peduncle, and the ultimate joint is nearly twice the length of the penultimate; the flagellum is scarcely equal in length to the carapace. A few spinules are met with on the outer surface of the carpus and propodus of the external maxillipedes, and a single minute spinule occurs at the distal end of the merus; the terminal joints are densely pubescent below.

The abdominal segments are uniformly covered with short stout spines arranged in transverse rows on the dorsal surface, which show a tendency to decrease in size towards the lateral margins; part of the first segment is uncovered by the carapace, forming a transverse carina which bears a single row of spines. The telson and last pair of appendages are smooth, and provided with long fringing hairs.

This fine species is distinguished at once from *Ptychogaster spinifer* by the armature of its abdomen, for in the latter all the segments are smooth; it bears a greater resemblance to *Ptychogaster formosus*, in which, however, the third, fourth, and fifth segments are devoid of spines. I have pleasure in dedicating it to Professor Alphonse Milne-Edwards, in recognition of his courteous assistance in connection with the identification of the deep-sea forms in the present collection.

Greatest breadth of carapace (of an adult male) 15.5 mm., breadth at antero-lateral angles 8 mm., length of body (including rostrum) 55 mm., of carapace (including rostrum) 22.5 mm., of left chelipede 118 mm., of chela 43.5 mm., of right chelipede 90 mm., of first ambulatory leg 90 mm.

Habitat.—Station 310, Sarmiento Channel, Patagonia; depth, 400 fathoms; bottom, blue mud. A single specimen.

Ptychogaster lævis, Henderson (Pl. XX. fig. 3).

Ptychogaster lævis, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 418, 1885.

Characters.—The carapace narrows very slightly in front, and its surface is uneven and glabrous, with only a few minute spinules present on the anterior half. The gastric area is scarcely elevated, and bears two pairs of spinules behind the base of the rostrum, (of which the external are slightly larger) as well as a spinule of very small size near the posterior limit of the area; a single minute spinule is also present on each midbranchial region behind the cervical groove. The rostrum is narrow, spinulous, and almost horizontal in direction, with a faint upward inclination. The lateral margin of the carapace is armed with five slender spines, situated on the anterior two-thirds of the border, and gradually decreasing in size from before backwards; the posterior margin is unarmed.

The chelipedes are extremely slender and closely beset with minute spinules arranged in distinct rows. The carpus is slightly longer than the palm, but the two joints are of equal width; the fingers are slender and slightly curved, with their apices acute, and their opposed margins setose, while a prominent tubercular tooth is present near the proximal end of each. The ambulatory limbs are very slender, and a few delicate spinules are present on the anterior margin of the meri and carpi, as well as two or three on the posterior margin and distal end of the propodi; the daetyli are broad, flattened, and but slightly curved, with a series of slender spines on the posterior margin, which increase in size towards the apex.

The eye-stalks are narrow and elongated, in length equalling the rostrum, with the corneæ dilated and deeply pigmented. The external maxillipedes are armed with a single spinule at the outer and distal end of the merus, and the three terminal joints are densely pubescent internally.

The abdominal segments are all smooth and glabrous externally, and their pleura are subobtuse.

This species is distinguished by its narrow and elongated eye-stalks, the comparative absence of spines from the carapace, and by its very small size.

Breadth of carapace (of a female with ova) 4 mm., length of body (including rostrum) 15 mm., of carapace (including rostrum) 6·5 mm., of chelipede 32 mm., of chela 10·2 mm., of ambulatory leg (detached) 14·5 mm., diameter of ova about 0·7 mm.

Habitat.—Station 192, off Little Ki Island; depth, 140 fathoms; bottom, blue mud. A single specimen in an imperfect state of preservation.

Genus *Uroptychus*, n. n.

Diptychus,¹ A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 61, 1880.

Rostrum flattened and acute, resembling that of *Galathea*. Carapace somewhat ovate in shape, with its surface glabrous and usually devoid of spines. Chelipedes elongated and of varying width; the ambulatory limbs slender. Eye-stalks short and stout, the corneæ scarcely dilated. Antennal peduncle slender, the first free joint provided with a flattened and acute acicle or movable spine; the flagellum never of great length, and in some cases remarkably short. External maxillipedes comparatively smooth, with the terminal joints elongated, more especially the propodus, which is considerably longer than any of the other joints. Abdomen smooth and glabrous externally, folded on itself; the telson (which is transversely segmented and of very small size), as well as the last pair of appendages, bent under the preceding segments and applied to the thoracic sterna; males with the first two pairs of appendages (copulatory organs)

¹ As this name has been previously used in Zoology to designate a genus of Cyprinoid Fishes, I have altered it to that given above.

fairly well developed, those of the third and fourth segments rudimentary, of the fifth absent; females with two pairs of ovigerous appendages on the third and fourth segments, those of the other segments (with the exception of the penultimate) absent. Eggs comparatively few in number, and of large size.

The species are mostly of small size, and characterised by the shining polished surface of their body and limbs. They are widely distributed, occurring at depths of about 100 to 700 fathoms, and many of the species appear to live among the branches of Corals, their limbs being specially adapted for clinging. The atrophy of the caudal swimming fin is carried to a greater extent than in either *Ptychogaster* or *Eumunida*, and it is probable that the folding in of that part is a result of this condition in all three genera. In one respect *Uroptychus* differs from all other Galatheids, viz., in the presence of a distinct movable acicle on the first free (in reality the second) joint of the antennal peduncle, an important and primitive character, but it must be remembered that a similar process, though of very small size, is present also in *Eumunida*. In those species which I have examined, the fifth arthrobranchia, counting from before backwards, is not of larger size than the others, whereas in most of the Galathodea it is distinctly enlarged. Professor A. Milne-Edwards has made known five species from the West Indies, dredged during the "Blake" expedition, and more recently another species from the "Talisman" dredgings in the North Atlantic.

Uroptychus nitidus (A. Milne-Edwards) (Pl. XXI. fig. 6).

Diptychus nitidus, A. Milne-Edwards, Bull. Mus. Comp. Zoöl., vol. viii. No. 1, p. 62, 1880.

Habitat.—Station 23, off Sombbrero Island, West Indies; depth, 450 fathoms; bottom, Pteropod ooze. Two males, and a female with ova; all of small size.

Station 24, off Culebra Island, West Indies; depth, 390 fathoms; bottom, Pteropod ooze. An adult male (figured), the body of which measures 34 mm. in length, and the chelipedes 69 mm.

The carapace is perfectly smooth and glabrous, with a single spinule placed on each lateral margin at the antero-lateral angle. The rostrum is about twice the length of the eye-stalks, with its margins entire, and it is slightly upturned towards the apex (this last character being liable to considerable variation in different specimens). The chelipedes are broad, flattened, and of great length, with their surface smooth and shining; the merus narrows very considerably towards its proximal end, and a few ill-defined granules occur, in some specimens at least, on its inner surface, while a minute spinule is found on the upper surface and at the distal end of the ischium; the fingers are excavated inferiorly, and their surfaces are clad with delicate silky hairs; two unequal teeth are met with on the inner margin of the dactylus, and an ill-defined projection occurs on the corresponding border of the immobile finger. The ambulatory limbs are slender, and

like the chelipedes glabrous, with a series of delicate spines articulated to the posterior margin of the propodi; the dactyli are short and strongly curved, with numerous spinules on the posterior margin, which increase in size and are separated by wider intervals towards the apex of the joint, in some cases also the dactyli are pubescent. The antennal aciele extends slightly beyond the tip of the eye-stalk, and almost to the end of the antennal peduncle; the flagellum is not equal in length to the carapace. The joints of the external maxillipedes are smooth. The abdominal segments are smooth and glabrous externally.

From the dredgings of the "Blake" it would appear that this species is common in the West Indies, it having been taken by that vessel at no less than eighteen stations, in depths varying from 88 to 734 fathoms. It was found in most of these cases adhering to Corals of the genus *Chrysogorgia*.

Uroptychus insignis, Henderson (Pl. XXI. fig. 1).

Diptychus insignis, Henderson, Ann. and Mag. Nat. Hist., ser 5, vol. xvi. p. 419, 1885.

Characters.—The surface of the carapace is smooth and glabrous, with a moderate convexity from side to side. The gastric area is crossed in front by a transverse row of short, stout spinules, chiefly arranged in two groups one on either side of the middle line; the remaining areas are unarmed. The rostrum is about four times the length of the eye-stalks, and its apical half is slightly upturned; two minute spinules are present on each lateral margin towards the apex, and the whole lower surface as well as the distal end of the upper surface bears a median carina. The lateral margin of the carapace is armed with two spines of moderate size on its anterior half, one being situated at the antero-lateral angle, and the other opposite the gastric row of spinules, with a few spines of smaller size intervening, while the posterior half is provided with a regular series, decreasing gradually in size from before backwards, and continued almost to the posterior limit. The posterior margin is regularly convex, with the convexity directed forwards. A few minute spinules occur on the anterior pterygostomial region.

The chelipedes are robust and of moderate length, with the proximal joints tuberculate and spiny. The merus and carpus are both armed with prominent spines at their distal ends, as also is the inner surface of the former joint, while their surfaces, but especially the upper one, are roughened by somewhat pointed tubercles which are mostly arranged in rows. The propodus is glabrous, and its upper surface is provided with indistinct tubercles, chiefly towards the proximal end; the fingers are more than half the length of the palm, their apices cross one another and are acute, while each in addition to having its inner margin finely serrated bears a single ill-defined tooth of moderate size. The ambulatory limbs are rather stout, and comparatively smooth, a few indistinct spinules being merely present on the anterior margin of the meral and carpal joints, and a rounded

projection occurs at the distal inferior end of the propodi, to which from eight to ten horny spines are articulated; the dactyli are short and strongly curved, with nine or ten spinules gradually increasing in size towards the apex, present on the inferior margin.

The eyes are of small size, and partially concealed in orbits, with the corneæ not dilated. The antennal acicle is elongated, being more than twice the length of the eye-stalks, and extending almost to the end of the antennal peduncle. A few ill-defined spinules occur on the inner margin and at the distal end of the mcrus of the external maxillipedes.

The abdominal segments are smooth and glabrous externally, with their pleura subacute; the pleuron of the second segment is bilobed, a feature common to most members of the genus, and the rounded anterior lobe overlaps the postero-external angle of the carapace.

This fine species is distinguished by the armature of its carapace, chelipedes, and ambulatory limbs, and the small size of its eyes. With the exception of *Uroptychus nitidus* (A. Milne-Edwards), it is the largest known species belonging to the genus.

Breadth of carapace (of an adult male) 12·4 mm., length of body (including rostrum) 34 mm., of carapace (including rostrum) 17·5 mm., of chelipede 45 mm., of chela 19·5 mm., of first ambulatory leg 29 mm. Females appear to equal the males in size, but their chelipedes are more slender; the ova have a diameter of nearly 1 mm.

Habitat.—Station 145A, off Prince Edward Island; depth, 310 fathoms; bottom, volcanic sand. Two males, four females (one bearing ova), and several young specimens.

Uroptychus spinimarginatus, Henderson (Pl. XXI. fig. 2).

Diptychus spinimarginatus, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 419, 1885.

Characters.—The carapace is glabrous, though its surface is roughened posteriorly and towards the lateral margins by very minute granulations, and in some specimens also the same parts are pubescent; no spines are met with anywhere on the surface. The rostrum is about four times the length of the eye-stalks, and three-fourths that of the remainder of the carapace; it is horizontal in direction, its lower surface bears a median carina, and two or three minute spinules are present on each lateral margin towards the apex. The posterior half of the lateral border of the carapace is armed with five large and prominent spines, the first of which reaches a larger size than any of the others, the second and third being subequal, as are also the fourth and fifth; the anterior half bears three or four spines of small size, including that at the antero-lateral angle. The pterygostomial region terminates anteriorly in a short acute spine.

The chelipedes are elongated and extremely slender, with the proximal joints finely tubercular and armed with a few short spines. A spine is placed at the upper distal end of the basis, a second at the lower distal end of the ischium, and two on the inner distal

end of the merus, while the minute tubercles are best marked on the merus and carpus. The propodus is glabrous, and its surface is minutely punctate; the fingers are scarcely half the length of the palm, with their surface slightly pubescent, and a single ill-defined tooth is present on the inner margin of each. The ambulatory limbs are slender, more particularly the first, and the joints are glabrous, though slightly pubescent; the meral joints are finely tubercular, and numerous distinct spinules are present on their anterior margin; the propodi, as well as the dactyli, are slightly curved, and a series of minute horny spinules is present on the posterior margin of the latter.

The eyes are of small size and partially concealed in orbits, with the corneæ but slightly dilated. The antennal acicle is of very small size, only reaching the end of the eye-stalk, and scarcely the middle of the last joint of the antennal peduncle. The external maxillipedes are smooth, one or two minute spinules being alone present at the distal end of the merus.

The abdominal segments are glabrous externally, though minutely punctate, and the fifth and sixth are in addition pubescent in some specimens; their pleura are subobtuse.

This species agrees with the West Indian *Uroptychus armatus* (A. Milne-Edwards) in having the carapace armed laterally with prominent spines, but in the latter species from seven to eight of these are present, and the ambulatory limbs are in addition smooth.

Breadth of carapace, not including spines (of a female with ova from Station 170) 7 mm., length of body (including rostrum) 22 mm., of carapace (including rostrum) 11 mm., of chelipede 29 mm., of chela 12 mm., of first ambulatory leg 13 mm., diameter of ova about 1 mm.

Habitat.—Station 170, off the Kermadec Islands; depth, 520 fathoms; bottom, volcanic mud. A female with ova, and a young male.

Station 214, south of the Philippines; depth, 500 fathoms; bottom, blue mud. Two females, both with ova.

Uroptychus parvulus, Henderson (Pl. XXI. fig. 3).

Diptychus parvulus, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 420, 1885.

Characters.—The carapace is slightly more convex than usual, and is everywhere smooth and glabrous, though a few minute punctations are visible on its surface. The rostrum is about half the length of the carapace, or four times the length of the eye-stalks, and slightly depressed, with its upper surface hollowed out from side to side, and the margins entire. The lateral border of the carapace is armed with a series of very minute spinules which are best marked towards the posterior limit. The pterygostomial region is provided with a few scattered granules.

The chelipedes are elongated and of moderate width, with the proximal joints finely spinose. The merus and carpus are each armed with numerous rows of short spinules,

which at the distal end of both joints become distinct spines. The propodus is slightly swollen in both its diameters and its surface is perfectly smooth; the fingers are more than half the length of the palm and their surface is pubescent, the apices are curved, the dactylus folding under the immobile finger, and a single tooth is present on the inner margin of each. The ambulatory limbs are of moderate width, and with the exception of a row of minute spinules on the anterior border of the meri (and in some cases also of the carpi) are smooth, a series of distinct horny spinules also occurs on the posterior margin of the propodi; the dactyli are more than half the length of the propodi and strongly curved, with from six to eight stout horny spinules articulated to the posterior margin of each, the apical one being of small size.

The eyes are of small size, with the corneæ subglobose and deeply pigmented. The antennal acicle is long and acuminate, extending slightly beyond the end of the peduncle, the last joint of which is prolonged inferiorly into an acute spine, and its basal portion is rather broad; the flagellum is remarkably short, not reaching the end of the rostrum, and consisting of scarcely half a dozen joints. The external maxillipedes are almost completely smooth, one or two minute spinules being found only at the distal end of the merus.

The abdominal segments are smooth and glabrous externally, with the pleura subacute, those of the third segment and the posterior part of the second segment being narrow and attenuated. The telson and last pair of appendages are of very small size.

This small species is distinguished by the form of its rostrum, and the armature of the chelipedes, as well as by the remarkable characters of the external antennæ.

Breadth of carapace of the largest specimen (a female with ova) 6 mm., length of body (including rostrum) 16 mm., of carapace (including rostrum) 9 mm., of chelipede 20 mm., of chela 9 mm., of first ambulatory leg 12 mm., diameter of ova about 0·8 mm. Males are of somewhat smaller size than the above (as are also the other females with ova) but their chelipedes are considerably stouter.

Habitat.—Station 310, Sarmiento Channel, Patagonia; depth, 400 fathoms; bottom, blue mud. About thirty specimens, including both males and females, several of the latter with ova.

Uroptychus politus, Henderson (Pl. VI. fig. 2).

Diptychus politus, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 420, 1885.

Characters.—The carapace is moderately convex from side to side, and everywhere perfectly smooth and glabrous, the margins even being entire, with the exception of a minute denticle at the antero-lateral border. The rostrum is horizontal and placed very slightly below the level of the highest part of the carapace, in length it exceeds the eye-stalks by a small part of its extent, and it narrows somewhat abruptly towards the apex,

the basal portion being of considerable breadth. The pterygostomial region is smooth but bears a slight depression near its centre.

The chelipedes are of moderate length, and the joints are everywhere perfectly smooth and glabrous, with the exception of a small spine at the upper and distal end of the ischium. The palm is slightly dilated, and equal in length to the carpus; the fingers are somewhat curved, and in male specimens a distinct hiatus exists between the two, a pair of conical teeth, the second of which is the larger, occur on the inner and proximal margin of the dactylus, with corresponding depressions on the inner margin of the immobile finger. The ambulatory limbs are slender and smooth, with the exception of the usual horny spinules on the posterior margin of the propodi; the dactyli are strongly curved, and more than half the length of the penultimate joints, with a series of short horny spines on their posterior margin.

The eyes are of moderate size, with the corneæ slightly dilated and of a light brown colour. The antennal acicle is not more than half the length of the peduncle, and narrows rather abruptly towards the apex; the flagellum is about twice the length of the peduncle. The external maxillipedes are perfectly smooth and glabrous, with the exception of the usual hairs.

The abdominal segments are smooth and glabrous externally, and their pleura are subobtuse.

This species is distinguished by its almost complete smoothness, and by the form of the fingers, more especially in male specimens.

Breadth of carapace (of a female with ova) 5.5 mm., length of body (including rostrum) 18 mm., of carapace (including rostrum) 8 mm., of chelipede 24 mm., of chela 9.5 mm., of ambulatory leg (detached) 12 mm., diameter of ova about 1.2 mm. In the male specimen (which is of slightly smaller size), the chelipedes are proportionately longer and stouter, and a hiatus exists between the fingers.

Habitat.—Station 171, near the Kermadec Islands; depth, 600 fathoms; bottom, hard ground. A female with ova, and a male.

Uroptychus australis, Henderson (Pl. XXI. fig. 4).

Diptychus australis, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 420, 1885.

Characters.—The carapace is everywhere smooth and glabrous, only a single small tooth being present at each antero-lateral angle. The gastric area is slightly swollen and raised above the level of the rostrum, with in some cases two very minute denticles present on its anterior margin. The rostrum is horizontal in direction, and extends for about one-fourth of its length beyond the apices of the eye-stalks; it is of considerable breadth towards the base, but gradually narrows towards the acute apex. The

pterygostomial region terminates anteriorly in a very minute spinule, and a depression is visible towards its middle.

The chelipedes are slender and elongated, with the joints smooth and glabrous. A row of four or five small tubercles occurs on the inner proximal end of the merus, and a few tubercles of smaller size are sometimes found on the inner surface of the ischium, while a small spine is present on the upper and distal end of the same joint; in some specimens all the tubercles are nearly obsolete. The palm is but slightly dilated, and not equal in length to the carpus; the fingers are pubescent and excavated inferiorly, and a single prominent tooth occurs on the inner margin of the dactylus. The ambulatory limbs are smooth, with the exception of a few delicate spines on the posterior margin of the propodi; the dactyli are strongly curved, and about half the length of the penultimate joints, with a series of minute horny spinules on their posterior margin.

The eyes are of moderate size, and the corneæ are light brown in colour. The antennal aciele is slightly curved, and tapers gradually towards the acute apex, which reaches almost to the end of the peduncle; the flagellum is scarcely twice the length of the peduncle (it is represented of too great a length in the figure). The external maxillipedes are unarmed.

The abdominal segments are smooth and glabrous externally, and their pleura are subobtusate.

This species is closely allied to *Uroptychus politus*, from which it differs in the following respects:—The gastric region of the carapace is more swollen in the former, the rostrum is broader towards its apex, the chelipedes are more elongated, and finely tubercular towards their bases, while there is no hiatus between the fingers, and the antennal aciele is longer, more curved, and acuminate.

The largest specimen (a female from Station 164) gives the following measurements:—Breadth of carapace, 7 mm., length of body (including rostrum) 21 mm., of carapace (including rostrum) 10·5 mm., of chelipede 39 mm., of chela 15·5 mm., of first ambulatory leg 18 mm. Diameter of ova, taken from another specimen, about 1 mm.

Habitat.—Station 164B, off Port Jackson; depth, 410 fathoms; bottom, green mud. Two adult females, one with ova, and a young male.

Station 170, off the Kermadec Islands; depth, 520 fathoms; bottom, volcanic mud. A female with ova.

Station 171, near the Kermadec Islands; depth, 600 fathoms; bottom, hard ground. A female with ova.

Station 194A, off Banda; depth, 360 fathoms; bottom, volcanic mud. A female with ova, and two young individuals.

Uroptychus gracilimanus, Henderson (Pl. XXI. fig. 5).

Diptychus gracilimanus, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 420, 1885.

Characters.—The carapace is smooth and glabrous as in the last two species, and armed only with a single small tooth at each antero-lateral angle. The gastric area is slightly raised above the level of the rostrum, but is without any definite anterior margin. The rostrum is horizontal, and extends for about one-third of its length beyond the ends of the eye-stalks; it is rather narrow at the base, and tapers gradually towards the acute apex. The pterygostomial region presents a slight depression towards its centre.

The chelipedes are remarkably long and slender, and there is no trace of armature, the joints being everywhere smooth and glabrous. The palm is only about three-fourths the length of the carpus and but slightly dilated; the fingers are pubescent, slightly curved, and rather deeply excavated below, while a compound tooth of considerable size exists on the proximal and inner margin of the dactylus. The ambulatory limbs are slender and elongated, with a few horny spines on the posterior margin of the propodi; the dactyli are strongly curved and scarcely half the length of the penultimate joint, while a series of short horny spinules occurs on their posterior margin.

The eyes are of rather small size, and the corneæ are deep brown in colour. The antennal acicle is acuminate, and scarcely reaches the end of the peduncle; the flagellum is but slightly longer than the peduncle. The external maxillipedes are unarmed.

The abdominal segments are smooth and glabrous externally, and their pleura are subobtusate.

This species is distinguished from *Uroptychus australis* by the great length and tenuity of its chelipedes, and the absence of minute tubercles from their basal joints. It may possibly be only a variety of the last species, but in none of the female specimens of the latter do the chelipedes assume so slender a form, and the material at my disposal therefore makes me inclined to regard it as distinct.

Breadth of carapace 8 mm., length of body (including rostrum) 22 mm., of carapace (including rostrum) 10·5 mm., of chelipede 50 mm., of chela 19·5 mm., of first ambulatory leg 19 mm., diameter of ova about 1 mm.

Habitat.—Station 164B, off Port Jackson; depth, 410 fathoms; bottom, green mud. A female with ova.

Uroptychus tridentatus, Henderson (Pl. VI. fig. 1).

Diptychus tridentatus, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi. p. 421, 1885.

Characters.—The carapace is smooth and glabrous, and its surface is unarmed. The rostrum is about one and a half times the length of the eye-stalk, and slightly depressed, with its apex tridentate, and the upper surface hollowed out from side to side. The

lateral margin of the carapace has three prominent spines on its middle third, and a few spines of smaller size are situated between the first of these and the antero-lateral angle. A few minute spinules occur on the anterior part of the pterygostomial region.

The chelipedes and ambulatory limbs are wanting in the single specimen.

The eyes are of small size, and somewhat wider at the base than at the free end; the corneæ are minute but deeply pigmented. The antennal acicle is broad and acuminate, slightly exceeding the peduncle in length; the terminal joint of the peduncle is prolonged on one side into a delicate spine; the flagellum is absent on both sides of the body. The carpal joint of the external maxillipedes is of smaller size than usual, and the outer and distal end of the merus is prolonged into a minute denticle.

The abdominal segments are smooth and glabrous externally, while their pleura are subaeute.

Although the collection contains but a single specimen, and that in a very imperfect state of preservation, the characters are in some respects so striking that I have felt justified in making it the type of a new species. It may be distinguished at once from all the other known species of *Uroptychus* by the form of its rostrum.

Breadth of carapace 4.3 mm., length of body (including rostrum) 12 mm., of carapace 5.5 mm., diameter of ova about 0.6 mm.

Habitat.—Amboina. The label gives the depth as 15 fathoms, but from what is known of the bathymetrical distribution of the genus it is probable that the specimen came from one of the deeper dredgings in that locality.

GEOGRAPHICAL DISTRIBUTION.

LIST OF STATIONS,

SHOWING THE PHYSICAL CONDITIONS AND THE SPECIES OF ANOMURA OBTAINED
AT EACH.

STATION VIIp. Off Tenerife, Canaries, February 10, 1873; lat. 28° 35' N., long. 16° 5' W.; depth, 78 fathoms; bottom, volcanic sand; surface temperature, 64°. Dredged.

<i>Pagurus calidus</i> , Risso.	<i>Anapagurus pusillus</i> , n. sp.
<i>Spiropagurus elegans</i> , Miers.	<i>Galathea dispersa</i> , Spence Bate.

“Label lost, probably Madeira.” More probably Bay of Biscay, in deep water.

Eupagurus excavatus (Herbst), var. *meticulosa*, Roux.

STATION 23. Off Sombrero, West Indies, March 15, 1873; lat. 18° 24' N., long. 63° 28' W.; depth, 450 fathoms; bottom, Pteropod ooze; surface temperature, 76°. Dredged.

<i>Munida</i> sp.	<i>Elasmonotus armatus</i> , A. Milne-Edwards).
<i>Munidopsis sigsbei</i> (A. Milne-Edwards).	wards).
<i>Uroptychus nitidus</i> (A. Milne-Edwards).	

St. Thomas, West Indies, shallow water.

<i>Hypoconcha sabulosa</i> (Herbst).	<i>Porcellana sayana</i> (Leach).
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STATION 24. Off Culebra Island, West Indies, March 25, 1873; lat. 18° 38' 30" N., long. 5° 65' 30" W.; depth, 390 fathoms; bottom, Pteropod ooze; surface temperature, 76°. Dredged.

<i>Porcellana robertsoni</i> , n. sp.	<i>Elasmonotus armatus</i> , A. Milne-Edwards).
<i>Munida microphthalma</i> , A. Milne-Edwards.	<i>Uroptychus nitidus</i> (A. Milne-Edwards).

Bermuda, on the sandy shore and in shallow water.

Remipes scutellatus (Fabricius). | *Petrolisthes armatus* (Gibbes).

STATION 49. South of Halifax, Nova Scotia, May 20, 1873; lat. 43° 3' N., long. 63° 39' W.; depth, 85 fathoms; bottom, gravel, stones; surface temperature, 40°·5; bottom temperature, 35°. Dredged.

Eupagurus pubescens (Kröyer), var. *kroyeri*, Stimpson.

STATION 56. Off Bermuda, May 29, 1873; lat. 32° 8' 45" N., long. 64° 54' 35" W.; depth, 1075 fathoms; bottom, coral mud; bottom temperature, 38°·2; surface temperature, 72°·5. Dredged.

Parapagurus abyssorum, A. Milne-Edwards. | *Munidopsis serratifrons* (A. Milne-Edwards).

STATION 68. Between Bermuda and the Azores, June 24, 1873; lat. 38° 4' N., long. 39° 19' W.; depth, 2175 fathoms; bottom, Globigerina ooze; bottom temperature, 36°·2; surface temperature, 70°. Trawled.

Parapagurus abyssorum, A. Milne-Edwards, var. *scabra*, nov.

STATION 73. West of the Azores, June 30, 1873; lat. 38° 30' N., long. 31° 14' W.; depth, 1000 fathoms; bottom, Pteropod ooze; bottom temperature, 39°·4; surface temperature, 69°. Dredged.

Pagurodes (?) sp.

STATION 75. Off Fayal, Azores, July 2, 1873; lat. 38° 38' 0" N., long. 28° 28' 30" W.; depth, 50-90 fathoms; bottom, volcanic mud; surface temperature, 70°·2. Dredged.

Anapagurus pusillus, n. sp. | *Galathea* sp.

St. Vincent, Cape Verde Islands.

Remipes scutellatus (Fabricius). | *Galathea* sp.
Pagurus callidus, Risso. | *Pachycheles barbatus*, A. Milne-Edwards.
Eupagurus excavatus (Herbst), var. *meticulosa*, Roux.

STATION 78. South of San Miguel, Azores, July 10, 1873; lat. 37° 26' N., long. 25° 13' W.; depth, 1000 fathoms; bottom, volcanic mud; surface temperature, 71°. Dredged.

Lithodes agassizii, S. I. Smith.

STATION 106. South-west of Sierra Leone, August 25, 1873; lat. $1^{\circ} 47' N.$; long. $24^{\circ} 26' W.$; depth, 1850 fathoms; bottom, Globigerina ooze; bottom temperature, $36^{\circ} 6'$; surface temperature, $78^{\circ} 8'$. Trawled.

Parapagurus abyssorum, A. Milne-Edwards.

St. Paul's Rocks; depth, 10 to 60 fathoms.

Munida saneti-pauli, Henderson.

STATION 113A. Off Fernando Noronha, September 2, 1873; lat. $3^{\circ} 47' 0'' S.$, long. $32^{\circ} 24' 30'' W.$; depth, 7 to 25 fathoms; bottom, volcanic sand and gravel; surface temperature, 78° . Dredged.

Munida spinifrons, Henderson.

STATION 122. Off Pernambuco, September 10, 1873; lat. $9^{\circ} 5' S.$, long. $34^{\circ} 50' W.$; depth, 350 fathoms; bottom, red mud; surface temperature, $77^{\circ} 5'$. Trawled.

Eupagurus oclusus, n. sp.

Paguristes visor, n. sp.

Parapagurus gracilis, n. sp.

Munida stimpsoni, A. Milne-Edwards.

Munida miles, A. Milne-Edwards.

Munidopsis erinacca (A. Milne-Edwards).

Off Bahia; depth, 7 to 20 fathoms.

Dromidia antillensis, Stimpson.

Hypoconcha panamensis, S. I. Smith.

Zanclijer earibensis (de Fréminville).

Petrolisthes serratus, n. sp.

Petrolisthes sp.

STATION 133. Near Tristan da Cunha, October 11, 1873; lat. $35^{\circ} 41' S.$, long. $20^{\circ} 55' W.$; depth, 1900 fathoms; bottom, Globigerina ooze; bottom temperature, $35^{\circ} 4'$; surface temperature, 58° . Trawled.

Parapagurus abyssorum, A. Milne-Edwards.

STATION 135C. Off Nightingale Island, Tristan da Cunha, October 17, 1873; lat. $35^{\circ} 25' 30'' S.$, long. $12^{\circ} 28' 30'' W.$; depth, 110 fathoms; surface temperature, 54° . Dredged.

Eupagurus tristanensis, n. sp.

Parapagurus dimorphus (Studer).

Simon's Bay, Cape of Good Hope; depth, 5 to 20 fathoms.

Dromidia spongiosa, Stimpson.

Pseudodromia latens, Stimpson.

Diogenes brevirostris, Stimpson.

Pagurus granulatus, Olivier.

Anapagurus pusillus, n. sp.

Porcellana streptocheles, Stimpson.

Galathea labidolepta, Stimpson (?).

Galathea sp.

STATION 142. Off Cape Agulhas, December 18, 1873; lat. $35^{\circ} 4' S.$, long. $18^{\circ} 37' E.$; depth, 150 fathoms; bottom, green sand; bottom temperature, 47° ; surface temperature, $65^{\circ}\cdot 5$. Dredged.

Dromidia bicornis, Studer. | *Eudromia frontalis*, n. gen. et. sp.
Parapagurus dimorphus (Studer).

STATION 145A. Off Marion Island, December 27, 1873; lat. $46^{\circ} 41' S.$, long. $38^{\circ} 10' E.$; depth, 85 to 310 fathoms; bottom, volcanic sand; surface temperature, $41^{\circ}\cdot 5$. Dredged.

Lithodes murrayi, n. sp. | *Parapagurus dimorphus* (Studer).
Paralomis aculeatus, n. sp. | *Munida spinosa*, Henderson.
Uroptychus insignis, Henderson.

STATION 146. Near Marion Island, December 29, 1873; lat. $46^{\circ} 46' S.$, long. $45^{\circ} 31' E.$; depth, 1375 fathoms; bottom, Globigerina ooze; bottom temperature, $35^{\circ}\cdot 6$; surface temperature, 43° . Trawled.

Pagurodes inarmatus, n. sp. | *Munidopsis subsquamosa*, Henderson,
var. *aculeata*, nov.

STATION 158. South-west of Australia, March 7, 1874; lat. $50^{\circ} 1' S.$, long. $123^{\circ} 4' E.$; depth, 1800 fathoms; bottom, Globigerina ooze; bottom temperature, $33^{\circ}\cdot 5$; surface temperature, 45° . Trawled.

Munidopsis antonii (A. Milne-Edwards).

STATION 161. Off Port Philip, April 1, 1874; lat. $38^{\circ} 22' 30'' S.$, long. $144^{\circ} 36' 30'' E.$; depth, 33 fathoms; bottom, sand; surface temperature, $63^{\circ}\cdot 5$. Trawled.

Eupagurus lacertosus, n. sp., var. *nana*, nov.

STATION 162. Off East Moneceur Island, Bass Strait, April 2, 1874; lat. $30^{\circ} 10' 30'' S.$, long. $146^{\circ} 35' E.$; depth, 38 fathoms; bottom, sand and shells; surface temperature, $63^{\circ}\cdot 2$. Dredged.

Dromia ciliata, n. sp. | *Eupagurus lacertosus*, n. sp., var.
Cryptodromia lateralis (Gray). | *nana*, nov.
Clibanarius stringimanus (White). | *Munida subrugosa* (White), var. *austra-*
liensis, nov.

STATION 163A. Off Twofold Bay, Australia, April 4, 1874; lat. $36^{\circ} 59' S.$, long. $150^{\circ} 20' E.$; depth, 150 fathoms; bottom, green mud; surface temperature, 71° . Trawled.

<i>Cryptodromia lateralis</i> (Gray).	|	<i>Glaucothöe carinata</i> , n. sp.
<i>Cryptodromia incisa</i> , n. sp.	|	<i>Pylocheles spinosus</i> , n. sp.
<i>Latreillia australiensis</i> , n. sp.	|	<i>Galathea pusilla</i> , Henderson.
<i>Munida laswelli</i> , Henderson.		

Port Jackson, April 1874; depth, 2 to 10 fathoms.

<i>Cryptodromia lateralis</i> (Gray).	|	<i>Diognes custos</i> (Fabricius).
<i>Cryptodromia nodulifera</i> , n. sp.	|	<i>Anapagurus australiensis</i> , n. sp.

STATION 163B. Off Port Jackson, June 3, 1874; lat. $33^{\circ} 51' 15'' S.$, long. $151^{\circ} 22' 15'' E.$; depth, 35 fathoms; bottom, hard ground; bottom temperature, 63° ; surface temperature, 69° . Dredged.

<i>Latreillia australiensis</i> , n. sp.	|	<i>Eupagurus lacertosus</i> , n. sp., var.
<i>Lyreidus tridentatus</i> , De Haan.	|	<i>nana</i> , nov.
<i>Pagurus</i> sp.	|	

STATION 164B. Off Port Jackson, June 13, 1874; lat. $34^{\circ} 13' S.$, long. $151^{\circ} 38' E.$; depth, 410 fathoms; bottom, green mud; surface temperature, $69^{\circ} 0$. Trawled.

<i>Uroptychus australis</i> , Henderson.		<i>Uroptychus gracilimanus</i> , Henderson.
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STATION 166. West of New Zealand, June 23, 1874; lat. $38^{\circ} 50' S.$, long. $169^{\circ} 20' E.$; depth, 275 fathoms; bottom, Globigerina ooze; bottom temperature, $50^{\circ} 8$; surface temperature, $58^{\circ} 5$. Trawled.

<i>Eupagurus lacertosus</i> , n. sp.		<i>Munida gracilis</i> , Henderson.
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STATION 167. West of New Zealand, June 24, 1874; lat. $39^{\circ} 32' S.$, long. $171^{\circ} 48' E.$; depth, 150 fathoms; bottom, blue mud; surface temperature, $58^{\circ} 5$. Trawled.

<i>Paguristes subpilosus</i> , n. sp.		<i>Parapagurus latimanus</i> , n. sp.
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STATION 167A. Near Wellington, New Zealand, June 27, 1874; lat. $41^{\circ} 4' S.$, long. $174^{\circ} 19' E.$; depth, 10 fathoms; bottom, mud; surface temperature, $51^{\circ} 5$. Dredged.

<i>Paguristes pilosus</i> (H. Milne-Edwards).		<i>Parapagurus latimanus</i> , n. sp.
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STATION 168. East of New Zealand, July 8, 1874; lat. $40^{\circ} 28' S.$, long. $177^{\circ} 43' E.$; depth, 1100 fathoms; bottom, blue mud; bottom temperature, $37^{\circ} \cdot 2$; surface temperature, $57^{\circ} \cdot 2$. Trawled.

Pagurodes inarmatus, n. sp. | *Elasmonotus marginatus*, Henderson.

STATION 169. East of New Zealand, July 10, 1874; lat. $37^{\circ} 34' S.$, long. $179^{\circ} 22' E.$; depth, 700 fathoms; bottom, blue mud; bottom temperature, 40° ; surface temperature, $58^{\circ} \cdot 2$. Trawled.

Eupagurus rubricatus, n. sp.

STATION 170. Off the Kermadec Islands, July 14, 1874; lat. $29^{\circ} 55' S.$, long. $178^{\circ} 14' W.$; depth, 520 fathoms; bottom, volcanic mud; bottom temperature, 43° ; surface temperature, 65° . Trawled.

Uroptychus spinimarginatus, Henderson. | *Uroptychus australis*, Henderson.
son.

STATION 171. North of the Kermadec Islands, July 15, 1874; lat. $28^{\circ} 33' S.$, long. $177^{\circ} 50' W.$; depth, 600 fathoms; bottom, hard ground; bottom temperature, $39^{\circ} \cdot 5$; surface temperature, $66^{\circ} \cdot 5$. Trawled.

Munida microphthalma, A. Milne-Edwards. | *Uroptychus politus*, Henderson.
| *Uroptychus australis*, Henderson.

STATION 172. Off Nukalofa, Tongatabu, July 22, 1874; lat. $28^{\circ} 58' S.$, long. $175^{\circ} 9' W.$; depth, 18 fathoms; bottom, coral mud; surface temperature, 75° . Dredged.

Pagurus euopsis, Dana. | *Petrolisthes unilobatus*, n. sp.
Galathea aculeata, Haswell.

STATION 172A. Off Nukalofa, Tongatabu, July 22, 1874; lat. $26^{\circ} 56' S.$, long. $175^{\circ} 11' W.$; depth, 240 fathoms; bottom, coral mud; surface temperature, 75° . Dredged.

Munida tuberculata, Henderson.

STATION 173. Off Matuku, Fiji, July 24, 1874; lat. $19^{\circ} 9' 35'' S.$, long. $179^{\circ} 41' 50'' E.$; depth, 315 fathoms; bottom, coral mud; surface temperature, 76° . Dredged.

Munida normani, Henderson. | *Munida tuberculata*, Henderson.
Munida granulata, Henderson. | *Elasmonotus miersii*, Henderson.
Munida militaris, Henderson. | *Elasmonotus debilis*, Henderson.

Reefs at Levuka, Fiji Islands.

Catapagurus australis, n. sp.

Kandavu, Fiji Islands, from the shore.

Cænobita rugosa, H. Milne-Edwards. | *Cænobita perlata*, H. Milne-Edwards.

STATION 174D. Off Ngaloa, Kandavu, Fiji Islands, August 3, 1874; lat. $19^{\circ} 5' 50''$ S., long. $178^{\circ} 16' 20''$ E.; depth, 210 fathoms; bottom, coral mud; surface temperature, $77^{\circ} \cdot 7$. Dredged.

Lyreidus tridentatus, De Haan. | *Munida spinicordata*, Henderson.

Api, New Hebrides, from the shore.

Cænobita rugosa, H. Milne-Edwards. | *Cænobita perlata*, H. Milne-Edwards.

STATION 186. Flinder's Passage, Cape York, North Australia, September 8, 1874; lat. $10^{\circ} 30'$ S., long. $142^{\circ} 18'$ E.; depth, 8 fathoms; bottom, coral mud; surface temperature, $77^{\circ} \cdot 2$. Dredged.

Mastigochirus quadrilobatus, Miers. | *Petrolisthes annulipes* (White) Miers.
Pagurus imbricatus, H. Milne-Edwards. | *Pachycheles pulchellus* (Haswell).
Polyonyx obesulus (White) Miers.

Torres Strait.

Spiropagurus spiriger (De Haan).

STATION 187. Cape York, North Australia, September 9, 1874; lat. $10^{\circ} 36'$ S., long. $141^{\circ} 55'$ E.; depth, 6 fathoms; bottom, coral mud; surface temperature, $77^{\circ} \cdot 7$.

Diogenes guttatus, n. sp.

STATION 188. Arafura Sea, south of Papua, September 10, 1874; lat. $9^{\circ} 59'$ S., long. $139^{\circ} 42'$ E.; depth, 28 fathoms; bottom, green mud; surface temperature, $78^{\circ} \cdot 5$. Dredged and trawled.

Spiropagurus spiriger (De Haan). | *Catapagurus australis*, n. sp.
Pachycheles pulchellus (Haswell).

STATION 190. Arafura Sea, south of Papua, September 12, 1874; lat. $8^{\circ} 56'$ S., long. $136^{\circ} 5'$ E.; depth, 49 fathoms; bottom, green mud; surface temperature, $79^{\circ} \cdot 2$. Trawled.

Spiropagurus spiriger (De Haan). | *Galathea australiensis*, Stimpson.

Wokan Dobbo, Arroo Islands, from the shore.

Cænobita rugosa, H. Milne-Edwards.

STATION 191. Off the Arroo Islands, September 23, 1874; lat. $5^{\circ} 41' 0''$ S., long. $134^{\circ} 4' 30''$ E.; depth, 800 fathoms; bottom, green mud; bottom temperature, $39^{\circ} 5$; surface temperature, $82^{\circ} 2$. Trawled.

Munidopsis brevimana, Henderson.

STATION 192. Off Little Ki Island, September 26, 1874; lat. $5^{\circ} 49' 15''$ S., long. $132^{\circ} 14' 15''$ E.; depth, 140 fathoms; bottom, blue mud; surface temperature, 82° . Trawled.

Homola orientalis, n. sp.

Notopoides latus, n. sp.

Notopus ovalis, n. sp.

Clibanarius (?) sp.

Munida scabra, Henderson.

Munida militaris, Henderson.

Eumunida smithii, Henderson.

Ptychogaster lævis, Henderson.

Arafura Sea.

Pagurodes piliferus, n. sp. (?)

Porcellana serratifrons, Stimpson.

STATION 194A. Off Banda, September 29, 1874; lat. $4^{\circ} 31' 0''$ S., long. $129^{\circ} 57' 20''$ E.; depth, 360 fathoms; bottom, volcanic mud; surface temperature, $82^{\circ} 5$. Trawled.

Galathea inconspicua, Henderson.

Uroptychus australis, Henderson.

STATION 195. Off Banda, October 3, 1874; lat. $4^{\circ} 21'$ S., long. $129^{\circ} 7'$ E.; depth, 1425 fathoms; bottom, blue mud; bottom temperature, 38° ; surface temperature, 82° . Trawled.

Parapagurus abyssorum, A. Milne-Edwards.

Galacantha talismanii, A. Milne-Edwards.

Amboina; depth, 15 fathoms.

Raninoides personatus (White)
Henderson.

Cosmonotus grayii, Adams and White.

Munida spinulifera, Miers.

? *Uroptychus tridentatus*, Henderson.

Amboina; depth, 100 fathoms.

Munida militaris, Henderson.

STATION 196. Near the Philippines, October 13, 1874; lat. $0^{\circ} 48' 30''$ S., long. $126^{\circ} 58' 30''$ E.; depth, 825 fathoms; bottom, hard ground; bottom temperature, $36^{\circ} \cdot 9$; surface temperature, 83° . Trawled.

Homologenus (?) sp. | *Munidopsis pilosa*, Henderson.

Ternate, October 15, 1874.

Remipes testudinarius, Latreille. | *Birgus latro* (Linné).

STATION 200. Off Samboangan, Philippines, October 23, 1874; lat. $6^{\circ} 47'$ N., long. $122^{\circ} 28'$ E.; depth, 250 fathoms; bottom, green mud; surface temperature, $85^{\circ} \cdot 5$. Trawled.

Munida incerta, n. sp. | *Munida militaris*, Henderson, var.
curvirostris, nov.

STATION 201. Off Samboangan, Philippines, October 26, 1874; lat. $7^{\circ} 3'$ N., long. $121^{\circ} 48'$ E.; depth, 82 fathoms; bottom, stones, gravel; surface temperature, 83° . Trawled.

Eupagurus sp.

Philippine Islands.

Birgus latro (Linné).

Reefs at Zebu, Philippine Islands.

Pagurus striatus, Latreille.

STATION 204A or 204B. Off Panay Island, Philippines, November 2, 1874; lat. $12^{\circ} 43'$ N., long. $122^{\circ} 9'$ E.; depth, 100 or 115 fathoms; bottom, green mud; surface temperature, 84° . Trawled.

Pagurus striatus, Latreille. | *Pagurodes piliferus*, n. sp.
Eupagurus spinulentus, n. sp. | *Paguroopsis typicus*, n. sp.
Galathea subsquamata, Stimpson.

STATION 205. Off Luzon, Philippines, November 13, 1874; lat. $16^{\circ} 42'$ N., long. $119^{\circ} 22'$ E.; depth, 1050 fathoms; bottom, blue mud; bottom temperature, 37° ; surface temperature, 82° . Trawled.

Parapagurus abyssorum, A. Milne-Edwards.

Hong Kong; depth, 10 fathoms.

Spiropagurus spiriger (De Haan). | *Porcellana serratifrons*, Stimpson.
Raphidopus ciliatus, Stimpson.

STATION 207. Off Tablas Island, Philippines, January 16, 1875; lat. $12^{\circ} 21' N.$, long. $122^{\circ} 15' E.$; depth, 700 fathoms; bottom, blue mud; bottom temperature, $51^{\circ} \cdot 6$; surface temperature, 80° . Trawled.

Munidopsis milleri, Henderson.

STATION 208. Among the Philippines, January 17, 1875; lat. $11^{\circ} 37' N.$, long. $123^{\circ} 31' E.$; depth, 18 fathoms; bottom, blue mud; surface temperature, 81° . Trawled.

Spiropagurus spiriger (De Haan).

Paguristes hians, n. sp.

Paguristes sp.

Galathea aculeata, Haswell.

STATION 209. Off Zebu, Philippines, January 22, 1875; lat. $10^{\circ} 14' N.$, long. $123^{\circ} 54' E.$; depth, 95 fathoms; bottom, blue mud; bottom temperature, 71° ; surface temperature, 81° . Dredged and trawled.

Homola orientalis, n. sp.

Latreilopsis bispinosa, n. sp.

Latreillia valida, De Haan.

Galathea grandirostris, Stimpson.

STATION 210. Off Mindanao, Philippines, January 25, 1875; lat. $9^{\circ} 26' N.$, long. $123^{\circ} 45' E.$; depth, 375 fathoms; bottom, blue mud; bottom temperature, $54^{\circ} \cdot 1$; surface temperature, $80^{\circ} \cdot 2$. Dredged and trawled.

Munida militaris, Henderson, var.

curvirostris, nov.

Elasmonotus debilis, Henderson.

STATION 212. Off Samboangan, Philippines, January 30, 1875; lat. $6^{\circ} 54' N.$, long. $122^{\circ} 18' E.$; depth, 10 fathoms; bottom, sand; surface temperature, 83° . Dredged and trawled.

Albunea microps (White) Miers.

Pagurus similimanus, n. sp.

Porcellanella triloba, White.

Galathea elegans, White.

STATION 214. Off the Meangis Islands, February 10, 1875; lat. $4^{\circ} 33' N.$, long. $127^{\circ} 6' E.$; depth, 500 fathoms; bottom, blue mud; bottom temperature, $41^{\circ} \cdot 8$; surface temperature, $80^{\circ} \cdot 5$. Trawled.

Parapagurus affinis, n. sp.

Uroptychus spinimarginatus, Henderson.

Pagurodes limatulus, n. sp.

STATION 218. North of Papua, March 1, 1875; lat. $2^{\circ} 33'$ S., long. $144^{\circ} 4'$ E.; depth, 1070 fathoms; bottom, blue mud; bottom temperature, $36^{\circ} \cdot 4$; surface temperature, 84° . Trawled.

<i>Parapagurus abyssorum</i> , A. Milne-Edwards.	<i>Munidopsis brevimana</i> , Henderson.
	<i>Elasmonotus latifrons</i> , Henderson.

STATION 219. Off Nares Harbour, Admiralty Islands, March 10, 1875; lat. $1^{\circ} 54' 0''$ S., long. $146^{\circ} 39' 40''$ E.; depth, 150 fathoms; bottom, coral mud; surface temperature, 84° . Trawled.

<i>Munida squamosa</i> , Henderson.	<i>Munida inornata</i> , Henderson.
<i>Munida proxima</i> , Henderson.	<i>Elasmonotus laevigatus</i> , Henderson.

Wild Island, Admiralty Islands.

<i>Cænobita clypeata</i> (Herbst).	<i>Cænobita rugosa</i> , H. Milne-Edwards.
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Tracy Island, Nares Harbour, Admiralty Islands.

Cænobita rugosa, H. Milne-Edwards.

Admiralty Islands; depth, 16 to 25 fathoms.

<i>Pagurus dearmatus</i> , n. sp.	<i>Spiropagurus spiriger</i> (De Haan).
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Off Yokoska, Japan; depth, 5 to 20 fathoms.

Cryptodromia japonica, n. sp.

Off Yokohama, Japan.

Eupagurus constans, Stimpson.

STATION 237. South of Japan, June 17, 1875; lat. $34^{\circ} 37'$ N., long. $140^{\circ} 32'$ E.; depth, 1875 fathoms; bottom, blue mud; bottom temperature, $35^{\circ} \cdot 3$; surface temperature, 73° . Trawled.

<i>Parapagurus abyssorum</i> , A. Milne-Edwards.	<i>Munidopsis subsquamosa</i> , Henderson.
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Tahiti, Society Islands, near the reefs, September 28, 1875.

<i>Cænobita rugosa</i> , H. Milne-Edwards.	<i>Calcinus tibicen</i> (Herbst).
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Reefs at Papiete, Society Islands.

Pagurus deformis, H. Milne-Edwards.

STATION 285. Mid South Pacific, October 14, 1875; lat. $32^{\circ} 36' S.$, long. $137^{\circ} 43' E.$; depth, 2375 fathoms; bottom, red clay; bottom temperature, 35° ; surface temperature, 65° . Trawled.

Tylaspis anomala, Henderson.

Valparaiso Beach, November 1875.

Petrolisthes violaceus (Guérin). | *Petrolisthes validus* (Dana).

STATION 300. Off Juan Fernandez, December 17, 1875; lat. $33^{\circ} 42' S.$, long. $78^{\circ} 18' W.$; depth, 1375 fathoms; bottom, Globigerina ooze; bottom temperature, $31^{\circ} 5'$; surface temperature, $92^{\circ} 5'$. Trawled.

Parapagurus abyssorum, A. Milne-Edwards. | *Munidopsis antonii* (A. Milne-Edwards).

Galacantha bellis, Henderson.

STATION 302. Off Patagonia, December 28, 1875; lat. $42^{\circ} 43' S.$, long. $82^{\circ} 11' W.$; depth, 1450 fathoms; bottom, Globigerina ooze; bottom temperature, $35^{\circ} 6'$; surface temperature, 55° . Trawled.

Munidopsis subsquamosa, Henderson, var. *aculeata*, nov.

STATION 304. Port Otway, Patagonia, December 31, 1875; lat. $46^{\circ} 53' 15'' S.$, long. $75^{\circ} 12' 0'' W.$; depth, 45 fathoms; bottom, green sand; surface temperature, $51^{\circ} 2'$. Dredged.

Munida subrugosa (White). | *Parapagurus abyssorum*, A. Milne-Edwards.

STATION 305A. In the Messier Channel, Patagonia, January 1, 1876; lat. $47^{\circ} 48' 30'' S.$, long. $74^{\circ} 47' 0'' W.$; depth, 125 fathoms; bottom, blue mud; surface temperature, 55° . Trawled.

Munida subrugosa (White).

Messier Channel, January 1876.

Petrolisthes validus (Dana).

Gray's Harbour, Patagonia; from the stomach of a fish.

Munida subrugosa (White).

STATION 308. Tom Bay, Patagonia, January 5, 1876; lat. $50^{\circ} 8' 30''$ S., long. $74^{\circ} 41' 0''$ W.; depth, 175 fathoms; bottom, blue mud; surface temperature, $51^{\circ} 7'$. Trawled.

Eupagurus comptus (White), var. *jugosa*, nov.

STATION 310. In the Sarmiento Channel, Patagonia, January 10, 1876; lat. $51^{\circ} 27' 30''$ S., long. $74^{\circ} 3' 0''$ W.; depth, 400 fathoms; bottom, blue mud; bottom temperature, $46^{\circ} 5'$; surface temperature, $50^{\circ} 5'$. Trawled.

Munidopsis trifida, Henderson.

Ptychogaster milne-edwardsi, Henderson.

Uroptychus parvulus, Henderson.

STATION 311. Off Port Churruca, Patagonia, January 11, 1876; lat. $52^{\circ} 45' 30''$ S., long. $73^{\circ} 46' 0''$ W.; depth, 245 fathoms; bottom, blue mud; bottom temperature, 46° ; surface temperature, 50° . Trawled.

Parapagurus dimorphus (Studer).

Elasmonotus asper, Henderson.

STATION 312. Port Famine, Patagonia, January 13, 1876; lat. $53^{\circ} 37' 30''$ S., long. $70^{\circ} 56' 0''$ W.; depth, 9 fathoms; bottom, blue mud; surface temperature, $49^{\circ} 8'$. Dredged.

Munida subrugosa (White).

Port Stanley, Falkland Islands.

Paralomis verrucosus (Dana).

STATION 315. Port William, Falkland Island, January 26, 1876; lat. $51^{\circ} 40'$ S., long. $57^{\circ} 50'$ W.; depth, 12 fathoms; bottom, sand, gravel; surface temperature, 50° . Dredged.

Eupagurus comptus (White), var. *jugosa*, nov.

Porcellanella triloba, White.

Munida subrugosa (White).

STATION 316. Port Louis, Falkland Islands, February 3, 1876; lat. $51^{\circ} 32'$ S., long. $58^{\circ} 6'$ W.; depth, 4 fathoms; bottom, mud; surface temperature, $51^{\circ} 2'$. Dredged.

Paralomis verrucosus (Dana).

STATION 320. Off Monte Video, February 14, 1876; lat. $37^{\circ} 17' S.$, long. $53^{\circ} 52' W.$; depth, 600 fathoms; bottom, green sand; bottom temperature, $37^{\circ} 2$; surface temperature, $67^{\circ} 5$. Trawled.

Paralomis formosus, n. sp. | *Munida subrugosa* (White).
Munida spinosa, Henderson.

STATION 335. Near Tristan da Cunha, March 16, 1876; lat. $32^{\circ} 24' S.$, long. $13^{\circ} 5' W.$; depth, 1425 fathoms; bottom, Pteropod ooze; bottom temperature, 37° ; surface temperature, $73^{\circ} 5$. Dredged.

Parapagurus abyssorum, A. Milne-Edwards.

STATION 343. Off Ascension Island, March 27, 1876; lat. $8^{\circ} 3' S.$, long. $14^{\circ} 27' W.$; depth, 425 fathoms; bottom, volcanic sand; bottom temperature, $40^{\circ} 3$; surface temperature, $80^{\circ} 8$. Dredged.

Munida microphthalmia, A. Milne-Edwards.

THE CHIEF GEOGRAPHICAL AREAS WITH THE SPECIES OF
ANOMURA OBTAINED IN EACH.

In order to facilitate the distributional study of the species collected during the Expedition, I have thought it advisable to group them according to the special areas in which they were found. In doing so I have followed the arrangement adopted by Mr. E. J. Miers in his Report on the Challenger Brachyura, which is in part founded on that originally proposed by Professor Dana. As regards the distribution of the littoral and shallow-water forms of higher Crustacea, he believes that four great regions can be recognised, viz.:—(1) The Arctic or Boreal Circumpolar Region; (2) the Antarctic or Austral Circumpolar Region; (3) the Atlantic Region; and (4) the Indo-Pacific or Oriental Region.

Of the Circumpolar Regions much remains to be learnt, but so far as is known their Crustacean fauna is a scanty one when compared with that of the other two divisions; in some respects they appear to gradually merge with the latter, for it has been shown that certain characteristic genera, *e.g.*, *Lithodes*, extend almost to the tropics, but are then found only in deep water where the temperature conditions are favourable. No part of the Arctic Region was visited by the Challenger, but I have followed Mr. Miers by including in the Antarctic Region all those species taken to the south of 40° S. latitude, an arrangement which has at least the merit of being convenient.

The Atlantic and Indo-Pacific Regions stand clearly apart from one another, each containing many species with a wide range of distribution, though if the deep-water forms be excluded a comparatively small number are common to both. Each of these great regions may be subdivided into a number of provinces, all of which are characterised by the presence of distinct species, and in most cases also of distinct genera. The following arrangement will be found on the whole consistent with the distribution of other groups of marine animals, and the nomenclature is in many respects similar to that adopted by Mr. Hoyle in his Report on the Challenger Cephalopoda:—

ATLANTIC PROVINCES.

- | | |
|---------------------------------------|---------------------------|
| 1. <i>Scandinavian</i> . ¹ | 5. <i>Mediterranean</i> . |
| 2. New England. | 6. West African. |
| 3. West Indian. | 7. South African. |
| 4. Lusitanian. | |

¹ The provinces printed in *italics* were not visited by the Challenger.

INDO-PACIFIC PROVINCES.

- | | |
|--|----------------------------|
| 1. <i>Mascarene</i> or <i>East African</i> . | 6. <i>Californian</i> . |
| 2. <i>Red Sea</i> . | 7. <i>Australian</i> . |
| 3. <i>Indo-Malayan</i> . | 8. <i>Nova Zeylanian</i> . |
| 4. <i>Japanese</i> . | 9. <i>Pacific</i> . |
| 5. <i>Columbian</i> . | 10. <i>Peruvian</i> . |

In no instance can the boundaries of these provinces be sharply defined, and in all cases many species are found common to adjacent provinces. The abyssal forms (taken at greater depths than 500 fathoms) are provisionally included in the nearest province, though as a result of the more uniform conditions met with at great depths, their distribution is not limited as in the case of shallow-water species.

The number of species recorded from each province bears a ratio to the amount of dredging done, rather than affords an index to the comparative prevalence of Anomura; and during the first part of the cruise, some allowance must perhaps be made for the fact that methods of capture were only undergoing development. Thus but few species are recorded from the North Atlantic or West Indies, while the investigations of the "Blake" have shown that the deep-water of the latter district is tenanted by a wonderfully rich Crustacean fauna.

An asterisk placed before a species indicates that it is abyssal, and one or more numbers after indicate the other provinces in which it was taken.

THE ATLANTIC REGION.

I. THE NEW ENGLAND PROVINCE.

This province extends from the Gulf of St. Lawrence, or possibly as far north as the coast of Labrador, to the coast of Carolina.

Eupagurus pubescens (Kröyer), var. *kroyeri*, Stimpson.

II. THE WEST INDIAN PROVINCE.

The Gulf of Mexico and the West Indian Islands form the centre of this province, but its fauna creeps along the South American coast possibly as far south as the Rio de

la Plata. In the north it includes the American shores from Florida to Carolina, as well as the Bermudas.

<i>Dromidia antillensis</i> , Stimpson.	<i>Munida milcs</i> , A. Milne-Edwards.
<i>Hypoeoncha sabulosa</i> (Herbst).	„ <i>microphthalma</i> , A. Milne-Edwards, IV., X.
„ <i>panamensis</i> , S. I. Smith.	„ <i>sancti-pauli</i> , n. sp.
<i>Zanclifer caribensis</i> (de Freminville).	„ <i>spiniifrons</i> , n. sp.
<i>Remipes scutellatus</i> (Fabricius), IV.	„ sp.
<i>Eupagurus oculus</i> , n. sp.	<i>Munidopsis erinaceus</i> (A. Milne-Edwards).
<i>Paguristes visor</i> , n. sp.	„ <i>sigsbei</i> (A. Milne-Edwards).
* <i>Parapagurus abyssorum</i> , A. Milne-Edwards, III., V., VI., VII., XI.	* „ <i>serratifrons</i> (A. Milne-Edwards).
„ <i>gracilis</i> , n. sp.	<i>Elasmonotus armatus</i> , A. Milne-Edwards.
<i>Petrolisthes armatus</i> (Gibbes).	<i>Uroptychus nitidus</i> (A. Milne-Edwards).
„ <i>serratus</i> , n. sp.	
„ sp.	
<i>Porcellana sayana</i> (Leach).	
„ <i>robertsoni</i> , n. sp.	
<i>Munida stimpsoni</i> , A. Milne-Edwards.	

III. THE LUSITANIAN PROVINCE.

Extends from the south coast of the British Islands to the Canaries, and includes the Azores. Towards its southern limit there is a decided admixture of Mediterranean and West African species.

* <i>Lithodes agassizii</i> , S. I. Smith.	* <i>Parapagurus abyssorum</i> , A. Milne-Edwards, var. <i>scabra</i> , nov.
<i>Pagurus ealidus</i> , Risso, IV.	* <i>Pagurodes</i> (?) sp.
<i>Eupagurus excavatus</i> (Herbst), var. <i>meticulosa</i> , Roux., IV.	<i>Galathea dispersa</i> , Spencee Bate.
<i>Spiropagurus elegans</i> , Miers.	„ sp.
<i>Anapagurus pusillus</i> , n. sp., V.	

IV. THE WEST AFRICAN PROVINCE.

This province extends along the west coast of Africa from the Canaries probably to the Tropic of Capricorn, and includes the islands of Ascension and St. Helena. The

fauna of the Cape Verde Islands (which I include in this section) shows a decided Lusitanian faeies.

<i>Remipes scutellatus</i> (Fabricius), II.	<i>Pachycheles barbatus</i> , A. Milne-Edwards.
<i>Pagurus calidus</i> , Risso, III.	
<i>Eupagurus excavatus</i> (Herbst), var. <i>metieulosa</i> , Roux, III.	<i>Munida microphthalma</i> , A. Milne-Edwards, II., X.

V. THE SOUTH AFRICAN PROVINCE.

Includes the south-west coast of Africa from the Tropic of Capricorn to Cape Agulhas, and the Tristan da Cunha group.

<i>Dromidia spongiosa</i> , Stimpson.	<i>Parapagurus dimorphus</i> (Studer), XII.
" <i>bicornis</i> , Studer.	
<i>Eudromia frontalis</i> , n. gen. et sp.	* " <i>abyssorum</i> , A. Milne-Edwards, II., III., VI., VII., XI.
<i>Pseudodromia latens</i> , Stimpson.	
<i>Diogenes brevirostris</i> , Stimpson.	<i>Porcellana streptocheles</i> , Stimpson.
<i>Pagurus granulatus</i> , Olivier.	<i>Galathea labidolepta</i> , Stimpson (?).
<i>Eupagurus tristanensis</i> , n. sp.	" sp.
<i>Anapagurus pusillus</i> , n. sp., III.	

THE INDO-PACIFIC REGION.

VI. THE INDO-MALAYAN PROVINCE.

This province is one of considerable extent. It includes the Malay Archipelago, the north coast of Australia, and extends in a northerly direction so as to take in the greater part of the Chinese seas, while it also comprises the coasts of India and Ceylon.

<i>Homola orientalis</i> , n. sp.	<i>Mastigochirus quadrilobatus</i> , Miers.
* <i>Homologenus</i> (?) sp.	<i>Albunea microps</i> (White), Miers.
<i>Latreillopsis bispinosa</i> , n. gen. et sp.	<i>Birgus latro</i> (Linné).
<i>Latreillia valida</i> , De Haan.	<i>Cænobita clypeata</i> (Herbst).
<i>Raninoides personatus</i> (White), Henderson.	" <i>rugosa</i> , H. Milne-Edwards, X.
<i>Notopoides latus</i> , n. gen. et sp.	<i>Diogenes guttatus</i> , n. sp.
<i>Notopus ovalis</i> , n. sp.	<i>Pagurus striatus</i> , Latreille.
<i>Cosmonotus grayii</i> , Adams and White.	" <i>imbriatus</i> , H. Milne-Edwards.
<i>Remipes testudinarius</i> , Latreille.	" <i>dearmatus</i> , n. sp.

<i>Pagurus similimanus</i> , n. sp.	<i>Galathea aculeata</i> , Haswell, X.
<i>Clibanarius</i> (?) sp.	„ <i>ineonspicua</i> , n. sp.
<i>Eupagurus spinulentus</i> , n. sp.	<i>Munida spinulifera</i> , Miers.
„ sp.	„ <i>incerta</i> , n. sp.
<i>Spiropagurus spiriger</i> (De Haan).	„ <i>squamosa</i> , Henderson.
<i>Catapagurus australis</i> , n. sp., X.	„ <i>scabra</i> , Henderson.
<i>Paguristes hians</i> , n. sp.	„ <i>proxima</i> , Henderson.
„ sp.	„ <i>militaris</i> , Henderson, X.
* <i>Parapagurus abjssorum</i> , A. Milne-Edwards, II., III., V., VII., XI.).	„ var. <i>curvirostris</i> , Henderson.
* „ <i>affinis</i> , n. sp.	„ <i>inornata</i> , Henderson.
* <i>Pagurodes limatulus</i> , n. sp.	* <i>Munidopsis brevimana</i> , Henderson.
„ <i>piliferus</i> , n. sp.	* „ <i>milleri</i> , Henderson.
<i>Paguroopsis typicus</i> , n. sp.	* „ <i>pilosa</i> , Henderson.
<i>Petrolisthes annulipes</i> (White), Miers.	<i>Elasmonotus laevigatus</i> , Henderson.
<i>Porcellana serratifrons</i> , Stimpson.	„ <i>debilis</i> , Henderson.
<i>Porcellanella triloba</i> , White, XII.	* <i>Galacantha talismanii</i> , A. Milne-Edwards.
<i>Raphidopus eiliatus</i> , Stimpson.	<i>Eumunida smithii</i> , Henderson.
<i>Paehyehelus pulchellus</i> (Haswell).	<i>Ptychogaster laevis</i> , Henderson.
<i>Polyonyx obesulus</i> (White), Miers.	* <i>Uroptychus spinimarginatus</i> , Henderson, X.
<i>Galathea elegans</i> , White.	„ <i>australis</i> , Henderson, VIII., X.
„ <i>australiensis</i> , Stimpson.	
„ <i>subsquamata</i> , Stimpson.	
„ <i>grandirostris</i> , Stimpson.	

VII. THE JAPANESE PROVINCE.

The Crustacean fauna of the Japanese seas is in many respects so peculiar that there can be little doubt that they are entitled to rank as a distinct province.

<i>Cryptodromia japonica</i> , n. sp.	* <i>Parapagurus abyssorum</i> (A. Milne-Edwards), II., III., V., VI., XI.
<i>Eupagurus constans</i> , Stimpson.	
* <i>Munidopsis subsquamata</i> , Henderson.	

VIII. THE AUSTRALIAN PROVINCE.

This includes Tasmania and the whole Australian continent with the exception of the northern coast.

<i>Dromia ciliata</i> , n. sp.	<i>Anapagurus australiensis</i> , n. sp.
<i>Cryptodromia lateralis</i> (Gray).	<i>Glaucothöe carinata</i> , n. sp.
„ <i>nodulifera</i> , n. sp.	<i>Pylocheles spinosus</i> , n. sp.
„ <i>incisa</i> , n. sp.	<i>Galathea pusilla</i> , n. sp.
<i>Latrecillia australiensis</i> , n. sp.	<i>Munida rugosa</i> (White), var. <i>australiensis</i> , nov.
<i>Lyreidus tridentatus</i> , De Haan, X.	„ <i>haswelli</i> , n. sp.
<i>Diogenes custos</i> (Fabricius).	<i>Uroptychus australis</i> , n. sp., VI., X.
<i>Pagurus</i> sp.	„ <i>gracilimanus</i> , n. sp.
<i>Clibanarius strigimanus</i> (White).	
<i>Eupagurus lacertosus</i> , n. sp., var. <i>nana</i> , nov.	

IX. THE NOVO-ZEYLANIAN PROVINCE.

This province, which includes only the islands of New Zealand, is fairly distinct from the last, though there is a considerable number of species common to both.

<i>Eupagurus lacertosus</i> , n. sp.	<i>Parapagurus latimanus</i> , n. sp.
„ <i>rubricatus</i> , n. sp.	* <i>Pagurodes inarmatus</i> , n. sp., XII.
<i>Paguristes pilosus</i> (H. Milne-Edwards).	<i>Munida gracilis</i> , n. sp.
„ <i>subpilosus</i> , n. sp.	* <i>Elasmonotus marginatus</i> , n. sp.

X. THE PACIFIC PROVINCE.

This province is one which extends over a large area, and at the same time its boundaries are by no means clearly defined. It comprises the shores of the various groups of islands throughout the Pacific.

<i>Lyreidus tridentatus</i> , De Haan, VIII.	<i>Pagurus cuopsis</i> , Dana.
<i>Cænobita rugosa</i> , H. Milne-Edwards, VI.	<i>Calcinus tibicen</i> (Herbst).
„ <i>perlata</i> , H. Milne-Edwards.	<i>Catapagurus australis</i> , n. sp., VI.
<i>Pagurus deformatis</i> , H. Milne-Edwards.	* <i>Tylaspis anomala</i> , n. gen. et sp.
	<i>Petrolisthes unilobatus</i> , n. sp.

<i>Galathea aculeata</i> , Haswell, VI.	<i>Elasmonotus miersii</i> , Henderson.
* <i>Munida micropthalma</i> , A. Milne-Edwards, II., IV.	„ <i>debilis</i> , Henderson.
„ <i>normani</i> , Henderson.	* <i>Uroptychus spinimarginatus</i> , Henderson, VI.
„ <i>granulata</i> , Henderson.	* „ <i>australis</i> , Henderson, VI., VIII.
„ <i>militaris</i> , Henderson, VI.	„ <i>politus</i> , Henderson.
„ <i>tuberculata</i> , Henderson.	
„ <i>spinipectinata</i> , Henderson.	

XI. THE PERUVIAN PROVINCE.

This includes the coasts of Chili and Peru; possibly it extends further north than the boundary of the latter country.

* <i>Parapagurus abyssorum</i> , A. Milne-Edwards, II., III., V., VI., VII.	* <i>Munidopsis antonii</i> (A. Milne-Edwards), XII.
<i>Petrolisthes violaceus</i> (Guérin).	* <i>Galacantha bellis</i> , n. sp.
„ <i>validus</i> (Dana), XII.	

THE ANTARCTIC REGION.

XII.

As already indicated, this region is held to include all these species taken to the south of 40° S. latitude. I have, however, comprised certain Antarctic forms taken at Station 320, off the Rio de la Plata.

<i>Lithodes murrayi</i> , n. sp.	* <i>Munida spinosa</i> , Henderson.
<i>Paralomis verrucosus</i> (Dana).	<i>Munidopsis antonii</i> (A. Milne-Edwards), XI.
„ <i>aculeatus</i> , n. sp.	* „ <i>subsquamosa</i> , Henderson, var. <i>aculeata</i> , nov.
* „ <i>formosus</i> , n. sp.	„ <i>trifida</i> , Henderson.
<i>Eupagurus comptus</i> (White), var. <i>jugosa</i> , nov.	<i>Elasmonotus asper</i> , Henderson.
<i>Parapagurus dimorphus</i> (Studer), V.	<i>Ptychogaster milne-edwardsi</i> , Henderson.
* <i>Pagurodes inarmatus</i> , n. sp., IX.	<i>Uroptychus insignis</i> , Henderson.
<i>Petrolisthes validus</i> (Dana), XI.	„ <i>parvulus</i> , Henderson.
<i>Porellanella triloba</i> , White, VI.	
<i>Munida subrugosa</i> (White).	

BATHYMETRICAL DISTRIBUTION.

In the following tables the species are grouped according to the bathymetrical zones in which they occurred. I have thought it unnecessary to incorporate the results of other and later deep-sea expeditions, for so far as is known from what has already been published on the subject, these do not add materially to the results obtained by a study of the Challenger collection.

I have followed Professor A. Agassiz in considering all depths beyond 500 fathoms as abyssal, but this limit must be regarded as a somewhat arbitrary one. There is less difficulty in deciding where the littoral fauna ceases and the deep-water forms make their appearance, and as regards the Anomura at least, the 100 fathom line marks approximately the boundary between the two.

The Anomura, it may be stated generally, occupy an intermediate position between the Macrura and the Brachyura, in regard to the limit of depth at which they are found. The more highly specialised forms are like the Brachyura found in shallow-water and moderate depths, whereas the more primitive Macruran types extend to the abysses of the ocean. Mr. Miers has pointed out that the Brachyura obtained from the greatest depths are essentially those most nearly related to the Anomura.

The tables, in addition to affording a list of the species taken at different depths, indicate the relative proportion of new species obtained in each vertical zone. It will be seen that a large proportion of the deep-water and abyssal forms belong to previously undescribed species—indeed all of the latter, with a single exception, were taken for the first time by the Challenger; though in the long interval that has elapsed since the return of the expedition, subsequent deep-sea investigations have resulted in the rediscovery of several.

One or more numbers placed after any species indicate that it was also obtained from the corresponding zones.

TERRESTRIAL SPECIES.

<i>Birgus latro</i> (Linné).	|	<i>Cænobita rugosa</i> , H. Milne-Edwards.
<i>Cænobita clypeata</i> (Herbst).	|	„ <i>perlata</i> , H. Milne-Edwards.

LITTORAL AND SHALLOW-WATER SPECIES.

I. From between tide-marks to 20 fathoms.

- | | |
|---|---|
| <i>Cryptodromia lateralis</i> (Gray), II., IV. | <i>Eupagurus constans</i> , Stimpson. |
| „ <i>japonica</i> , n. sp. | <i>Spiropagurus spiriger</i> (De Haan), II. |
| „ <i>nodulifera</i> , n. sp. | <i>Anapagurus pusillus</i> , n. sp., III. |
| <i>Dromidia antillensis</i> , Stimpson. | „ <i>australiensis</i> , n. sp. |
| „ <i>spongiosa</i> , Stimpson. | <i>Catapagurus australis</i> , n. sp., II. |
| <i>Pseudodromia latens</i> , Stimpson. | <i>Paguristes pilosus</i> (H. Milne-Edwards). |
| <i>Hypoconcha sabulosa</i> (Herbst). | „ <i>hians</i> , n. sp. |
| „ <i>panamensis</i> , S. I. Smith. | „ sp. |
| <i>Raninoides personatus</i> (White), Henderson. | <i>Parapagurus latimanus</i> , n. sp. |
| <i>Cosmonotus grayii</i> , Adams and White. | <i>Petrolisthes violaceus</i> (Guérin). |
| <i>Zanclifer caribensis</i> (de Freminville). | „ <i>validus</i> (Dana). |
| <i>Remipes testudinarius</i> , Latrielle. | „ <i>armatus</i> (Gibbes). |
| „ <i>scutellatus</i> , Fabricius. | „ <i>annulipes</i> (White), Miers. |
| <i>Mastigochirus quadrilobatus</i> , Miers. | „ <i>unilobatus</i> , n. sp. |
| <i>Albunca microps</i> (White), Miers. | „ <i>serratus</i> , n. sp. |
| <i>Paralomis verrucosus</i> (Dana). | „ sp. |
| <i>Diogenes custos</i> (Fabricius). | <i>Porcellana sayana</i> (Leach). |
| „ <i>brevirostris</i> , Stimpson. | „ <i>streptocheles</i> , Stimpson. |
| „ <i>guttatus</i> , n. sp. | „ <i>serratifrons</i> , Stimpson. |
| <i>Pagurus striatus</i> , Latrielle, IV. | <i>Porcellanella triloba</i> , White. |
| „ <i>granulatus</i> , Olivier. | <i>Raphidopus ciliatus</i> , Stimpson. |
| „ <i>calidus</i> , Risso, III. | <i>Pachycheles barbatus</i> , A. Milne-Edwards. |
| „ <i>deformis</i> , H. Milne-Edwards. | „ <i>pulchellus</i> (Haswell), II. |
| „ <i>imbricatus</i> , H. Milne-Edwards. | <i>Polyonyx obesulus</i> (White), Miers. |
| „ <i>cuopsis</i> , Dana. | <i>Galathea elegans</i> , White. |
| „ <i>dearmatus</i> , n. sp. | „ <i>labidolepta</i> , Stimpson (?). |
| „ <i>similimanus</i> , n. sp. | „ <i>aculeata</i> , Haswell. |
| <i>Calcinus tibicen</i> (Herbst). | „ sp. |
| <i>Eupagurus excavatus</i> (Herbst), var. <i>reticulosa</i> , Roux. | <i>Munida subrugosa</i> (White), II., IV., VI. |
| <i>Eupagurus comptus</i> (White), var. <i>jugosa</i> , nov., IV. | „ <i>spinulifera</i> , Miers. |
| | „ <i>spinifrons</i> , Henderson. |

V. From 200 to 500 fathoms.

<i>Lyrcidus tridentatus</i> , De Haan, II.	<i>Munida tuberculata</i> , Henderson.
<i>Lithodes murrayi</i> , n. sp.	„ <i>spinicordata</i> , Henderson.
<i>Paralomis aculeatus</i> , n. sp.	„ sp.
<i>Eupagurus lacertosus</i> , n. sp.	<i>Munidopsis crinacca</i> (A. Milne-Edwards).
„ <i>occlusus</i> , n. sp.	„ <i>sigsbeii</i> (A. Milne-Edwards).
<i>Paguristes visor</i> , n. sp.	„ <i>trifida</i> , Henderson.
<i>Parapagurus dimorphus</i> (Studer), IV.	<i>Elasmonotus armatus</i> , A. Milne-Edwards.
„ <i>gracilis</i> , n. sp.	„ <i>miersii</i> , Henderson.
<i>Porcellana robertsoni</i> , n. sp.	„ <i>asper</i> , Henderson.
<i>Galathea inconspicua</i> , Henderson.	„ <i>debilis</i> , Henderson.
<i>Munida stimpsoni</i> , A. Milne-Edwards.	<i>Ptychogaster milne-edwardsi</i> , Henderson.
„ <i>miles</i> , A. Milne-Edwards.	<i>Uroptychus nitidus</i> (A. Milne-Edwards).
„ <i>microphthalma</i> , A. Milne-Edwards, VI.	„ <i>insignis</i> , Henderson.
„ <i>spinosa</i> , Henderson, VI.	„ <i>parvulus</i> , Henderson.
„ <i>normani</i> , Henderson.	„ <i>australis</i> , Henderson, VI.
„ <i>incerta</i> , n. sp.	„ <i>gracilimanus</i> , Henderson.
„ <i>granulata</i> , Henderson.	
„ <i>militaris</i> , Henderson, IV.	
„ <i>militaris</i> , Henderson, var. <i>curvirostris</i> , nov.	
„ <i>gracilis</i> , Henderson.	

ABYSSAL SPECIES.

VI. From 500 to 1000 fathoms.

<i>Homologenus</i> (?) sp.	<i>Munida spinosa</i> , Henderson, V.
<i>Paralomis formosus</i> , n. sp.	<i>Munidopsis brevimana</i> , Henderson, VII.
<i>Eupagurus rubricatus</i> , n. sp.	„ <i>milleri</i> , Henderson.
<i>Parapagurus affinis</i> , n. sp.	„ <i>pilosa</i> , Henderson.
<i>Pagurodes limatulus</i> , n. sp.	<i>Uroptychus spinimarginatus</i> , Henderson.
<i>Munida subrugosa</i> (White), I., II., IV.	„ <i>politus</i> , Henderson.
„ <i>microphthalma</i> , A. Milne-Edwards, V.	„ <i>australis</i> , Henderson, V.

VII. From 1000 to 1500 fathoms.

<i>Lithodes agassizii</i> , S. I. Smith.	<i>Munidopsis subsquamosa</i> , Henderson,
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	<i>Galacantha talismanii</i> , A. Milne- Edwards.
	„ <i>bellis</i> , Henderson.

VIII. From 1500 to 2000 fathoms.

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	<i>Munidopsis subsquamosa</i> , Henderson.

IX. From 2000 to 2500 fathoms.

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SUMMARY.

The Challenger collection contains 161 species, or well-marked varieties, of Anomura, referable to 52 different genera, and of these 86 species and 7 genera are described as new to science.

The large proportion of new species is scarcely to be wondered at when the nature of the Challenger dredgings is borne in mind. Prior to 1873 scarcely any deep-water investigations had been made in the seas visited by the Expedition, and the abysses of the ocean practically remained a sealed book to naturalists; hence it is not surprising that slightly more than three-fourths of the total number of new species were taken beyond the one hundred fathom line.

In some respects the collection is disappointing, a few of the shallow-water groups being but poorly represented, while many well-known and widely distributed species are conspicuous by their absence. The interest and value of the collection is, however, by no means confined to the deep-water forms, for the careful manner in which the locality and conditions of existence were noted at the time of capture has disclosed many important facts, and added materially to our knowledge of the distribution of shallow-water species. The main interest, however, centres in the Paguridea and the Galatheidea—two great groups which extend to abyssal depths.

The more highly specialised Anomura, *i.e.*, the Dromidea, Raninidea, and Hippidea, are less fully represented in the collection than the Maeruran forms, and, like the Brachyura, they appear to be almost confined to shallow water. With the exception of *Homologenus*, founded by Alphonse Milne-Edwards for the reception of a West Indian species, to which a young Homolid taken by the Challenger is doubtfully referred, none of the Dromidea are known to occur beyond the five hundred fathom line, though several genera are found in comparatively deep water. So far as is known the Raninidea are even more completely restricted to shallow water, and few of the species in all probability occur at greater depths than 200 fathoms. The deepest water in which any Raninid has been found is 210 fathoms, at which depth specimens of the rare Japanese *Lyreidus tridentatus*, De Haan, were taken off the Fiji Islands. The Hippidea are represented by only four species, all of which have been previously described, though two belong to rare and little known forms. There is every reason to believe that the members of this

group are strictly littoral, and most if not all occur from between tide-marks to a depth of not more than a few fathoms.

Two of the new genera in the above-mentioned groups are of special interest. *Latreillopsis*, of which a single species was taken off the Philippines, forms an interesting connecting link between *Homola* and *Latreillia*, inasmuch as it combines the body of the former, with the attenuated limbs and eye-stalks of the latter, thus showing the necessity of placing all three in a single family. The genus *Zanclifer* has been established for a curious Raninid taken in shallow water off Bahia, which possesses some interesting structural peculiarities. Originally discovered in the West Indies, upwards of fifty years ago, it was described in a very imperfect manner by its discoverer, de Freminville, who referred it to the fossil genus *Eryon*. The manifest inaccuracy of this description led to its being ignored by most subsequent writers, and the species was apparently lost sight of till rediscovered by the Challenger. It is sharply distinguished from all other Raninidea by certain prominent features, and more especially by the form of the eyes, which are so extremely rudimentary as to be scarcely recognisable at first sight. It seems probable that in this case partial loss of vision has been brought about by the animal taking up its abode in subterranean burrows.

The Paguridea and Galatheidea comprise more than four-fifths of the total number of species in the collection, and the facts connected with their bathymetrical distribution are among the most important discussed in the Report.

Three new species of Lithodea were taken, all of them in the southern hemisphere. The members of this group were formerly believed to occur only in the shallow water of the northern and southern temperate regions, but deep-sea dredgings, more especially those of the "Talisman," have shown that they extend to the tropics, in which case they are confined to deep water (some of the species reaching a depth of over 1000 fathoms), where the temperature conditions are doubtless favourable to their existence. As Professor A. Milne-Edwards has pointed out, this unexpected feature in their distribution is not without interest, inasmuch as it shows the possibility of certain forms spreading from the one circumpolar region to the other, and accommodating themselves to the altered environment, in order to obtain the necessary conditions of temperature.

The Paguroidea, or Hermit Crabs, extend to a depth of more than 2000 fathoms. A few of the characteristic shallow-water genera, *e.g.*, *Eupagurus* and *Paguristes*, extend to deep water, but the majority of the abyssal species belong to genera which have either recently, or in the preceding pages, been described as new. In nearly all cases the branchiæ of the deep-water forms, while retaining their normal arrangement, exhibit a puzzling modification of structure. The two collateral rows of flattened leaflets met with on each branchial stem in the gills of the ordinary Pagurids are replaced by a double row of rounded filaments; in other words, there is a departure from the phyllobranchiate to the trichobranchiate type. It so happens that this condition is the reverse of what

might be expected, for it is known that the supply of oxygen is diminished at great depths, and in many other deep-sea animals the respiratory surface is apparently increased with the object as it were of counterbalancing this diminution in the supply. I am, therefore, led to the conclusion that this character is an ancestral one, and that certain at least of the Paguroidea are the descendants of Maerura in which the gills were trichobranchiate. This view is partly supported by the fact that in *Pylocheles*, A. Milne-Edwards, a deep-water genus which is represented by a single species in the collection, and retains to a remarkable extent the primitive Macruran characteristics, the gills have essentially this structure.

The other structural modifications met with in the deep-water Pagurids are comparatively few and unimportant. The eyes as a rule are slightly reduced in size, but in all cases they are pigmented and apparently functional, a fact which would lead us to suppose that the Paguroidea have spread more recently into deep water than the Galathodea. The most characteristic genus is *Parapagurus*, S. I. Smith, the species of which appear to live invariably in a state of commensalism with an Anemone, which exerts a solvent action on the shell originally taken possession of by the Hermit, so that in many cases the latter is merely protected by its clinging messmate. I have failed to detect a single instance in which a shell had not apparently been present at one time. In all the females which I have examined the genital opening of the right side is apparently absent, a peculiarity which doubtless coincides with a deficiency in the internal reproductive organs, though I have been unable to satisfy myself on this point. One of the species, *Parapagurus abyssorum*, A. Milne-Edwards, appears to be almost universally distributed at great depths, affording a noticeable instance of the greatly extended distribution enjoyed by many abyssal species.

The Pagurid which I have described under the name of *Tylaspis*, and which occurred at a depth of more than 2000 fathoms, is remarkable chiefly for the fact that its gills have essentially the ordinary phyllobranchiate structure, though the characters of the carapace and abdomen are also sufficiently marked. *Paguroopsis*, another of the new genera, also presents several features of extreme interest. It is distinguished by the large size of its eyes, and by two characters in which it stands apart from all other Pagurids, viz., the last two pairs of thoracic legs are subdorsal in position, and the unpaired abdominal appendages occur on the right side.

It is, however, among the Galatheidea that the largest proportion of deep-water forms is found.

The Porcellanodea, or more highly specialised Galatheids, are almost confined to shallow water, but a new species (*Porcellana robertsoni*) was taken in the West Indies at a depth of 390 fathoms, which in all probability marks approximately the extreme vertical limit of the group.

The Galathodea, on the other hand, are found abundantly to a depth of about 2000

fathoms. Most of the abyssal species are blind, and the eyes have undergone a process of degeneration which is tolerably uniform in all. The eye-stalk is frequently prolonged in the form of a short spine, while the visual portion is pale in colour and absolutely devoid of pigment. A distinct corneal surface is always present, though in one species (*Munidopsis pilosa*, Henderson) it is remarkably reduced; and in nearly all cases the degenerative changes have taken place without any marked reduction in the size of the eye as a whole. Some of the blind species are remarkable for the great length of their antennæ, rendering it probable that the loss of sight is partially compensated by an increased development of the tactile sense. The puzzling fact that certain deep-water species are blind, while in others belonging to the same group and found at similar depths the eyes are well developed, has been frequently commented on, and the explanation that the former have probably migrated into deep water at an earlier period, and have consequently had sufficient time to undergo modification, appears to be the most satisfactory one. The blind Galatheids share so many features in common, and the most widely separated types are so frequently connected by intermediate forms, that the retention of certain of the genera which have been founded for their reception must, I hold, be regarded as questionable. Since the return of the expedition other naturalists have instituted five new genera, all of which are represented in the Challenger collection.

A very conspicuous feature is the prevalence of species of *Munida*. They are found almost everywhere in deep water, though but few reach a depth of 1000 fathoms, which appears to represent their bathymetrical limit. Prior to the Challenger investigations not more than half a dozen species were known to science, but recent deep-sea dredgings have increased the number to upwards of thirty; no less than fifteen of the species in the present collection are described as new. In none of them—with a single exception—do we meet with any striking modification, though in most cases the eyes are slightly enlarged, a feature commonly observed in those deep-sea animals in which the visual organs are still functional. The exception referred to is that of a species named *Munida microphthalmia* by A. Milne-Edwards in his Preliminary Report on the "Blake" Crustacea, which was taken by the Challenger in both the Atlantic and the Pacific. In this species signs of commencing degeneration are apparent, the eyes being remarkably reduced in size, and the corneæ of a light brown colour.

In the majority of the deep-water Galatheids—with the exception of those belonging to the genus *Munida*—the eggs carried by the female are few in number and of remarkably large size. It may be inferred from this that in the deep sea enemies are fewer, and the chances of each individual egg undergoing its full development therefore relatively greater, the result being diminished production on the part of the parents; while the large size of the ova perhaps indicates a protracted embryonic existence.

Two well-marked genera, *Ptychogaster* and *Uroptychus*, and to a lesser extent a third,

Eumunida, are distinguished by a curious modification in the form of the abdomen, which, unlike that of other Galatheids, has become twice folded on itself. Some of the species appear to dwell in the branches of *Gorgonia*, &c., and the rudimentary nature of the terminal swimming fan points to their leading a sedentary life, which has resulted in the abdomen becoming folded, as there is now no need for keeping it semi-extended. These forms are thus assuming to a slight extent the main feature of the *Brachyura*.

Numerous instances occur of abyssal species with a greatly extended range of distribution, and of these we may cite what is perhaps the most striking. *Munidopsis antonii* (A. Milne-Edwards), which was captured by the "Talisman" off the north-west coast of Africa, was taken by the Challenger in the Southern Ocean and off the island of Juan Fernandez, South America.

An examination of the deep-sea forms in the collection does not afford any insight into the colour which they possessed during life, for long immersion in alcohol has reduced them all to a dull white. It is known, however, that red is the prevailing colour at great depths, and it appears that, in some cases at least, shallow-water species assume this colour when they pass into deeper water. In the summer of 1885, when dredging in Loch Fyne, on the west coast of Scotland, along with Mr. John Murray and other naturalists, we captured at a depth of 105 fathoms a large number of examples of the shrimp *Pandalus annulicornis*, Leach, in which the colour was a bright red, whereas specimens from shallow water on the same coast are invariably of the same pale greyish hue as the sandy bottom on which they are usually found.

In conclusion, it may be stated that the collection of Anomura reported on in the preceding pages is one of the most valuable which has ever been brought together during a single voyage. It has indeed furnished a knowledge of the bathymetrical distribution of the Anomura which previous to the dispatch of the Challenger was almost entirely wanting, and last, though not least, it has very materially added to the number of known species in the group.

APPENDIX.

Two species of Anomura, taken in shallow water, off Bahia, were received too late for satisfactory identification and insertion in the Report. One is a *Hypoconcha*, of small size, though an adult female bearing eggs, which is perhaps referable to *Hypoconcha panamensis*, S. I. Smith, while the other is a species of *Petrolisthes*.

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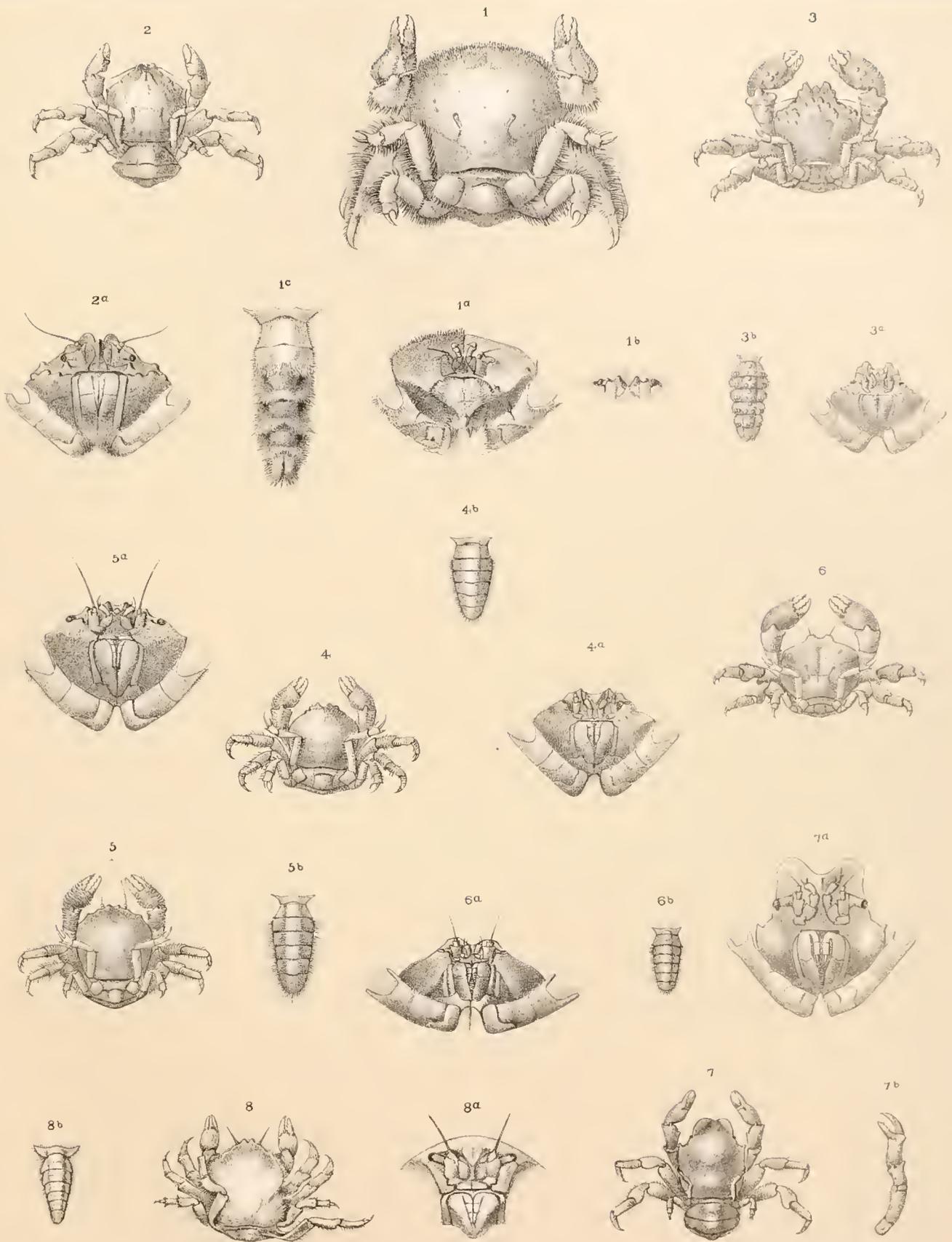


PLATE II.

PLATE II.

	Diam.	Page
Fig. 1. <i>Homola orientalis</i> , n. sp.,	× 1	19
<i>a.</i> Left chelipede of female,	× 1½	
Fig. 2. <i>Homologenus</i> , sp. (?), juv.,	× 2	21
Fig. 3. <i>Latreillopsis bispinosa</i> , n. gen. et sp.,	× 1	22
<i>a.</i> Under surface of trunk,	× 2	
<i>b.</i> Right chela of female,	× 4	
<i>c.</i> Terminal joints of fifth right leg,	× 4	
Fig. 4. <i>Latreillicia australiensis</i> , n. sp.,	× 1	24
<i>a.</i> Abdominal plate of female,	× 2	
<i>b.</i> Apex of fourth left leg,	× 4	
Fig. 5. <i>Raminoides personatus</i> , White, MS.,	× 1½	27
<i>a.</i> Left chelipede of male,	× 2	
<i>b.</i> Left external maxillipede,	× 2	
Fig. 6. <i>Notopus ovalis</i> , n. sp.,	× 2	31
<i>a.</i> Left chelipede of female,	× 2½	
<i>b.</i> Left external maxillipede,	× 2	

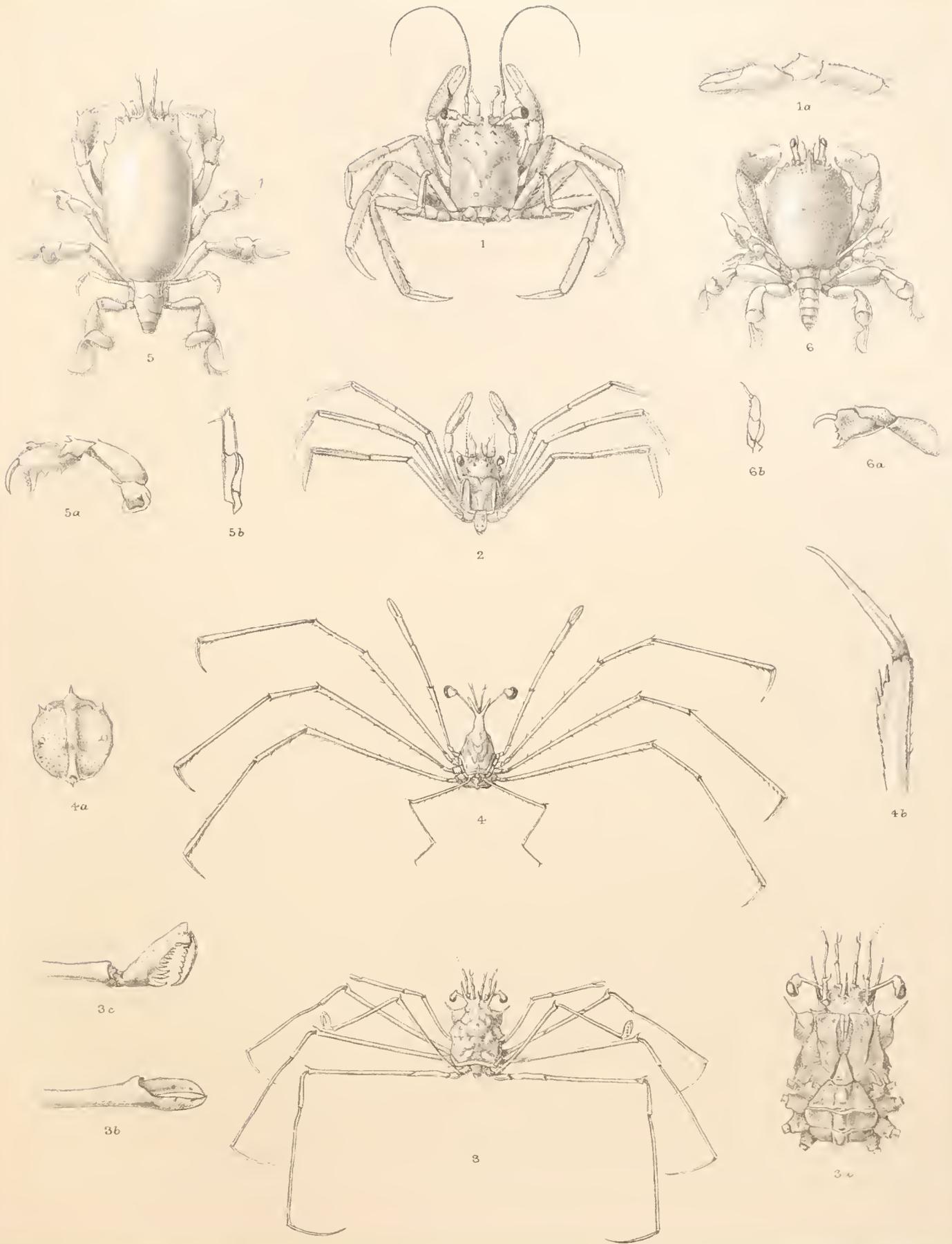
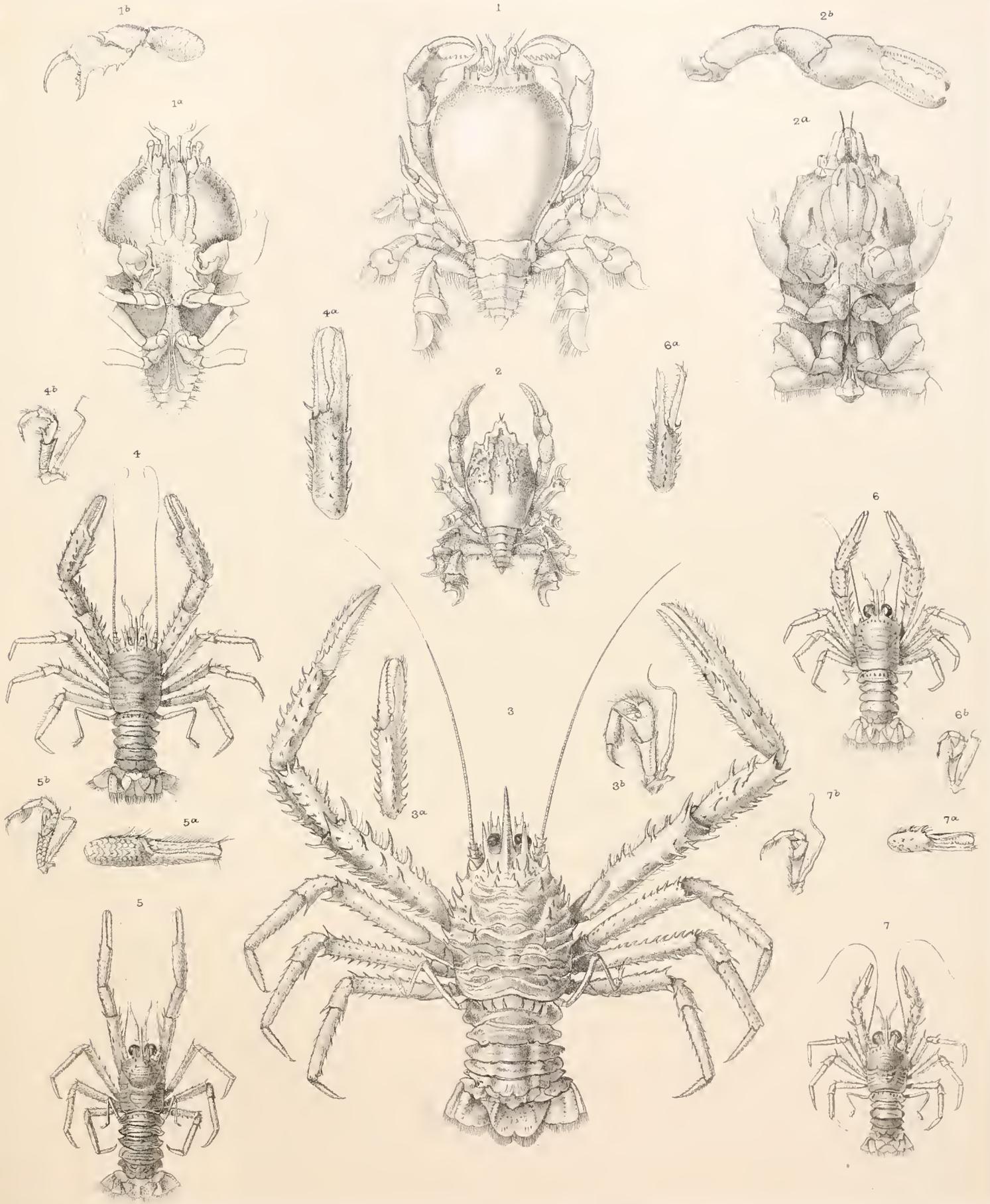


PLATE III.

PLATE III.

					Diam.	Page
Fig. 1.	<i>Notopoides latus</i> , n. gen. et sp.,	.	.	.	× 1	29
	<i>a.</i> Under surface,	.	.	.	× 1	
	<i>b.</i> Left chelipede of male,	.	.	.	× 1	
Fig. 2.	<i>Zanclifer caribensis</i> (de Freminville),	.	.	.	× 1	34
	<i>a.</i> Under surface,	.	.	.	× 2	
	<i>b.</i> Right chelipede of male,	.	.	.	× 2	
Fig. 3.	<i>Munida spinosa</i> , Henderson,	.	.	.	slightly enlarged	128
	<i>a.</i> Right chela of male,	.	.	.	× 1	
	<i>b.</i> Left external maxillipede,	.	.	.	× 2	
Fig. 4.	<i>Munida microphthalma</i> , A. Milne-Edwards,	.	.	.	× 1	127
	<i>a.</i> Right chela of male,	.	.	.	× 2	
	<i>b.</i> Left external maxillipede,	.	.	.	× 2	
Fig. 5.	<i>Munida haswelli</i> , Henderson,	.	.	.	× 1	139
	<i>a.</i> Right chela of female from Station 173, doubtfully referred to this species,	.	.	.	× 2	
	<i>b.</i> Left external maxillipede,	.	.	.	× 2	
Fig. 6.	<i>Munida sancti-pauli</i> , Henderson,	.	.	.	× 1	142
	<i>a.</i> Right chela of female,	.	.	.	× 2	
	<i>b.</i> Left external maxillipede,	.	.	.	× 2	
Fig. 7.	<i>Munida militaris</i> , Henderson, var. <i>curvirostris</i> , Henderson,	.	.	.	× 1	139
	<i>a.</i> Right chela of female,	.	.	.	× 2	
	<i>b.</i> Left external maxillipede,	.	.	.	× 2	



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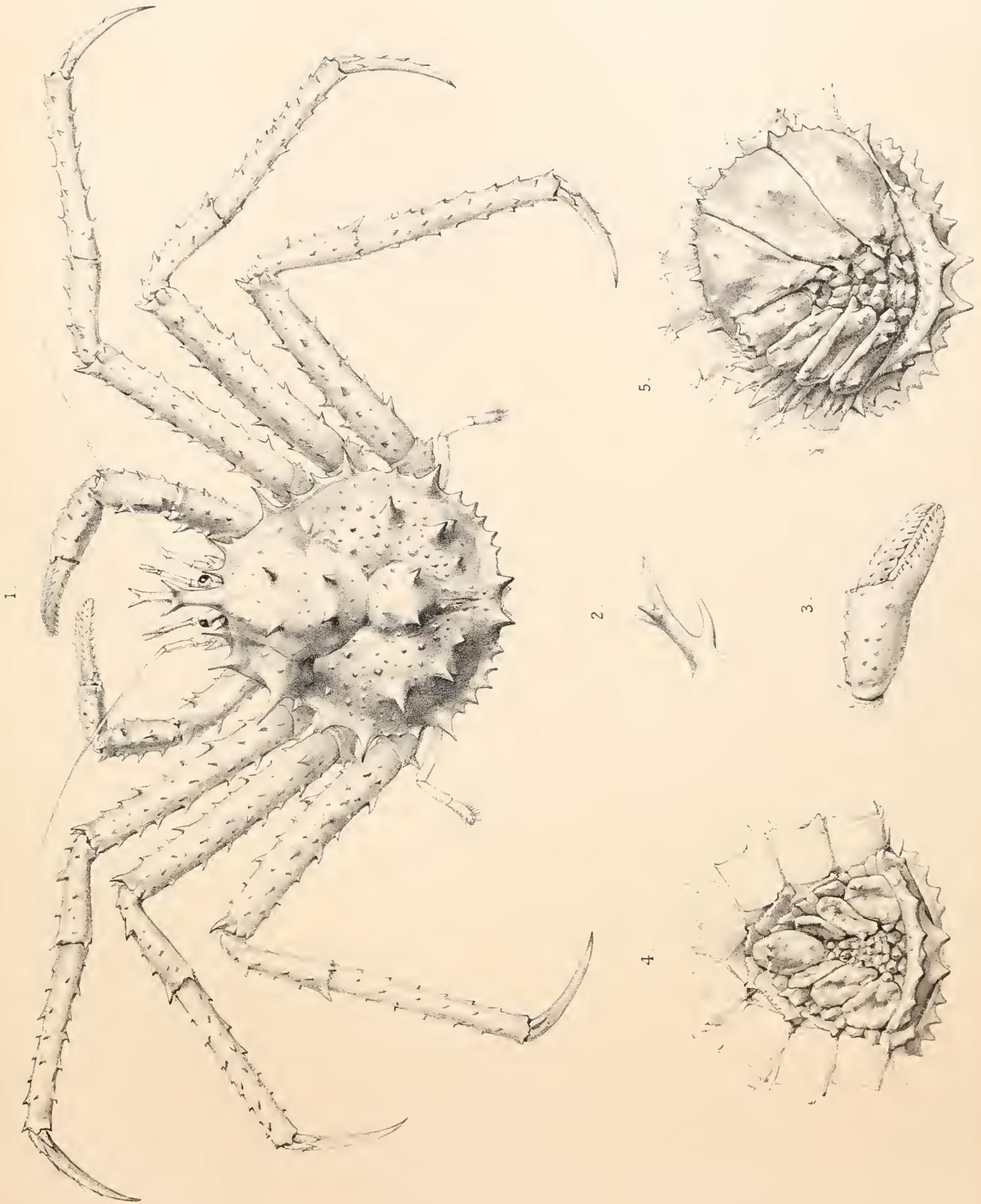
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NOTOPOIDES, ZANCLIFER, MUNIDA.

PLATE IV.

PLATE IV.

	Diam.	Page
Figs. 1-5. <i>Lithodes murrayi</i> , n. sp.,	× about $\frac{2}{3}$	43
Fig. 2. Side view of rostrum, . . . . .	. × 1	
Fig. 3. Right chela of male, . . . . .	. × 1	
Fig. 4. Abdomen of male,	× about $\frac{2}{3}$	
Fig. 5. Abdomen of female,	× about $\frac{2}{3}$	



F. Huth, Jr. del.

F. Huth Litho. Edin.

LITHODES.

PLATE V.

PLATE V.

					Diam.	Page	
Fig. 1.	<i>Paralomis aculeatus</i> , n. sp.,	.	.	.	×	1	45
	<i>a.</i> Side view of carapace,	.	.	.	×	1	
	<i>b.</i> Side view of rostrum of male,	.	.	.	×	2	
	<i>c.</i> Abdomen of male,	.	.	.	×	1	
Fig. 2.	<i>Paralomis formosus</i> , n. sp.,	.	.	.	×	1	46
	<i>a.</i> Side view of carapace,	.	.	.	×	1	
	<i>b.</i> Antennal peduncle, from above,	.	.	.	×	4	

PLATE VI.

PLATE VI.

					Diam.	Page
Fig. 1.	<i>Uroptychus tridentatus</i> , n. sp.,	.	.	.	.	181
	Dorsal surface of trunk,	.	.	.	× 3	
	a. Left external maxillipede,	.	.	.	× 5	
Fig. 2.	<i>Uroptychus politus</i> , n. sp.,	.	.	.	× 1	178
	a. Frontal region,	.	.	.	× 3	
	b. Left external maxillipede,	.	.	.	× 5	
Fig. 3.	<i>Diogenes brevirostris</i> , Stimpson,	.	.	.	× 1	53
	a. Frontal region,	.	.	.	× 5	
Fig. 4.	<i>Diogenes guttatus</i> , n. sp.,	.	.	.	× 1	54
	a. Frontal region,	.	.	.	× 6	
	b. Left chela of male,	.	.	.	× 2	
Fig. 5.	<i>Pagurus dearmatus</i> , n. sp.,	.	.	.	× 1	58
	a. Frontal region,	.	.	.	× 3	
	b. Left chela of female,	.	.	.	× 3	
Fig. 6.	<i>Pagurus similimanus</i> , n. sp.,	.	.	.	× 1	59
	a. Frontal region,	.	.	.	× 2	
Fig. 7.	<i>Eupagurus lacertosus</i> , n. sp.,	.	.	.	× 1	63
	a. Frontal region,	.	.	.	× 3	
Fig. 8.	<i>Eupagurus constans</i> , Stimpson,	.	.	.	× 1	67
	a. Frontal region,	.	.	.	× 3	

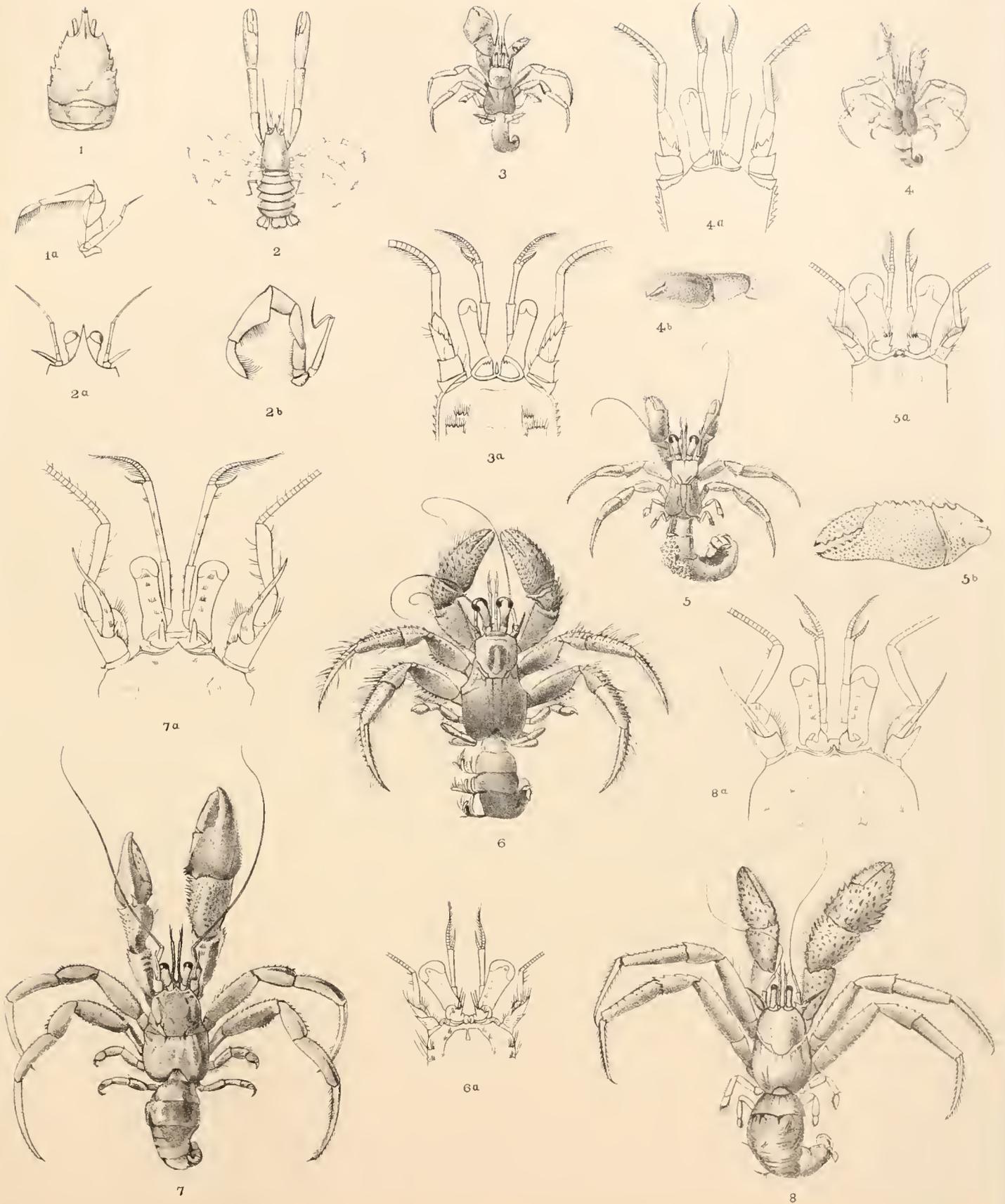
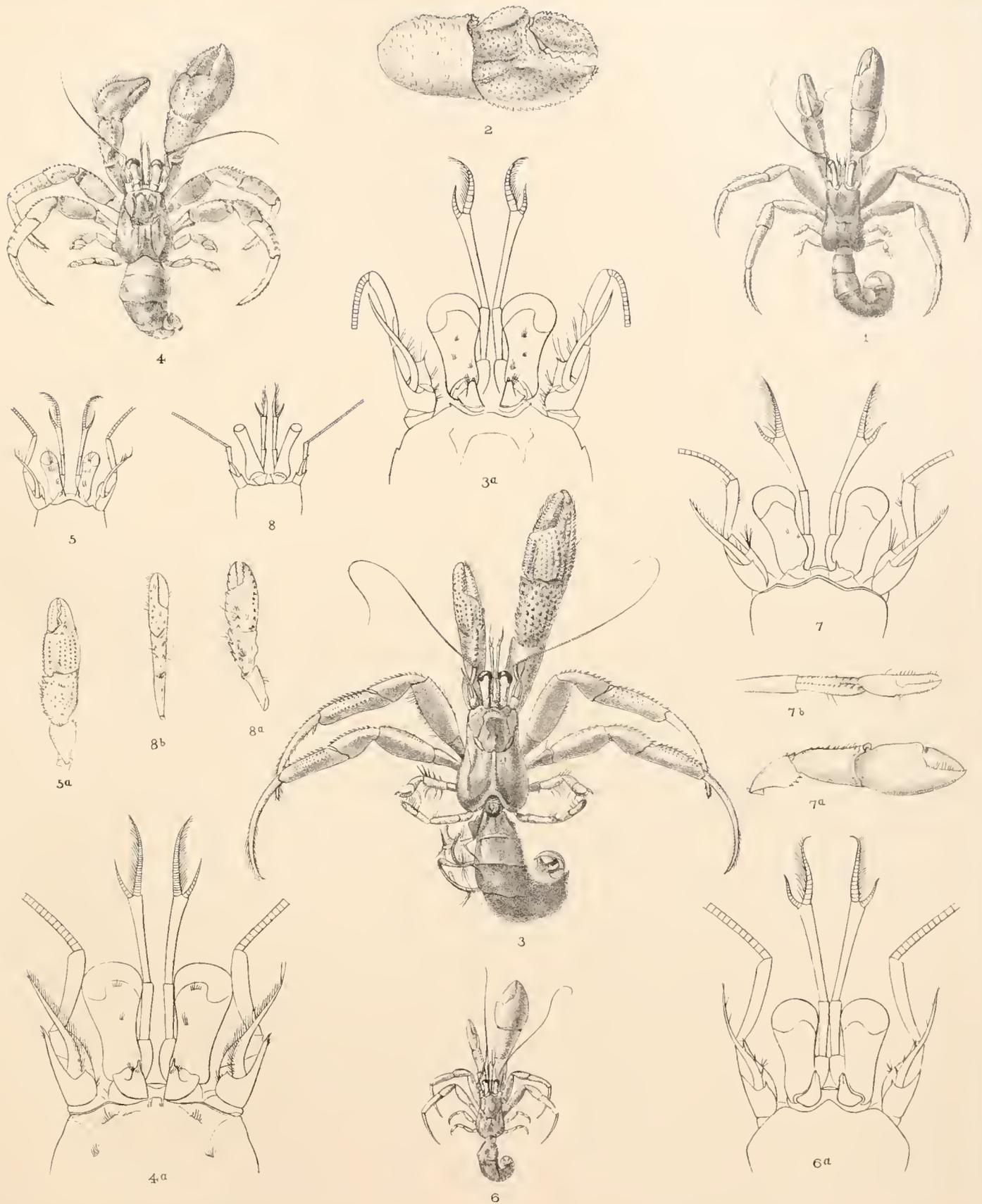


PLATE VII.

(ZOOLOGICAL CHALLENGER.—PART LXIX.—1888.)—Zzz.

PLATE VII.

	Diam.	Page
Fig. 1. <i>Eupagurus lacertosus</i> , n. sp., var. <i>nana</i> , nov.,	× 2	64
Fig. 2. <i>Eupagurus comptus</i> (White), var. <i>jugosa</i> , nov.,		67
Right chela of male,	× 3	
Fig. 3. <i>Eupagurus spinulentus</i> , n. sp.,	× 1	68
<i>a.</i> Frontal region,	× 3	
Fig. 4. <i>Eupagurus rubricatus</i> , n. sp.,	× 1	69
<i>a.</i> Frontal region,	× 4	
Fig. 5. <i>Eupagurus tristanensis</i> , n. sp.,		66
Frontal region,	× 4	
<i>a.</i> Right chelipede of male,	× 3	
Fig. 6. <i>Eupagurus oclusus</i> , n. sp.,	× 1	70
<i>a.</i> Frontal region,	× 5	
Fig. 7. <i>Anapagurus pusillus</i> , n. sp.,		73
Frontal region,	× 9	
<i>a.</i> Right chelipede of male,	× 5	
<i>b.</i> Left chelipede of male,	× 5	
Fig. 8. <i>Anapagurus australiensis</i> , n. sp.,		74
Frontal region,	× 6	
<i>a.</i> Right chelipede of male,	× 5	
<i>b.</i> Left chelipede of male,	× 6	



EUPAGURUS, ANAPAGURUS.

PLATE VIII.

PLATE VIII.

	Diam.	Page
Fig. 1. <i>Catapagurus australis</i> , n. sp., . . . . .	.	76
Frontal region,	× 7	
<i>a.</i> Right chelipede of male,	× 4	
<i>b.</i> Left chelipede of male,	× 4	
Fig. 2. <i>Paguristes subpilosus</i> , n. sp.,	× 1	77
<i>a.</i> Frontal region,	× 6	
Fig. 3. <i>Paguristes visor</i> , n. sp.,	× 1	78
<i>a.</i> Frontal region,	× 3	
Fig. 4. <i>Paguristes hians</i> , n. sp.,	× 2	79
<i>a.</i> Frontal region,	× 6	
<i>b.</i> Right chela of male,	× 3	
Fig. 5. <i>Tylaspis anomala</i> , n. gen. et sp.,	× 2	81
<i>a.</i> Under surface,	× 4	
<i>b.</i> Right chela of male,	× 3	

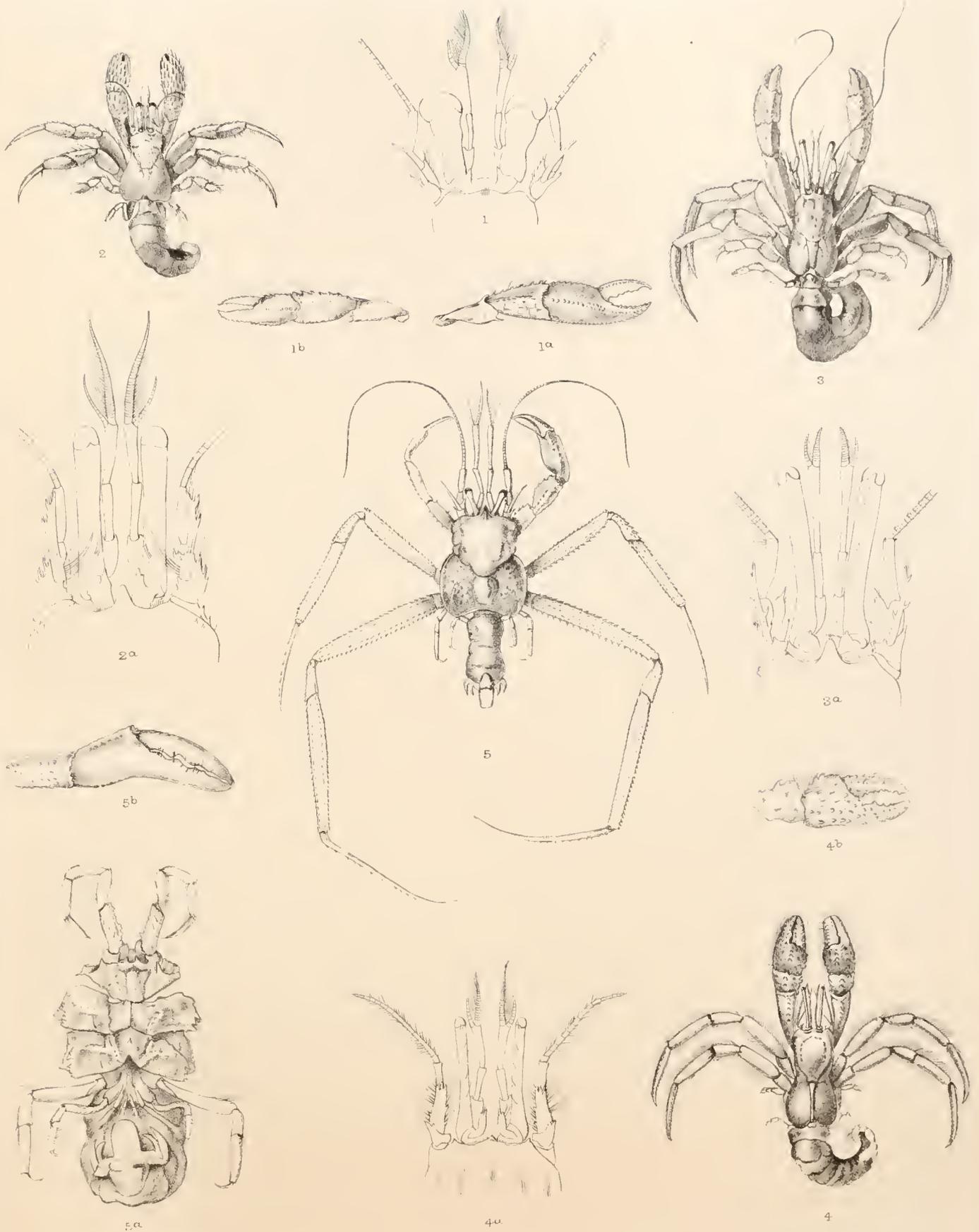
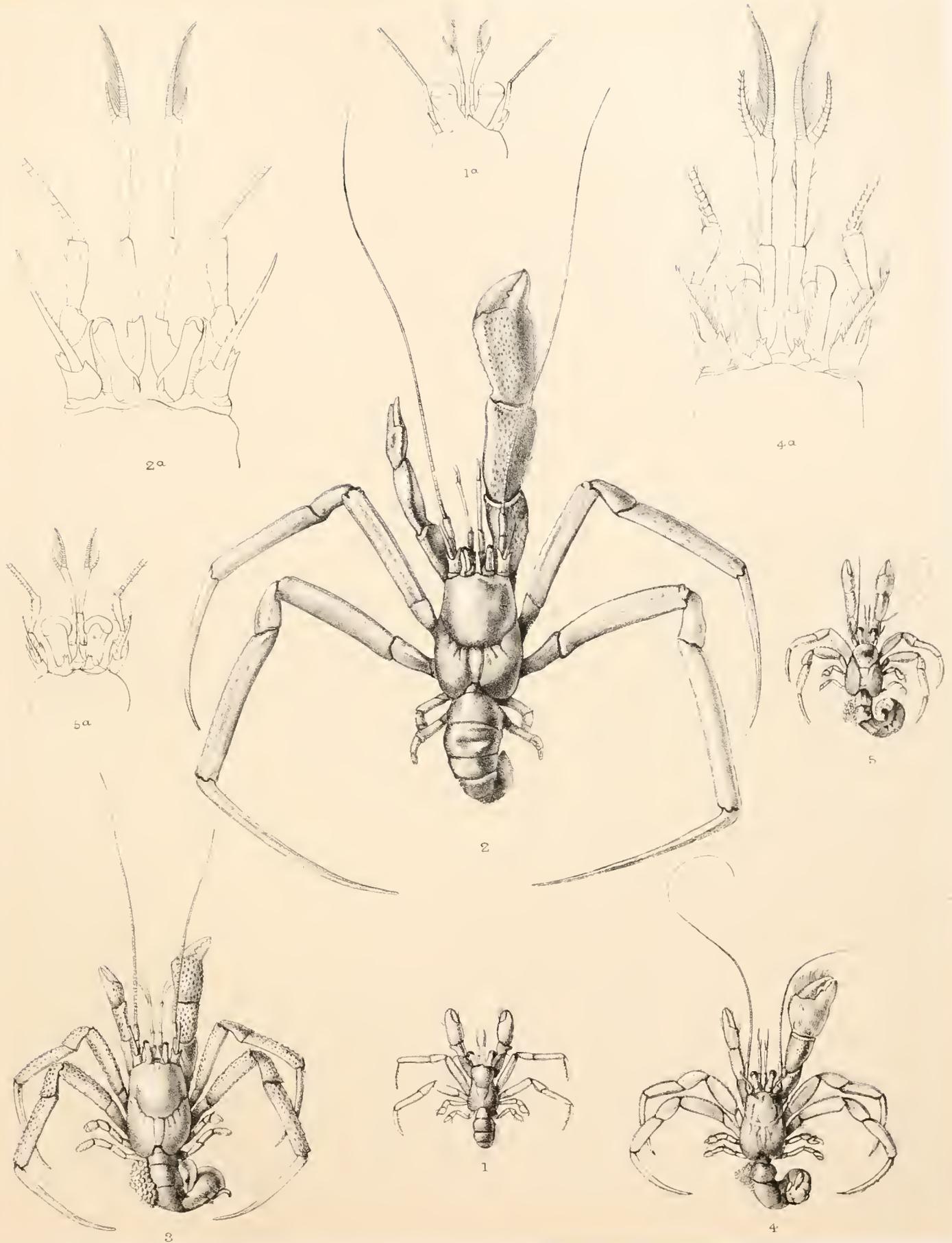


PLATE IX.

PLATE IX.

	Diam.	Page
Fig. 1. <i>Glaucothoë carinata</i> , n. sp.,	× 2	84
<i>a.</i> Frontal region,	× 6	
Fig. 2. <i>Parapagurus abyssorum</i> (A. Milne-Edwards),	× 1	87
<i>a.</i> Frontal region,	× 2	
Fig. 3. <i>Parapagurus abyssorum</i> (A. Milne-Edwards), var. <i>scabra</i> , nov.,	× 1	89
Fig. 4. <i>Parapagurus affinis</i> , n. sp.,	× 1	90
<i>a.</i> Frontal region,	× 4	
Fig. 5. <i>Pagurodes piliferus</i> , n. sp.,	× 1	96
<i>a.</i> Frontal region,	× 3	



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GLAUCOTHOE, PARAPAGURUS, PAGURODES.

PLATE X.

PLATE X.

	Diam.	Page
Fig. 1. <i>Parapagurus dimorphus</i> (Studer),	× 3	86
Fig. 2. <i>Parapagurus latimanus</i> , n. sp.,	× 1	91
<i>a.</i> Frontal region,	× 6	
Fig. 3. <i>Parapagurus gracilis</i> , n. sp.,	× 2	92
<i>a.</i> Frontal region,	× 6	
Fig. 4. <i>Paguroopsis typicus</i> , n. gen. et sp.,	× 1	99
<i>a.</i> Frontal region,	× 5	
<i>b.</i> Side view of carapace,	× 2	
Fig. 5. <i>Pagurodes inarmatus</i> , n. gen. et sp.,	× 1	94
<i>a.</i> Frontal region,	× 5	
Fig. 6. <i>Pagurodes limatulus</i> , n. sp.,	× 2	97
<i>a.</i> Frontal region,	× 6	

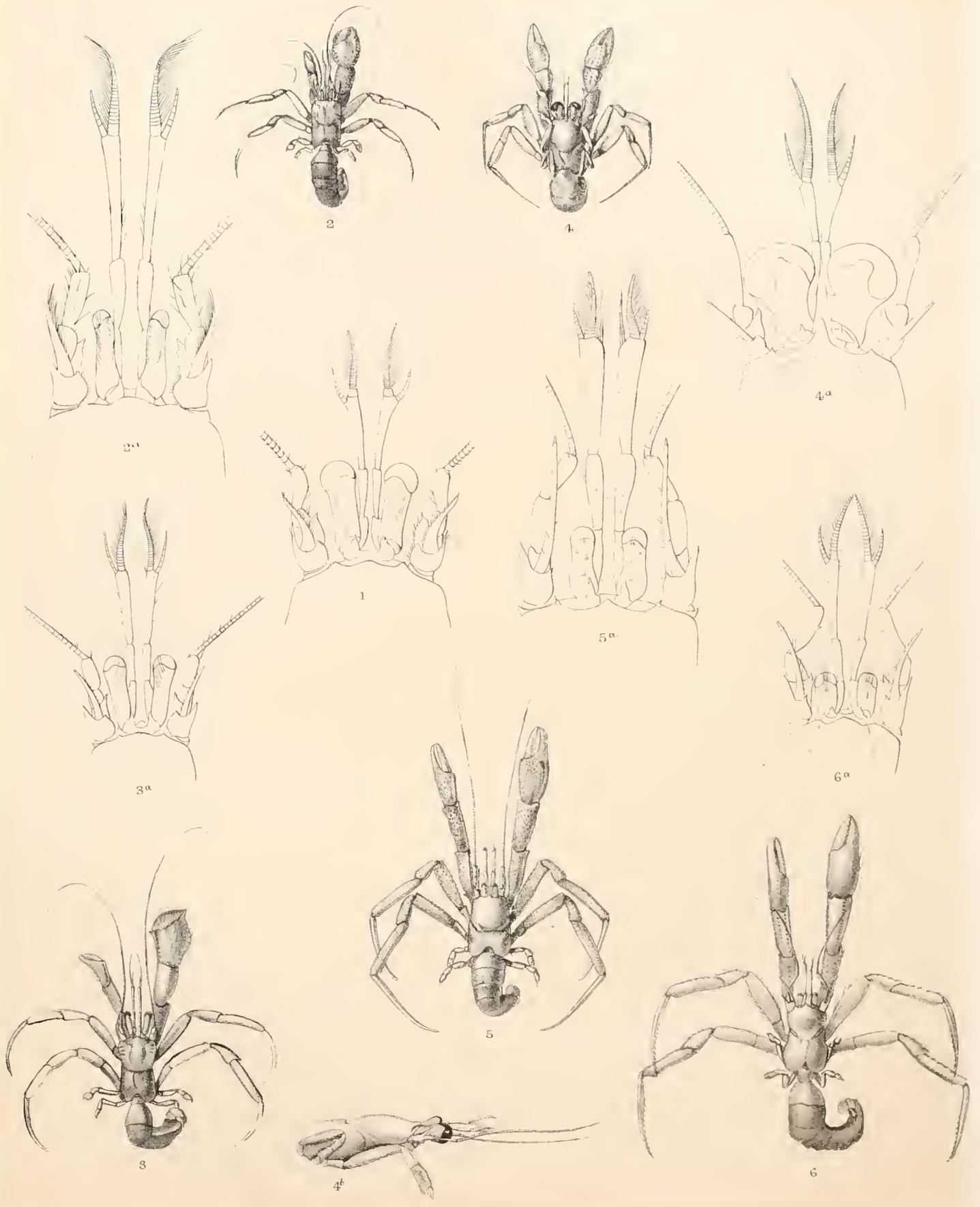
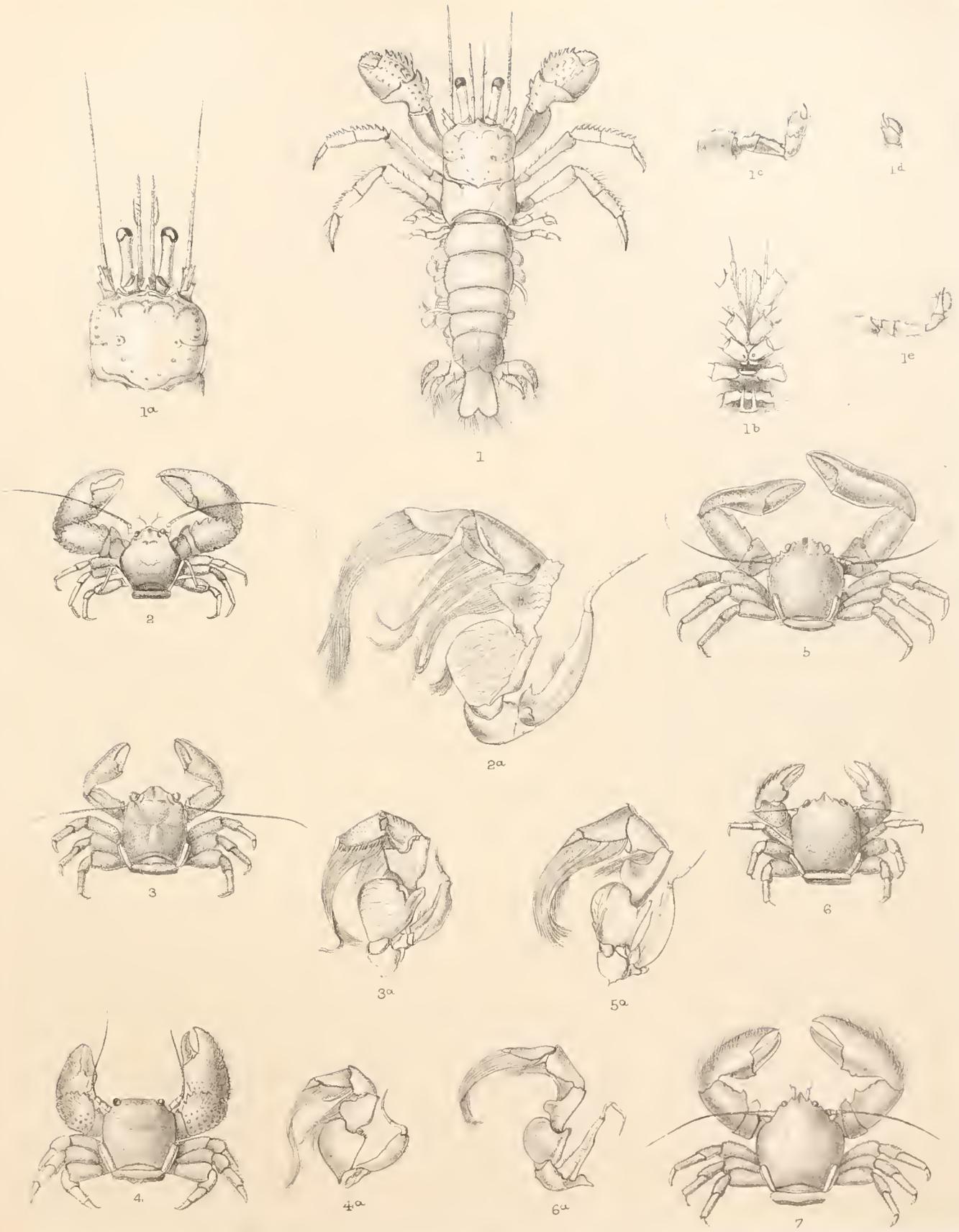


PLATE XI.

PLATE XI.

	Diam.	Page
Fig. 1. <i>Pylocheles spinosus</i> , n. sp.,	× 2	101
<i>a.</i> Frontal region,	× 3	
<i>b.</i> Under surface of thorax,	× 2	
<i>c.</i> Fourth left leg (from below and in front),	× 3	
<i>d.</i> Apex of fourth left leg (from above),	× 3	
<i>e.</i> Fifth left leg (from below and behind),	× 3	
Fig. 2. <i>Petrolisthes serratus</i> , n. sp.,	× 1	107
<i>a.</i> Left external maxillipede,	× 5	
Fig. 3. <i>Petrolisthes unilobatus</i> , n. sp.,	× 2	106
<i>a.</i> Left external maxillipede,	× 5	
Fig. 4. <i>Pachycheles barbatus</i> , A. Milne-Edwards (?),	× 3	114
<i>a.</i> Left external maxillipede,	× 7	
Fig. 5. <i>Porcellana serratifrons</i> , Stimpson,	× 2	110
<i>a.</i> Left external maxillipede,	× 6	
Fig. 6. <i>Porcellana robertsoni</i> , n. sp.,	× 3	111
<i>a.</i> Left external maxillipede,	× 7	
Fig. 7. <i>Porcellana platycheles</i> (Pennant),	× 3	112
(Young specimen from Millport, Firth of Clyde.)		



PYLOCHELES, PETROLISTHES, PACHYCHELES,
PORCELLANA

PLATE XII.



PLATE XII.

	Diam.	Page
Fig. 1. <i>Galathea pusilla</i> , Henderson,	× 5	121
<i>a.</i> Right chelipede of male,	× 3	
<i>b.</i> Left external maxillipede,	× 5½	
Fig. 2. <i>Galathea inconspicua</i> , Henderson,	× 5	122
Fig. 3. <i>Galathea grandirostris</i> , Stimpson (?),	× 5	119
Fig. 4. <i>Galathea subsquamata</i> , Stimpson (?),	× 3	118
Fig. 5. <i>Galathea australiensis</i> , Stimpson (?),	× 3	118
Fig. 6. <i>Galathea dispersa</i> , Spence Bate (?),	× 2	119
<i>a.</i> Left external maxillipede,	× 5	

PLATE XIII.

PLATE XIII.

	Diam.	Page
Fig. 1. <i>Munida squamosa</i> , Henderson,	× 1	131
<i>a.</i> Right chela of male,	× 1	
<i>b.</i> Left external maxillipede,	× 2	
Fig. 2. <i>Munida proxima</i> , Henderson,	× 1	135
<i>a.</i> Right chela of female,	× 2	
<i>b.</i> Left external maxillipede,	× 2	
Fig. 3. <i>Munida subrugosa</i> , White, var. <i>australiensis</i> , nov.,	× 1	125
<i>a.</i> Right chela of male,	× 3	
<i>b.</i> Left external maxillipede,	× 3	
Fig. 4. <i>Munida incerta</i> , n. sp.,	× 1	130
<i>a.</i> Left external maxillipede,	× 2	
Fig. 5. <i>Munida normani</i> , Henderson,	× 1	129
<i>a.</i> Right chela of male,	× 2	
<i>b.</i> Left external maxillipede,	× 2	

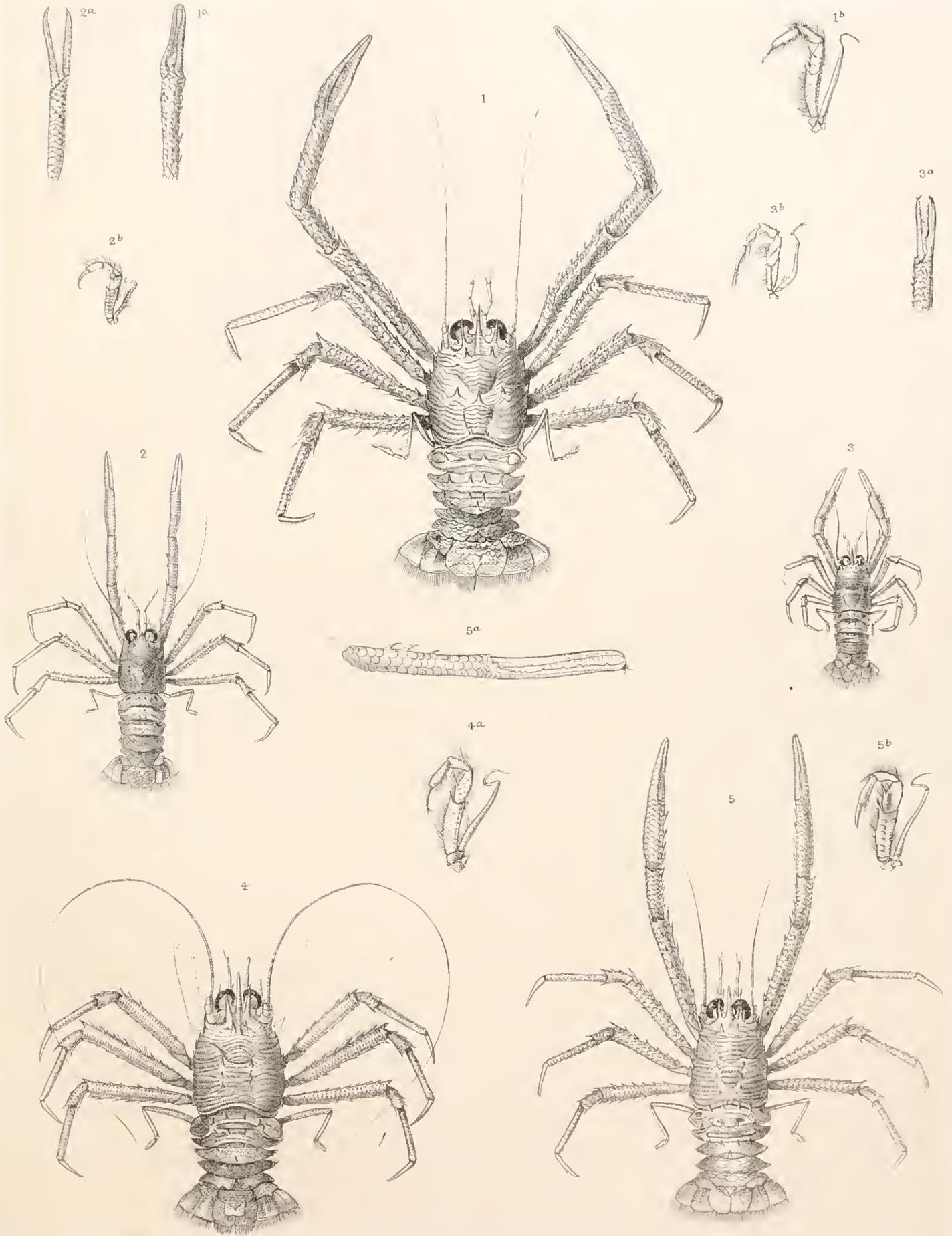


PLATE XIV.

PLATE XIV.

			Diam.	Page
Fig. 1.	<i>Munida stimpsoni</i> , A. Milne-Edwards,	.	× 1	126
	<i>a.</i> Right chela of male,	.	× 2	
	<i>b.</i> Left external maxillipede,	.	× 2	
Fig. 2.	<i>Munida militaris</i> , Henderson,	.	× nearly 2	137
	<i>a.</i> Right chela of female,	.	× 2	
	<i>b.</i> Left external maxillipede,	.	× 2	
Fig. 3.	<i>Munida granulata</i> , Henderson,	.	× 1	133
	<i>a.</i> Right chela of male,	.	× 2	
	<i>b.</i> Left external maxillipede,	.	× 2	
Fig. 4.	<i>Munida gracilis</i> , Henderson,	.	× 1	143
	<i>a.</i> Right chela of female,	.	× 2	
	<i>b.</i> Left external maxillipede,	.	× 2	
Fig. 5.	<i>Munida militaris</i> , Henderson,	.	× 1	137
	<i>a.</i> Right chela of male,	.	× 1	
	<i>b.</i> Left external maxillipede,	.	× 2	
Fig. 6.	<i>Munida inornata</i> , Henderson,	.	× 1	140
	<i>a.</i> Right chela of male,	.	× 2	
	<i>b.</i> Left external maxillipede,	.	× 2	

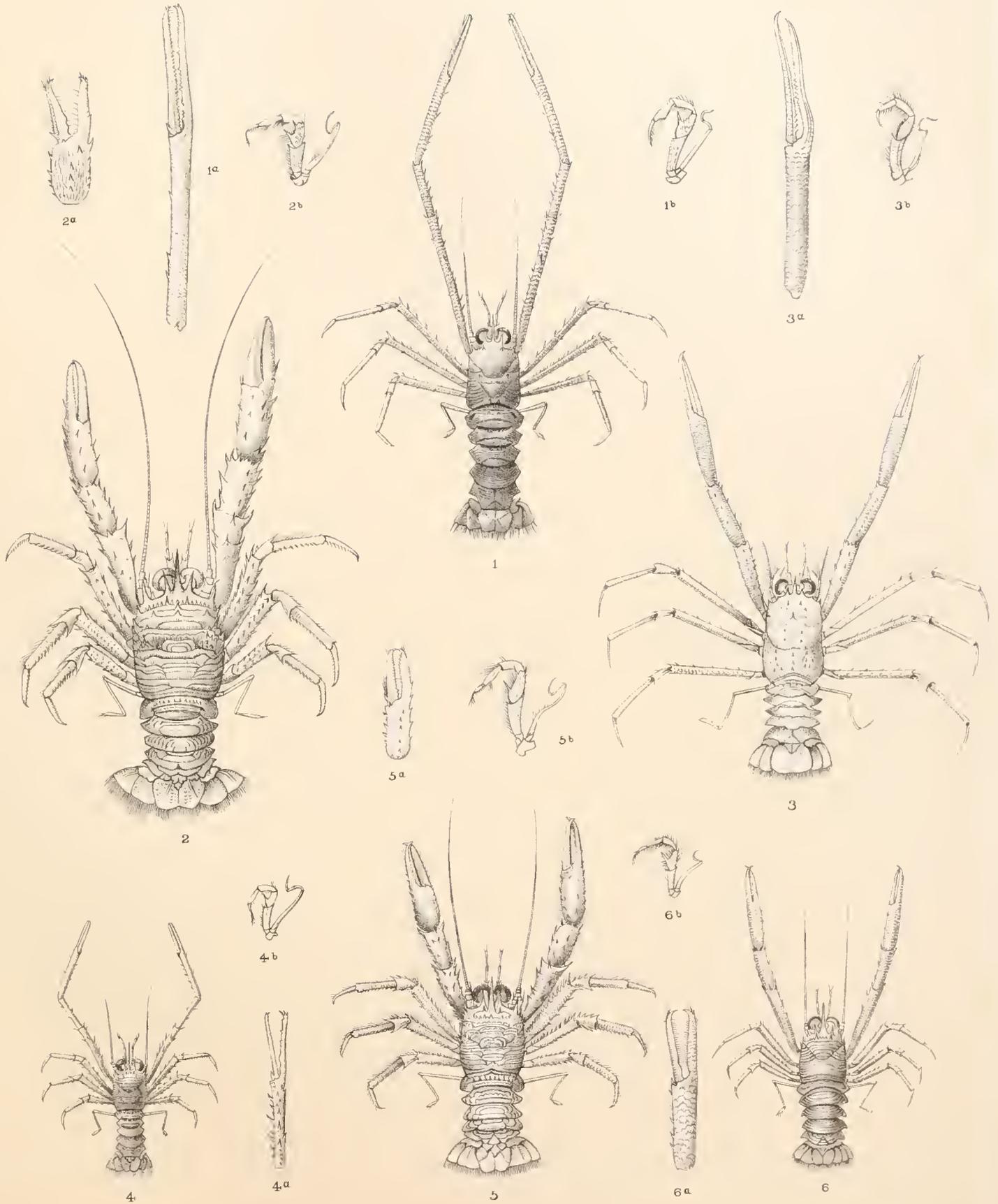
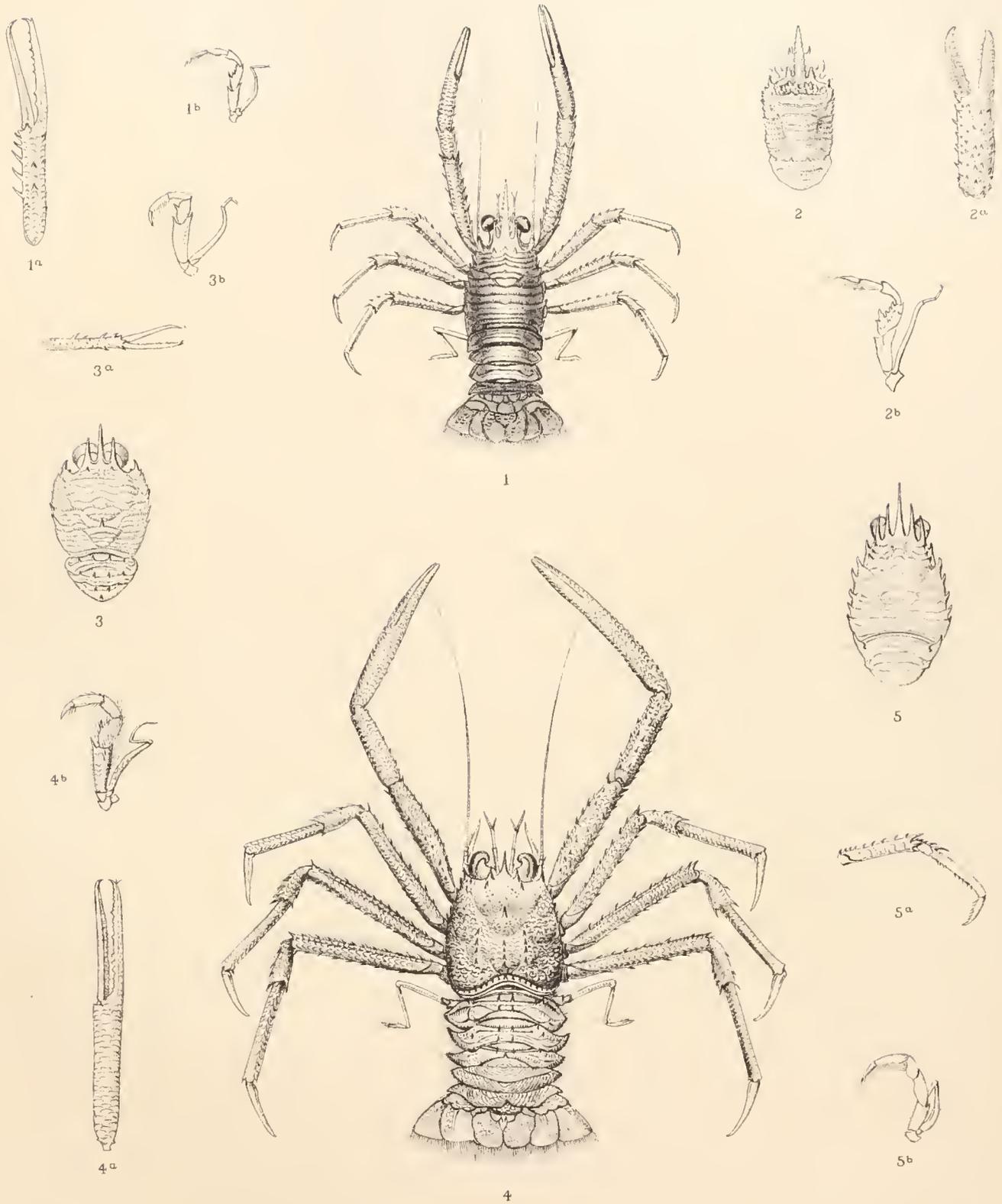


PLATE XV.

PLATE XV.

	Diam.	Page
Fig. 1. <i>Munida spinifrons</i> , Henderson,	× 2	144
<i>a.</i> Right chela of female,	× 3	
<i>b.</i> Left external maxillipede,	× 3	
Fig. 2. <i>Munida tuberculata</i> , Henderson,	× 3	145
<i>a.</i> Right chela of male,	× 5	
<i>b.</i> Left external maxillipede,	× 5	
Fig. 3. <i>Munida spinicordata</i> , Henderson,	× 3	146
<i>a.</i> Right chela of male,	× 3	
<i>b.</i> Left external maxillipede,	× 5	
Fig. 4. <i>Munida scabra</i> , Henderson,	× 1	134
<i>a.</i> Right chela of male,	× 2	
<i>b.</i> Left external maxillipede,	× 2	
Fig. 5. <i>Eumunida smithii</i> , Henderson,	× 3	169
<i>a.</i> Third right ambulatory limb,	× 3	
<i>b.</i> Left external maxillipede,	× 5	



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MUNIDA, EUMUNIDA

PLATE XVI.

PLATE XVI.

		Diam.	Page
Fig. 1. <i>Munidopsis subsquamosa</i> , Henderson, var. <i>aculeata</i> , nov.,	.	× 1	153
<i>a.</i> Left external maxillipede,	.	× $1\frac{1}{2}$	
Fig. 2. <i>Munidopsis trifida</i> , Henderson,	.	× 1	156
<i>a.</i> Left external maxillipede,	.	× 2	
Fig. 3. <i>Munidopsis serratifrons</i> (A. Milne-Edwards),	.	× 1	149
<i>a.</i> Left external maxillipede,	.	× 3	
Fig. 4. <i>Munidopsis erinacea</i> (A. Milne-Edwards),	.	× 1	149
<i>a.</i> Left external maxillipede,	.	× 3	

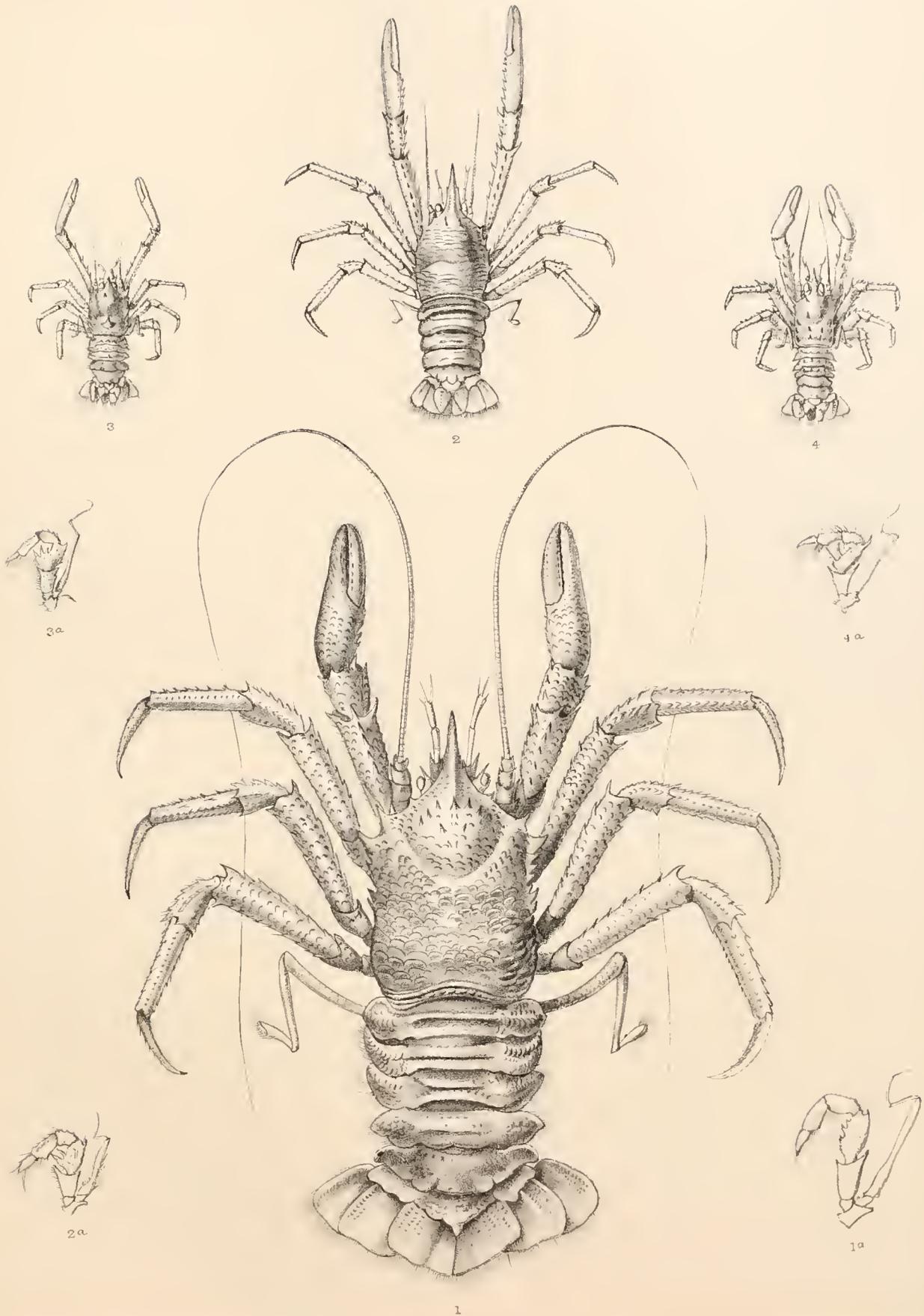


PLATE XVII.

PLATE XVII.

	Diam.	Page
Fig. 1. <i>Munidopsis brevimana</i> , Henderson,	× 1	154
<i>a.</i> Left external maxillipede,	× 3	
Fig. 2. <i>Munidopsis brevimana</i> , Henderson (<i>juv.</i>),	× 2	155
<i>a.</i> Left external maxillipede,	× 5	
Fig. 3. <i>Munidopsis milleri</i> , Henderson,	× 1	155
<i>a.</i> Left external maxillipede,	× 3	
Fig. 4. <i>Munidopsis subsquamosa</i> , Henderson,	slightly enlarged	152
<i>a.</i> Left external maxillipede,	× 2	
Fig. 5. <i>Munidopsis pilosa</i> , Henderson,	× 1	157
<i>a.</i> Right chelipede from above,	× 2	
<i>b.</i> Left external maxillipede,	× 4	

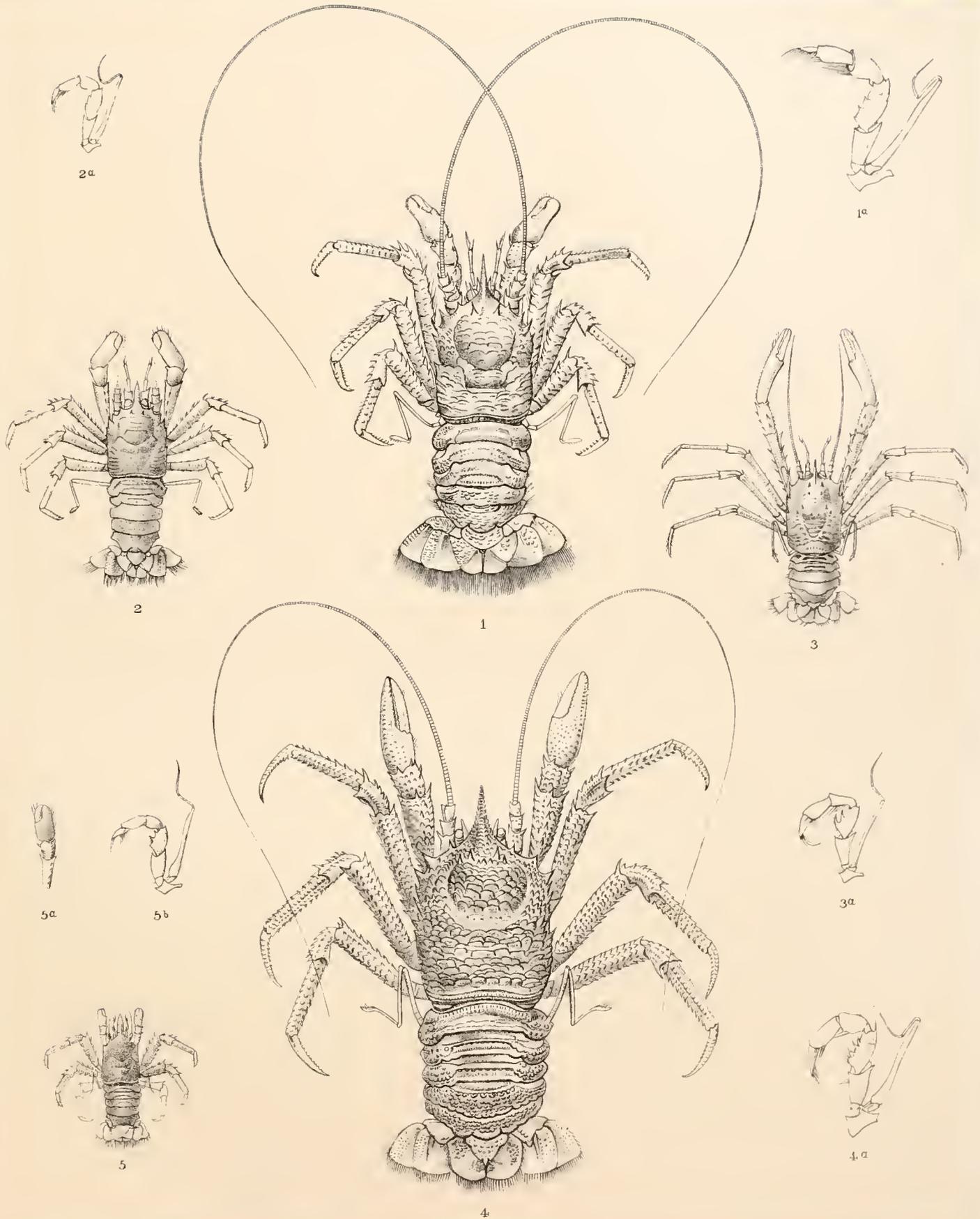
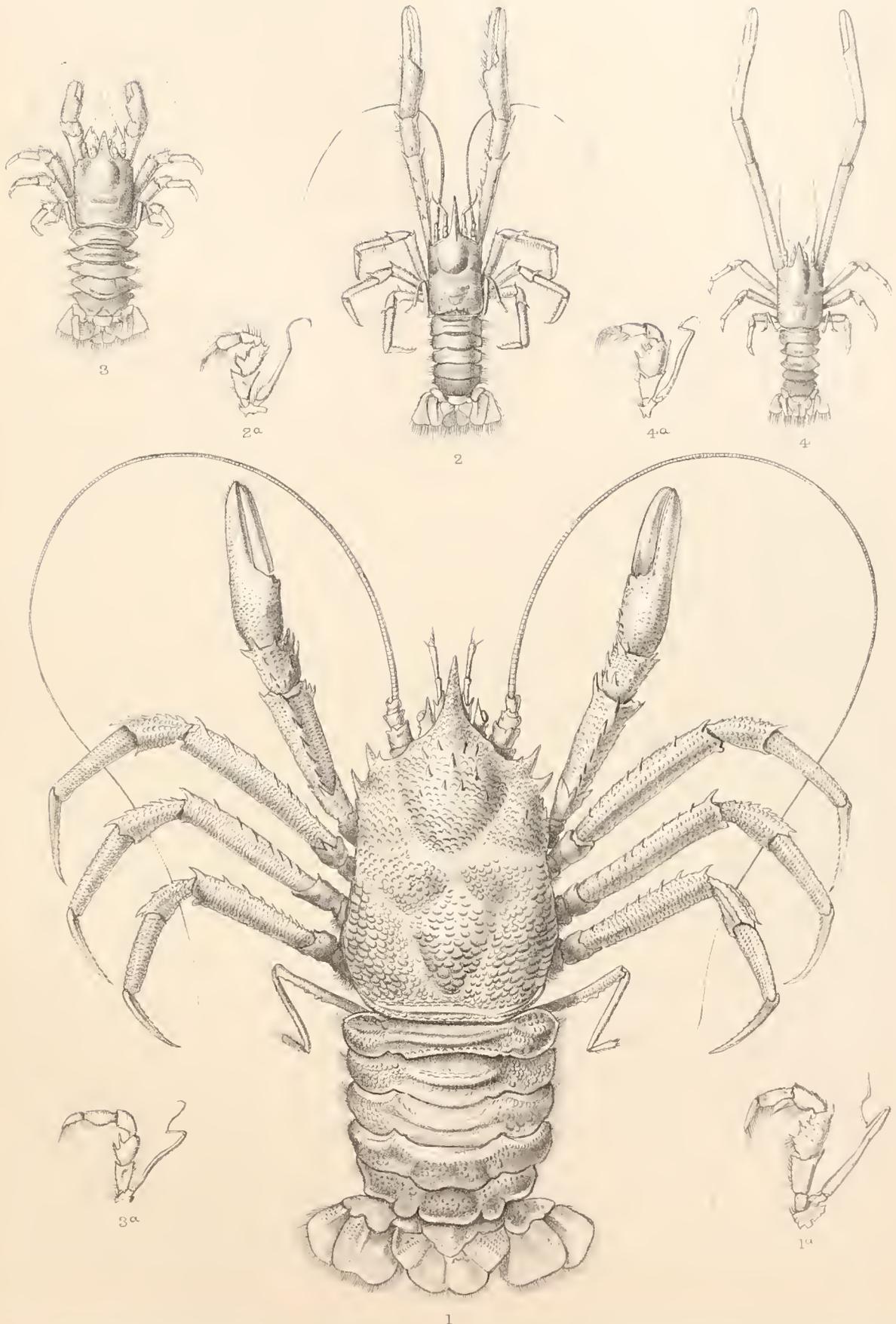


PLATE XVIII.

PLATE XVIII.

		Diam.	Page
Fig. 1. <i>Munidopsis antonii</i> (A. Milne-Edwards),	.	slightly enlarged	151
<i>a.</i> Left external maxillipede,	. . . . .	× 1½	
Fig. 2. <i>Munidopsis sigsbei</i> (A. Milne-Edwards),	.	× 1	150
<i>a.</i> Left external maxillipede,	. . . . .	× 2	
Fig. 3. <i>Elasmonotus laevigatus</i> , Henderson,	.	× 1	164
<i>a.</i> Left external maxillipede,	. . . . .	× 3	
Fig. 4. <i>Elasmonotus debilis</i> , Henderson,	.	× 2	165
<i>a.</i> Left external maxillipede,	× 5	



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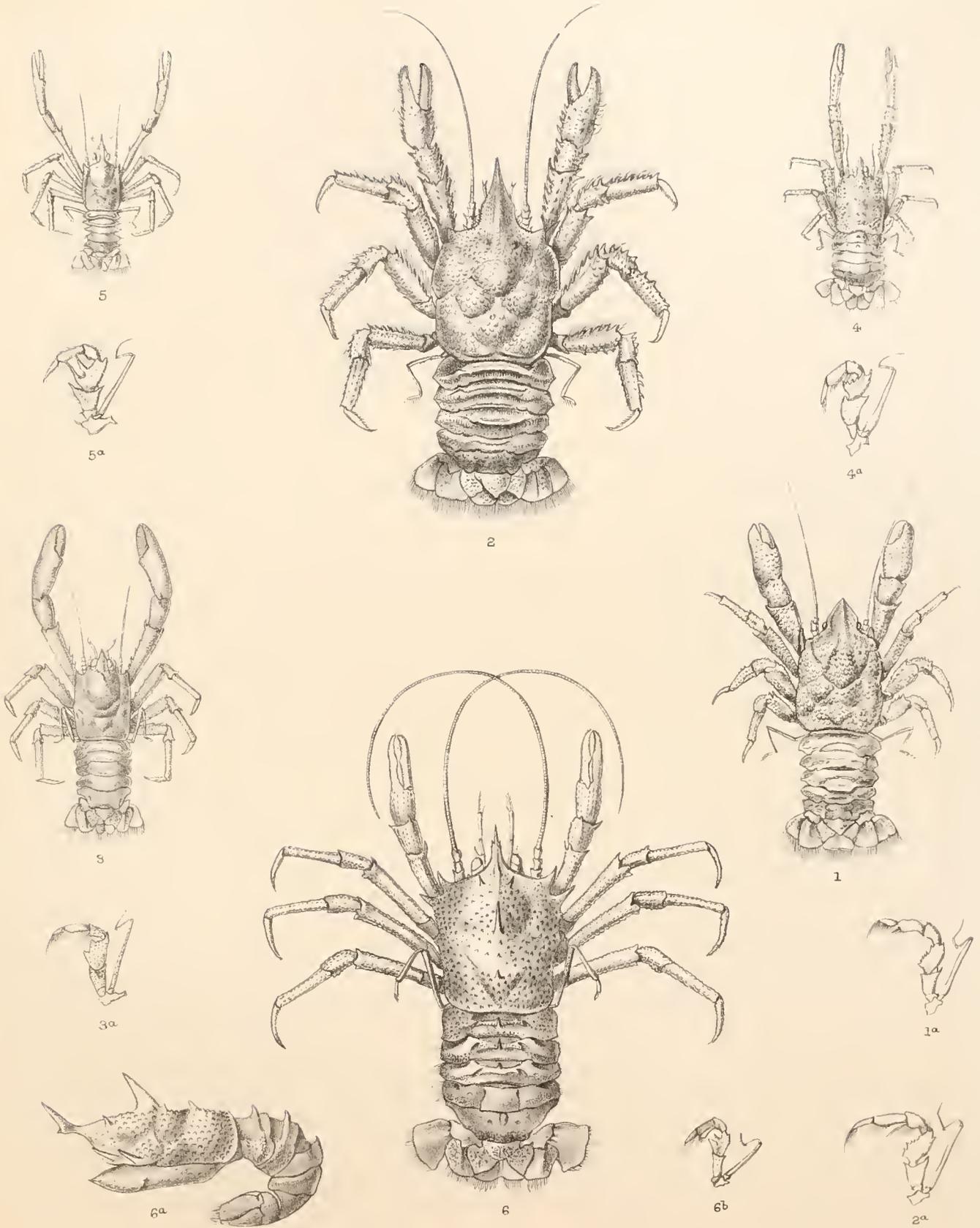
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MUNIDOPSIS. ELASMONOTUS.

PLATE XIX.

PLATE XIX.

	Diam.	Page
Fig. 1. <i>Elasmonotus latifrons</i> , Henderson,	slightly enlarged	160
<i>a.</i> Left external maxillipede,	× 3	
Fig. 2. <i>Elasmonotus marginatus</i> , Henderson,	slightly enlarged	161
<i>a.</i> Left external maxillipede,	× 2	
Fig. 3. <i>Elasmonotus miersii</i> , Henderson,	× 2	162
<i>a.</i> Left external maxillipede,	× 5	
Fig. 4. <i>Elasmonotus asper</i> , Henderson,	× 1	159
<i>a.</i> Left external maxillipede,	× 3	
Fig. 5. <i>Elasmonotus armatus</i> , A. Milne-Edwards,	× 1	159
<i>a.</i> Left external maxillipede,	× 3	
Fig. 6. <i>Galacantha bellis</i> , Henderson,	× 1	167
<i>a.</i> Side view of trunk,	× 1	
<i>b.</i> Left external maxillipede,	× 1	



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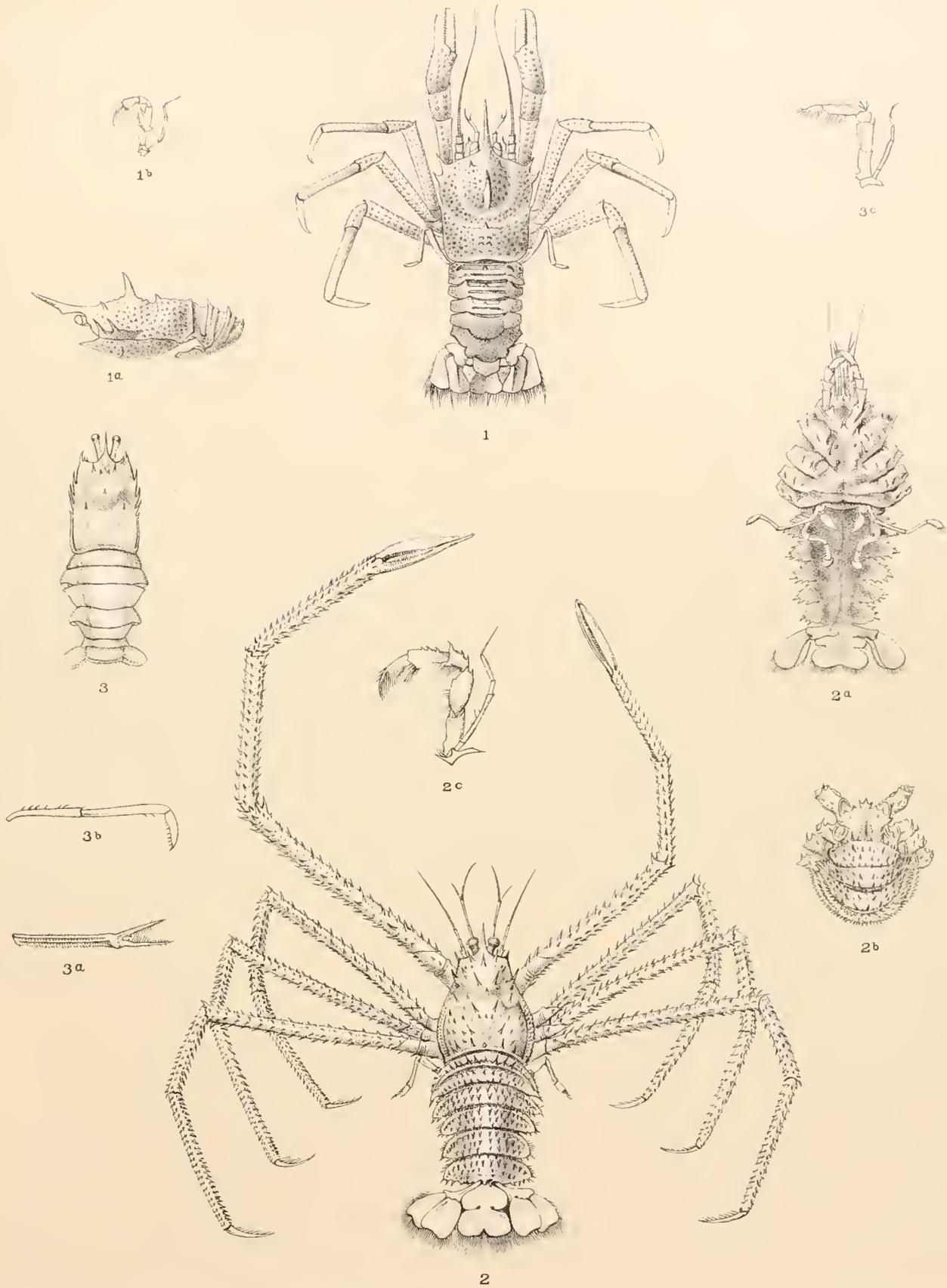
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ELASMONOTUS, GALACANTHA.

PLATE XX.

PLATE XX.

			Diam.	Page
Fig. 1. <i>Galacantha talismanii</i> , A. Milne-Edwards (?),	.	.	× 2	167
<i>a.</i> Lateral view of trunk,	.	.	× 2	
<i>b.</i> Left external maxillipede,	.	.	× 2	
Fig. 2. <i>Ptychogaster milne-edwardsi</i> , Henderson,	.	.	× 1	171
<i>a.</i> Under surface of trunk,	.	.	× 1	
<i>b.</i> Under surface, showing the abdomen folded naturally,	.	.	× 1	
<i>c.</i> Left external maxillipede,	.	.	× 2	
Fig. 3. <i>Ptychogaster lævis</i> , Henderson,	.	.	.	172
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<i>c.</i> Left external maxillipede,	.	.	× 4	

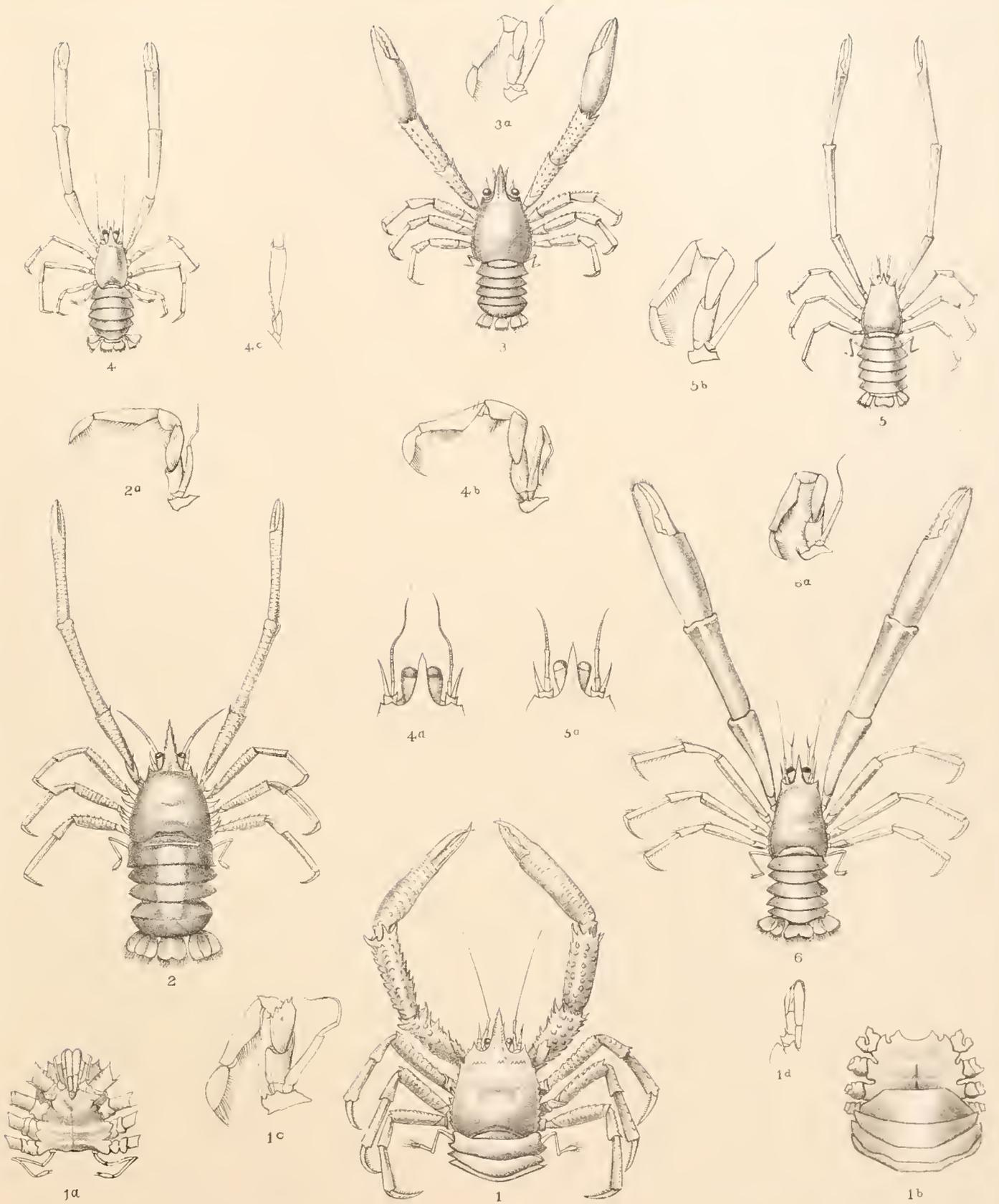


GALACANTHA, PTYCHOGASTER.

PLATE XXI.

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	Diam.	Page
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UROPTYCHUS.