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CRUSTACEA.

PART I.

By THOMAS WHITELEGGE.

*Zoologist, Australian Museum.*

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# CRUSTACEA.

## PART I.

BY THOMAS WHITELEGGE,  
Zoologist, Australian Museum.  
(Plates xxxii.-xxxv.)

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The collection of Crustacea obtained during the cruise of the "Thetis" proves to be exceptionally rich in forms either new to science or to the fauna of New South Wales.

Of the forty-five species herein dealt with, twenty are additions to the fauna; nine of which are described as new.

The above remarks apply to the higher Crustacea only; the lower, when thoroughly worked out, will I believe yield a far larger proportion of novelties. Although the "Thetis" collection shows the coastal waters to be so rich, it probably includes but a small portion of our Crustacean fauna. It must be remembered that the "Thetis" Trawling Expedition was fitted out to test the deeper waters off the coast for fish alone; all other organisms were considered of secondary importance. Still Mr. Waite on several occasions contrived means to secure representatives of the smaller forms of life, and succeeded in preserving a very large quantity of material which will yield a rich harvest when fully investigated.

The extreme richness of the fauna of Port Jackson is now generally acknowledged, but many still entertain the idea that the waters off the coast are deficient in fish food, and that there is a scarcity of minute living organisms such as abound in other parts of the ocean. Considering our limited knowledge of the fauna of the deeper waters of the coast, there seems to be some justification for this idea; but if the fauna as at present known is taken into account it is evident that it is scarcely correct, and when the coastal area has been thoroughly explored, there cannot be the least doubt that its waters will be found as richly endowed with life as in any part of the world. In support of this view mention may be made of the vast streams of Pelagic

life which visit these shores annually. This "cycle of matter in the sea" makes its appearance about the middle of January, and is more or less present on the coast until the latter end of June. It consists of millions of living organisms, moving along the crowded sea animal streets, and contains representatives—either as young or adults—of almost all groups of marine life. The number of different species wandering about in one of these sea thoroughfares must be very great; still our knowledge of them is scanty indeed, and will remain so until proper means are taken for their investigation. The results of the "Thetis" Expedition are such that we may reasonably expect to meet with an extremely rich bottom fauna off the coast when it has been systematically explored, and in this connection it is hoped that the Government will furnish the means for a more complete investigation of our marine fauna, particularly in regard to the organisms which constitute the food of fishes.

As an instance of the remarkable wealth of life, at moderate depths off the coast, mention may be made of a stone that was acquired by the Museum in May, 1898. See Plate xxxii.

In order to fully realise the number of organisms living on this stone, it will be necessary to give some account of how it was obtained and the treatment it subsequently received. A man while fishing in 30 fathoms off Long Reef, near Manly, suddenly found his line fast, and after much tugging, finally succeeded in hauling it up. When the leaded end neared the surface he saw that his line had become entangled round the stem of a large "sea-fan," the base of which was attached to the corner of a stone nearly thirty pounds in weight. The stone was placed in the bottom of the boat, and when the fisherman returned home he took it with him for the sake of the beautiful "sea-fan." During this rough handling many small active Gasteropods, Annelids, Amphipods, Isopods and Echinoderms doubtless escaped. Next day this object was brought to the Museum, and was handed over to me for preservation. It was washed in fresh water to remove the salt, and the organisms disturbed were carefully collected. The stone is irregularly oval in shape, measuring 35 cm. in length, 26 cm. in breadth, and 10 cm. in height or thickness. The Gorgonia or "sea-fan" which is attached at one corner is a species of *Juncella*, measuring 90 cm. in height, 60 cm. in breadth; the greatest diameter of the stem does not exceed 8 mm., while its base forms a circle of about 30 mm. across.

The whole of the upper surface of the stone is completely covered with animal growths, so that it is impossible to see any portion of the original surface; one patch about the size of a half-crown appeared to be like the naked rock, but is found to be a dried Compound Ascidian.

The smaller objects in the following list have been determined by means of a hand-lens; the specimens are so numerous and so closely packed that it is difficult to bring them into focus, owing to a miniature forest of projecting stems, branches and worm tubes. Were it possible to apply the microscope direct the number of species might be considerably increased; these remarks apply more especially to the Polyzoa, which cannot be determined in their present position, and their removal from the stone would entail their destruction as well as the objects near them.

The following is a list of the species attached to the stone, and also of the free or active ones, as ascertained by an examination of the residue of the fresh-water washing:—

## FORAMINIFERA.

## ATTACHED OR FIXED.

*Polytrema miniaceum*, Linn.

*Haliphysema*, sp.

## ACTIVE OR FREE.

## PORIFERA.

*Sycon gelatinosum*, Blainv.

„ sp.

*Ute*, sp.

*Hircinia*, sp.

## ALCYONARIA.

*Juncella*, sp.

*Acanthoisis flabellum*, Wright and Studer.

*Plumarella penna*, Lamarck.

*Primnoella australasiae*, Gray.

„ *grandisquama*, Wright and Studer.

*Telesto smithii*, Gray.

*Cornularia? australis*, Busk.

## MADREPORARIA.

*Balanophyllia bairdiana*, Edwards and Haime.

*Flabellum*, sp.

## ECHINODERMATA.

*Antedon macronema*, Muller? *Holothuria*, sp.

## CRUSTACEA.

## ATTACHED OR FIXED.

*Balanus trigonus*, Darwin.

## ACTIVE OR FREE.

*Pilumnus*, sp.*Thalamita prymna*, M. Edwards.

The Amphipoda are represented by one hundred and fifty specimens, belonging to about ten species and five or six genera.

The Isopoda number two hundred and twenty examples, representing twelve or more species, belonging to nine genera, among which are the following:—*Sphaeroma*, *Cirolana*, *Apsedes*, *Gnathia*, *Arcturus*, *Serolis*.

## VERMES.

Six species of Tubicolous worms, belonging to about four genera.

## POLYZOA.

*Retepora*, sp.*Tubucellaria hirsuta*, Lamouroux.*Craspedozoum roboratum*, Hincks.*Catenicella*, sp.

" sp.

*Caberea*, sp.*Cellepora*, sp.

" sp.

*Amphiblestrum cervicorne*, Busk.*Schizoporella*, sp.*Idmonea*, sp.*Tubulipora*, sp.*Lichenopora*, sp.

## MOLLUSCA.

*Spondylus tenellus*, Reeve.*Chiton*, sp.*Vermetes*, sp.

## TUNICATA.

Compound Ascidian.

The above enumeration includes eight distinct groups or classes, over fifty genera and sixty-five species, with a total of three hundred and seventy-two free individuals, and it may be estimated that fully a third of the once denizens of this square foot of the floor of the Pacific was lost after its entanglement in the fisherman's line. What the original population of this stone may have been is impossible to say; it would probably be less difficult to estimate the quantity of sand grains in the stone than to ascertain the number of individual organisms still remaining on its surface.

The collection of Crustacea dealt with in subsequent pages comprises about seven hundred and twenty specimens, representing thirty-eight genera and forty-nine species. The following are described as new :—

- Pugettia mosaica.*
- Chlorinoides waitei.*
- Paramithrax tuberculatus.*
- Pilumnus australis.*
- Paguristes tuberculatus.*
- Sympagurus diogenes.*
- Glaucothoë hexagonata.*
- Porcellano-pagurus tridentatus.*
- Galathea*, sp.
- Arctus crenatus.*

It has been found necessary to re-describe some of the known species, either wholly or in part. These are :—

- Pilumnus tomentosus*, Latreille.
- „ *rufo-punctatus*, Stimpson.
- Gonioneptunus subornatus*, Ortmann.
- Pilumnoplax abyssicola*, Miers.
- Mursia armata*, DeHaan.
- Homola orientalis*, Henderson.
- Clibanarius strigimanus*, White.
- Glaucothoë carinata*, Henderson.
- Galathea pusilla*, Henderson.
- „ *magnifica*, Haswell.
- „ *australiensis*, Stimpson.
- „ *corallicola*, Haswell.
- „ *aculeata*, Haswell.
- Munida haswelli*, Henderson.
- Pseudosquilla stylifera*, Milne Edwards.

The following species have not previously been recorded for New South Wales, and those preceded by an asterisk are new to the fauna of Australia:—

- Achaeus tenuicollis*, Miers. (*Hab.* : Bass Straits and Port Phillip.)
- \**Naxia robillardi*, Miers. (*Hab.* : Mauritius.)
- Pilumnus tomentosus*, Latreille. (*Hab.* : Bass Straits and Port Phillip.)
- \**Gonioneptunus subornatus*, Ortmann. (*Hab.* : Japan.)
- \**Goniosoma miles*, DeHaan. (*Hab.* : Japan.)
- \**Pilumnoplax abyssicola*, Miers. (*Hab.* : Fiji.)
- \**Mursia armata*, DeHaan. (*Hab.* : Fiji and Japan.)
- \**Homola orientalis*, Henderson. (*Hab.* : Little Ki Island; Philippines.)
- \**Pontocaris propensulata*, Bate. (*Hab.* : Off Ki Island.)
- \**Pseudosquilla stylifera*, Milne Edwards. (*Hab.* : Chile and San Pedro; California.)
- \**Squilla armata*, Milne Edwards. (*Hab.* : Chile and New Zealand.)

## BRACHYURA.

### OXYRHYNCHA OR MAIOIDEA.

Legion I. MAIINEA.

Family INACHIDÆ.

Subfamily LEPTOPODIINÆ.

ACHAEUS, *Leach.*

ACHAEUS TENUICOLLIS, *Miers.*

Stations 35, 37.

*Achaeus tenuicollis*, Miers, Chall. Rep., Zool., xvii., 1886, p. 9, pl. I., fig. 3.

Eleven examples of this well-marked species were obtained at Stations 35 and 37, off Port Hacking and Botany Bay at depths ranging from 22 to 52 fathoms. This form has not been previously recorded for New South Wales. The Challenger examples were obtained off Port Phillip, Victoria, and in Bass' Straits.

*Subfamily* ACANTHONYCHINÆ.PUGETTIA, *Dana*.

## PUGETTIA MOSAICA, sp. nov.

(Plate xxxv., figs. 5, 6, 7.)

Stations 13, 35, 36, 37, 41, 42, 44, 57.

Carapace subpyriform, slightly longer than broad, densely covered with minute bead-like granules, rostral spines, gastric and lateral branchial regions with a few slender hooked setæ; the upper surface is marked by two elevated bosses, one on the cardiac and the other on the intestinal region; a short marginal spine is present on each hepatic, and a large one is seated on each branchial region; the pair of branchial spines is in a transverse line with the cardiacal elevation. Rostral spines short, acute, as long as the interorbital space is wide, divergent and deflected towards their apices. Preocular spine small, triangular and subacute; the postocular is separated from the orbital margin by a V-shaped fissure, and from the hepatic spine by a wide sinus; viewed from above its outline is narrow and acute, the inner margin being granulose and the outer smooth; when seen from its lateral aspect the outline is oblong with rounded ends, the surface being smooth, white and slightly concave.

The eyestalks and the joints of the antennæ are more or less beset with minute granules. The basal joint of the second antenna is somewhat narrowed distally, the outer margin is thin and acute, the base is rounded, and the apex terminates in a triangular tooth; the outer superior and the central surfaces are minutely granulose; the granules on the latter are situated in a longitudinal groove, and are bounded above and at the sides by a smooth marginal band.

Chelipedes in adult male as long as the carapace and rostral spines; merus joint trigonus, outer angle obtuse, granulose, inferior and superior borders with a thin acute keel, granulose on the inner side; inferior surface convex, smooth.

Carpus a little longer than deep, about equal in length to the diameter of the merus; external surface granulose; inner granulose setose; upper surface smooth, with an acute arcuate keel.

Hand compressed, sharply keeled above and below, scarcely twice as long as the depth of the palm; inner and outer surfaces

of the latter smooth, except the inner superior margin, and the distal and proximal extremities. Fingers acute, their inner edges with five or six denticles on their distal half; upper surface of mobile finger granulose, with two smooth longitudinal ridges; immobile finger slightly granulose at the base. Ambulatory legs rather elongate, gradually diminishing in size posteriorly, the first nearly twice as long as the fourth without the tarsus. Merus joint of the first leg equal in length to the carpus and propodus, subcylindrical, with a thin even carina on the upper surface, commencing at a short distance from the base and continued to near the distal extremity.

Outer aspect of crest and upper posterior surface quite smooth; inferior and anterior granular and setose. Carpus shorter than the tarsus, depressed, a little broader distally than proximally, smooth and grooved above, granular and setiferous at the sides and below. Propodus rounded, sensibly diminishing in diameter towards the extremity.

Tarsus subcylindrical, slightly shorter than the preceding joint, straight, except at the tip, which is hooked; surface granulose-setose, but not spinose.

The meral joints of the third and fourth legs are similar to those of the second, except that the keel is shorter and confined to the distal half of the joints; on the merus of the fifth the keeled is represented by a compressed tooth.

In the female the post-abdomen is six-jointed, the chelipedes are weak, and the hands small; the upper and lower borders of the latter are rounded; the whole of the outer surface of the palm and the upper and lower third of the inner are closely granulose.

This species may be separated from those previously described by the granulation of the carapace and limbs, and by the character of the postocular spine, which not only differs in shape but is quite distinct from that on the hepatic region. It also wants the conspicuous granules on the pterygostomial which are present in *Pugettia incisa* and *P. quadridens*. From *P. minor* it differs in the absence of a distal spine on the merus, and in having the outer angle obtuse and granulose.

*Colour*.—Uniform pale cream.

Length of carapace, including rostral spines, 14 mm; breadth 8 mm.

Forty-seven specimens of this interesting form were obtained, ranging from Cape Three Points to Wata Mooli, and at depths varying from 20 to 59 fathoms.

*Family MAIIDÆ.**Subfamily MAIINÆ.*CHLORINOIDES, *Haswell.*

## CHLORINOIDES WAITEI, sp. nov.

(Plate xxxiii.)

Stations 2, 21, 22, 25, 36, 41, 42, 57.

Carapace strongly spinose, about one-tenth longer than broad. Regions well-defined, convex, limited by wide grooves, which are more or less interrupted by elevations; between the latter are situated narrow pit-like depressions; anteriorly they are few, large and isolated, posteriorly they are numerous, small, segregate and somewhat plicate, especially on the boundaries of the cardiac and intestinal regions. Body sparsely clothed with hooked setæ; a few also occur on the upper surfaces of the limbs.

Carapace and legs more or less covered with very short stiff setæ; the latter on the ambulatory legs arise from small bead-like granules, occasionally they spring from the summit but generally from the base; these setæ are directed towards the distal extremities of the limbs. The granules on the hands of the chelipedes are smaller and closer than elsewhere, and are devoid of setæ. The setæ are so minute that they can only be seen with a lens, and in no way interfere with the apparent smoothness of the body and limbs, yet they are very evident to the touch.

Rostral spines tapering, straight, acute, separated by a narrow V-shaped space, 20 mm. deep and 12 mm. wide at the summit.

The larger spines on the carapace are disposed as follows:—

1. A median series of four, two on the gastric, one on the cardiac and one on the intestinal region.
2. A submedian series of twelve, arranged transversely in six pairs, of which two pairs are situated on the interorbital space in a line with the rostral spines, two on the gastric region, one on the cardiac and one on the posterior border. There are also two obliquely placed pairs on the anterior intestinal region.

Inner orbital border smooth, prominent, terminating outwardly in a strong curved spine, the upper surface bearing two irregular rows of spiniform granules; inner orbital fissure wide, outer

narrower above than below; interfissural spine of moderate size, with a supplementary spine behind at its base; outer angle of the orbit bispinose, with an accessory spine situated externally about midway between the apex and the base.

Hepatic region prominent, with a series of small spines both above and below, and two strong spines on the margin, of which the anterior is much the larger.

Branchial region beset with numerous spines and tubercles; a series of five large spines form a semicircle along the elevated margin, all equidistant save the last, which is nearer; a line drawn from the fourth one of the series to the tip of the rostral spine would pass over two other strong spines, one on the gastric and the other on the anterior branchial region.

There is a small blunt spine on the pterygostomial region, immediately below the hepatic spine.

The very stout basal joint of the outer antenna terminates in two strong spines; the external and larger spine is directed upwards; it possesses two accessory spinules, one on the outer margin midway between the apex and the base, and the other on the inner margin and in contact with the front of the orbit. The inner spine is directed forward and slightly outwards; a small spinule is present near its inferior base.

Chelipedes in adult male large, and nearly twice the length of the carapace. Merus joint equal in length to the palm, twice as long as the carpus, armed below with a single longitudinal row of three or four, and above with two rows of six unequal spines or spinose tubercles. The distal extremity bears four spines, one on the outer, one on the inner angle, and two in a median line superiorly; the posterior one is rather large, and slightly exceeds another spine situated at about the distal two-thirds. Carpus with numerous subspiniform tubercles and a few spines; the former are irregularly distributed on the external and upper surfaces, but they are more prominent on the ridges, as are also the spines, of which there are two proximal and one distal in a median line on the rounded upper border. Hand compressed, especially in the upper fourth; surface, including fingers, apparently smooth, but covered everywhere with a fine, close bead-like granulation; palm twice as long as deep, and a little longer than the mobile finger.

Fingers with a large gap at the base when closed, their inner edges acute and denticulated distally, broad, rounded and transversely ridged proximally. Ambulatory legs long; somewhat slender distally, gradually decreasing in size posteriorly; the first pair are twice as long as the fifth pair without the tarsus. Lobes above the bases of all the legs except the chelipedes terminating

in a large, acute, triangular spine. Merus joint of anterior leg as long as the carpus and propodus, cylindrical but perceptibly narrowed in the middle, transversely dilated, and three-lobed distally; the median lobe is tipped with a short spine; a similar spine is present on the middle lobe of each succeeding pair of legs.

Carpus as long as the calcified portion of the tarsus, depressed and much narrower proximally than distally, with a wide, shallow, longitudinal groove above and below; a short lateral spine is present on the inner surface near the distal extremity, and there are traces of a second one in the same line about the middle of the joint. Propodus slender, cylindrical, increasing slightly in diameter towards the extremity, about twice as long as the carpus measured along the inner side. Tarsus curved, its basal two-thirds cylindric, the last third tapering and densely clothed at the sides with short stiff setæ, distally terminating in a strong, acute, horny claw.

*Colour.*—When alive pale olive, with red markings. In the dried example the colours have faded; the upper surface of the carapace is now dullish red; the lateral sides of the branchial regions and the spines are more or less cream, with small red spots.

The fingers and the lower part of the hand are pale cream; the outer surface of the palm has a few elongate, transverse, red blotches, and on the inner surface the blotches are numerous, more especially on the upper half. The upper surfaces of the meral and carpal joints are of varying shades of red, those of the first pair being bright, deep and somewhat glossy, and dotted here and there with cream coloured spots; the second pair are similarly coloured, but the surface is dull; the succeeding pairs have a cream ground, with numerous blotches and spots of red; a few small spots are also present on the propodal joints.

The female does not differ materially from the male, the chelipedes are, however, weaker, shorter, and the hands are much less.

The following measurements are taken from a large adult male:—

Length of carapace	...	...	...	...	140 mm.
Breadth of "	...	...	...	...	125 "
Length of right chelipede	...	...	...	...	227 "
" " " first ambulatory leg	...	...	...	...	229 "
" " " fourth " "	...	...	...	...	195 "
" " rostral spine	...	...	...	...	20 "
" " larger spines of carapace	...	...	...	...	16 "

Twenty-six examples of this remarkably fine species were obtained, including a few young under 20 mm. in length. The

armature of the carapace and limbs is if anything more pronounced in the young than in the adult; the spines appear proportionately longer, but this appearance is due to their bases being narrower and not so much swollen and elevated as in the adult. This species appears to be quite distinct from any hitherto described.

P A R A M I T H R A X, *Milne Edwards.*

PARAMITHRAX TUBERCULATUS, sp. nov.

(Plate xxxiv., figs. 1, 2.)

Stations 10, 35, 37, 41, 42.

Rostral spines short, acute, slightly divergent, about twice as long as broad at the base.

Carapace subpyriform, about one-fifth longer than broad; regions prominent and sharply defined; inner limit of branchial with four equidistant pits, and a large depression on each side of the intestinal region. Upper surface with numerous tubercles and a few spines; there is a median series of three spines, two on the gastric and one on the cardiac; the latter region is centrally surmounted by an elevated, transverse, confluent pair, and a small pair is present on the posterior border.

A series of submedian tubercles is disposed as follows:—Two widely separated pairs on the interorbital space, a pair about their height apart on the anterior, and four equidistant in a transverse line on the posterior gastric region, and a pair on the intestinal, situated immediately in front of a median subspiniform tubercle. Upper orbital border, hepatic, anterior cardiac and branchial regions with numerous small tubercles; a few of a larger kind are scattered on the gastric and branchial regions.

The tubercles are clothed with minute granules, and are surmounted with hooked hairs.

Inner orbital fissure twice as long as wide, bounded on the inner side by a short triangular tooth, and on the outer by a granulose spine; outer fissure deep, narrow, and almost closed above; external orbital angle acute but not spinose.

Hepatic region prominent, with two short lateral spines and a few granules on the swollen inferior surface. Margin of branchial region bearing four spines, rather more than twice their length apart; first and second compressed, granulose superiorly; third and fourth smooth, conical, the last one arising from a broad elevated base.

The sides of the branchial regions below the spines are concave, smooth, shining, and clothed with remote, adpressed, microscopic hairs. The posterior border is acute and minutely tuberculate.

Basal joint of outer antenna terminating in two spines; the outer is directed upwards and outwards; its apex is in a line with and projects slightly beyond the front of the orbit; the outer margin and the apex superiorly are tuberculated. Inner spine short, triangular, directed forwards and outwards.

Chelipedes in adult male of moderate size, equal in length to the carapace and rostral spines; merus joint as long as the upper border of the hand, beset with tubercles similar to those occurring on the carapace, the larger of which are seriate; three form a longitudinal row on the inferior surface; another row of three occurs on the inner proximal portion of the upper border, and there are two or more in a line with a blunt median spine, situated at the distal extremity.

Carpus obtusely angulate, a little shorter than the mobile finger; outer and upper surfaces with numerous small tubercles; a large spiniform tubercle marks the junction of the angles proximally.

Hand measured along the lower surface twice as long as deep, tumid and rounded below, narrow and somewhat angular in the proximal half above; surface minutely granulose, and more or less clothed with distant, adpressed, microscopic hairs. Fingers with lines of pits on their lateral surfaces; inner edges acute and minutely denticulate distally, proximally each has a slight lobe; the lobe on the mobile finger is a little in advance of and is adapted to a depression anterior to that on the lower; there is a slight hiatus at the base when the fingers are closed.

Ambulatory legs elongate, slender, decreasing in size posteriorly; the anterior are about twice as long as the carapace is broad. Merus joint rounded, perceptibly increasing in diameter in the distal half, about as long as the carpus and propodus combined.

Carpus depressed and slightly grooved both above and below, nearly twice as wide distally as proximally.

Propodus cylindrical, twice as long as the carpus.

Tarsus curved, compressed, about one-tenth shorter than the preceding joint.

Joints of all the legs more or less covered with minute, adpressed hairs; fourth, fifth and sixth with tufts of hooked setæ along their upper borders; the seventh bears numerous short stiff setæ, which are confined to the borders; the lateral surfaces are glabrous and longitudinally grooved.

The female differs from the male in having smaller and more slender chelipedes; the hand is much less tumid, and three times

as long as deep; the basal lobes on the inner edges of the fingers are wanting, and the post-abdomen has a marginal fringe of setæ.

Length of carapace 40 mm., breadth 31 mm.

The differences between this species and *Paramithrax sternicostulatus*, M. Edwards, to which it is closely allied, may be enumerated as follows:—

	<i>P. tuberculatus</i>	<i>P. sternicostulatus</i> .
External orbital angle ... ..	acute	truncate
Inferior surface of body and sides of branchial region ... ..	smooth	closely granular
Number of depressions in sternal plate between insertion of the chelipedes and buccal orifice ... ..	one	six
Post-abdomen and maxillipedes ...	glabrous	densely setose
External ridge on carpus of chelipedes	rounded	keeled
Hooked setæ on body and limbs ...	few	many
Spines of rostrum and on posterior border of carapace .. ..	short	long
Number of spines on branchial margin	four	three

*Colour*.—In spirit, ground cream, more or less tinted with light red, becoming deep red in the median line of the carapace.

Sixteen examples were obtained. The range extends from Broken Head to Wata Mooli, the depth varies between 20 and 78 fathoms.

#### N A X I A, *Milne Edwards*.

##### NAXIA (NAXIOIDES) ROBILLARDI, *Miers*.

*Naxia (Naxioides) robillardi*, Miers, Proc. Zool. Soc., 1882, p. 339, pl. xx., figs. 1 and 1a, 1b, 1c. Pocock, Ann. Mag. Nat. Hist., (6), v., 1890, p. 79.

Stations 20, 21, 22, 24.

Nine specimens—five males and four females—were obtained off Morna Point and in the Newcastle Bight at depths varying from 21 to 48 fathoms. The examples are smaller than the types, from which they do not otherwise differ. In the largest male the carapace is 55 mm. long and 40 mm. broad; the rostral spines measure about 40 mm. The first ambulatory limbs are 150 mm. in length.

Hitherto only recorded from Mauritius.

*Subfamily* MICIPPINÆ.MICIPPA, *Leach*.MICIPPA SPINOSA, *Stimpson*.

*Micippa spinosa*, Stimpson, Proc. Acad. Nat. Sci. Philad., 1857, p. 217. Miers, Chall. Rep., Zool., xvii., 1886, p. 70, pl. viii., fig. 2.

Station 28.

A small, much damaged specimen is in the collection from Station 28, off the Manning River; depth 22 fathoms.

## CYCLOMETOPA OR CANCROIDEA.

## Legion I. CANCRINEA.

*Family* CANCRIDÆ.*Section* CANCRINÆ.PILUMNUS, *Leach*.PILUMNUS TOMENTOSUS, *Latreille*.

*Pilumnus tomentosus*, Latreille, Encyclopédie Methodique, x., 5, 1825, p. 125. H. Milne-Edwards, Hist. Nat. Crust., i., 1834, p. 418. Miers, Zool. Col. "Alert," Crust., 1884, p. 220; Chall. Rep., Zool., xvii., 1886, p. 160, pl. xiv., fig. 4.

Stations 12, 21, 37, 41, 44, 48.

Carapace moderately convex, punctate, smooth, or with a few isolated granules, about one-fifth wider than long, covered as well as the limbs with simple yellow hairs, which are about 0.2 mm. apart, and from 0.5 mm. to 1.5 mm. in length; those measuring over 0.8 mm. are confined to the ambulatory legs. Regions pretty well defined anteriorly.

Frontal lobes rounded, somewhat prominent, with a median V-shaped notch; each lobe bears about eight subspiniform denticles, and is bounded externally by a shallow sinus and a

spine, which is situated at the apex of the infero-lateral process of the front.

Outer orbital angle defined by a small spine. Upper margin of orbit with two shallow notches, outer two-thirds smooth, the inner third bears a few granules; lower orbital border with six or seven subspiniform granules, of which the innermost is large and visible from above.

Anterior lateral margin armed with four spines; the first is seated on the subhepatic region, and is rather nearer to the orbital spine than to the second, its inferior base is slightly granulose; the second spine is compressed, acute, and often has one or two granules immediately behind the apex; third and fourth spines smooth, conical and acute.

Chelipedes robust, unequal, either left or right the larger; anterior angle of ischium joint subacute and granulose; merus trigonus, broader than long; surfaces smooth, punctate, glossy and sparsely hairy; inferior angle rounded, superior acute, granulose, and armed distally by two spines, one terminal and the other posterior to a deep transverse groove.

Carpus as long as broad, equal to the merus in length, armed on the external and superior surfaces with from twelve to twenty spines, which are a little higher than broad at the base; they arise from small mound-like elevations, giving the surface a somewhat uneven aspect, and there is a moderate sized spine at the intero-distal angle.

Lower margin of larger hand twice as long as the upper, and equal to the depth of the palm at the base of the fingers; inner surface of the palm smooth, convex centrally, and excavated at the base proximally. Crest of upper border with five spines, the two anterior are in contact at the base; upper surface spinose; the lower and distal external surfaces bear numerous subspiniform granules; an oblique line drawn from the base of the mobile finger to the lower articulation of the palm would separate the spines from the granules, which gradually diminish in size towards the lower border, the distal third of which is smooth.

Fingers dark brown, the colour being confined to their surfaces; their inner edges bear three or four denticles, those on the lower being slightly the larger; the denticles and tips of the fingers are whitish in colour; the lower finger has both surfaces grooved, but the upper is grooved externally only.

Anterior surfaces of the meral and carpal joints of the ambulatory legs punctate, smooth; posterior surfaces and the rest of the joints beset with longish hairs. Merus joint trigonus, as long as the inferior borders of the carpus and propodus, that of the first

being slightly granulose below, and has a small spinule superiorly at the distal extremity.

Carpus longer than the propodus, about equal to the tarsus; that of the first leg has a minute spinule at its outer distal apex.

Propodus slightly compressed, deepest about the middle.

Tarsus rounded, tapering gradually to the short but little curved horny claw.

Post-abdomen seven-jointed in both male and female, closely covered with hairs, similar to but shorter than those on the carapace; the female has a marginal fringe of long setæ.

The spines and granules are generally of a bright red colour.

Length of carapace (male)	...	...	...	15 mm.
Breadth	„	„	...	18 „
Length	„	(female)	...	17 „
Breadth	„	„	...	20 „

Thirty-two examples were obtained. The range extends from Cape Three Points to Wollongong, and the depth 23 to 71 fathoms.

Mr. E. J. Miers, in his remarks on *Pilumnus rufo-punctatus*, Stimp., states\* that Stimpson's species "possibly is itself to be identified with *P. tomentosus*, Milne Edwards." It is again referred to in the Challenger Report,† and the opinion expressed that *P. rufo-punctatus*, Stimp., "may be the true *Pilumnus tomentosus*, Latreille."

It seems quite possible that the original description given by Latreille was ignored in dealing with this species. Had it been consulted I feel sure that the conclusion arrived at would have been different. The brief diagnosis of Latreille agrees with examples of those here regarded as *P. tomentosus*, and further, it does not accord with specimens of *P. rufo-punctatus*, Stimpson. There are several characters exhibited by the latter species which have not been noted. The carpal and propodal joints of the ambulatory legs are armed posteriorly and superiorly with numerous subspiniform granules, similar to but smaller than those on the carpal joints of the chelipedes. The hairs on the carapace and limbs are very short, and measure from 0.3 to 0.4 mm. in length; each hair bears a subterminal cluster of branchlets; the latter are confined to a space about 0.06 mm. in length. The branchlets are generally covered with flocculent matter, and the hairs appear to be capitate when seen under a low magnifying power.

The hairs on the carapace of *Pilumnus tomentosus* measure 0.5 to 0.8 mm. in length, and they are quite smooth and unbranched.

\* Miers—Zool. Coll. "Alert," Crust., 1884, p. 220.

† Miers—Chall. Rep., Zool., xvii., 1886, p. 160.

## PILUMNUS AUSTRALIS, sp. nov.

(Plate xxxv., figs. 1-4.)

Stations 44, 49.

Carapace slightly convex, a little longer than broad, clothed as well as the limbs with fine short hairs and numerous stiff, elongate, yellow setæ; the latter arise from small pits with elevated margins, which render the surface very uneven, otherwise the surface is smooth and glossy.

Front prominent, with about ten denticles; lobes rounded, separated by a shallow V-shaped notch; each lobe is bounded laterally by a small sinus, and a cylindrical spine is present immediately above the subfrontal process.

Upper orbital border smooth, nearly entire, with only the faintest trace of a sinus; inner and outer angles of orbit without spines or granules externally at the junction of the upper and lower borders; the margin is thin, elevated, and exhibits a very shallow angular sinus.

Lower border of the orbit minutely denticulate externally, and a moderately large spine on the inner angle; the spine has a broad base and tapers to an acute apex; subocular, subhepatic, anterolateral, branchial, upper and inner pterygostomial regions more or less granulose, a few of which are subspiniform.

Anterior lateral border armed with three elongate and equidistant spines; the second is a little longer than the first and much longer than the third; the first spine is slightly curved and directed forwards; each spine bears two or more stiff setæ; they arise at about one-third from the base and continue parallel with the spine, and frequently exceed the latter in height.

Chelipedes unequal, the right or the left the larger. Anterior edge of ischium joint denticulate. Merus as broad distally as long; inner surface smooth and shining; outer and inferior surfaces minutely granulose; anterior border acute, with two unequal spinules proximally; lower border rounded, granulose, the granules becoming larger distally; superior border acute, with four spinules, two small about the middle, and two large—one distal and the other posterior to a shallow transverse groove.

Carpus as broad as long, equal to the merus in length; inner surface granulose; margin angular, tipped with a spine; upper and external surfaces armed with about fifteen acute spines, subequal in size and in distance apart; numerous stiff setæ occur at the bases and between the spines, the rest of the surface is smooth.

Lower border of the hand nearly equal to the merus and carpus combined; upper border shorter than the depth of the palm at the base of the fingers; inner surface of palm convex, smooth, glossy, with or without one or more minute granules near the centre; distal and outer lower surface smooth; upper and external surfaces spinose and setose; the spines are shorter and stouter than those on the carpus; the proximal half of the lower border is somewhat angular and granulose.

Fingers dark brown, the colour failing to reach their bases; inner margin of each armed with four denticles, those on the lower being the most distinct; mobile finger granulose at the base, without grooves; immobile with a groove on each side.

Ambulatory legs moderately elongate; the first is the shortest; the merus joint is trigonus; the superior border is arcuate and acute, and has four small curved spinules on the median portion and a straight spine at the distal extremity; the inferior borders are more or less granulose; anterior and posterior surfaces naked and smooth in all the legs, except the last pair, in which the merus is clothed with short hairs and stiff setæ.

Carpus about one-fourth shorter than the propodus; a little compressed; its depth is greatest at the distal end, and the upper border has three longish spinules, two on the proximal half and one at the distal extremity.

Propodus subcylindrical, deepest about the middle, with the lower border arcuate, unarmed but clothed with long setæ.

Tarsus a little longer than the carpus, compressed, tapering to the short hooked claw; upper border with numerous short hairs, lower with a few short curved setæ.

Inner margin of merus joint of the external maxillipedes somewhat produced and denticulate.

The description has been drawn from an adult male; the female does not present any marked differences.

This species is closely allied to *Pilumnus normanii*, Miers, but differs from it in having the lower external surface of the palm smooth, in wanting an external orbital spine, and in having the meral and carpal joints spinulose.

Length of carapace	...	...	..	...	7.5 mm.
Breadth	"	...	..	...	9 "
Length of larger chelipede	...	...	...	...	12 "
Depth of palm at base of fingers	...	...	...	...	4.5 "
Length of first ambulatory leg	...	...	...	...	11 "
" of third	"	"	"	...	13 "
" of spines on carpal joints	...	...	...	...	0.9 "
" of second antero-lateral spine	...	...	...	...	1.5 "
" of inferior orbital spine	...	...	...	...	0.8 "

Five examples of this form were obtained—four females and one male, off Coogee and Port Kembla, in 49 to 75 fathoms.

*Family* PORTUNIDÆ.*Section* PORTUNINÆ.NEPTUNUS, *De Haan*.NEPTUNUS PELAGICUS, *Linn.*

- Neptunus pelagicus* (Linn.), A. Milne-Edwards, Archiv. Mus. Hist. Nat., x., 1861, p. 320. De Haan, Fauna Jap., Crust., 1835, p. 37, pls. ix. and x.
- Neptunus bituberculatus*, Miers, Ann. Mag. Nat. Hist., (4), xvii., 1876, p. 221.

Stations 12, 23, 24.

Four specimens of this common species were obtained. They exhibit considerable variation in the granulation of the carapace, in the size of the median frontal teeth, and in the relative elevation of the tubercles seated on the cardiac region.

For comparison a large number of examples—both dried and in spirits—from Port Jackson, have been examined; these also exhibit similar variations. In the largest male the carapace measures 85 mm. by 182 mm. (lateral spines included). The chelipedes are about 305 mm. in length; the median frontal teeth measure 2 mm. The tubercles on the cardiac region are ill-defined, and not more distinct than a pair situated on the anterior gastric region. The granules on the carapace are few, small, sub-acute and distant, those seated on the main transverse lines are 1.5 mm. or more apart; on the shorter anterior transverse lines and in the central regions they are somewhat closer, whilst on the branchial regions they are more widely separated, varying from 2 to 3 mm. in distance apart.

In another male example the granules and median frontal teeth are very small. The tubercles on the cardiac region are,

however, very distinct, each tubercle being surmounted by numerous small granules, which occur in groups of two and three; a broadish band of similar granules extends from the tubercles to the intestinal region.

In the largest female example the carapace measures 78 by 170 mm.; the right chelipede is 185 mm. in length. The median frontal teeth are minute and unequal; the larger one measures 0.7 mm. The rounded granules on the transverse lines are about 0.6 mm. in diameter, and the same or less in distance apart; on the central regions they are slightly larger and crowded, but rarely in contact at the base. The cardiac region has two submedian granulose elevations, but they are not higher than other regional prominences.

In another female example the carapace measures 63 by 140 mm. and the right chelipede is about 145 mm. in length. The interstices between the numerous bead-like granules are closely invested with plumose hairs, about 0.5 mm. in length; the branches are confined to the upper third, and the acute apical portion of each hair is unbranched. The frontal teeth are small, under 1 mm. in length. The cardiac and gastric tubercles are low, broad and studded with moderately large granules, a few of which are in contact at the base. There appear to be three characters which are fairly constant and sexual. In the male the chelipedes are greatly elongated; the granules on the carapace are few, small, distant and tend to become spiniform, and the antero-lateral teeth are broader and less acute than in the female. In the latter the chelipedes are short; the granules are numerous, large, bead-like and rarely more than their own diameter apart, at least on the transverse lines and the regional elevations.

The median frontal teeth vary so much that little reliance can be placed on them as a character; in fact, they are frequently absent altogether. Since the "Thetis" examples were examined I have seen some hundreds of specimens exhibited for sale in Sydney, and always made a point of inspecting as many as possible, with a view of determining the amount of variation in the frontal teeth. I have examined many specimens in which the teeth were wanting, and others in which they were represented by mere points or granules; in some cases only one tooth is developed, the other being absent, and the individual figured on Plate x. in the *Fauna Japonica* presents the same feature—the right submedian tooth is wanting.

The middle lobe of the upper orbital border has a compressed tooth at its outer angle, which is often acute, but this is not constant; it is frequently rounded like that on the inner angle.

GONIONEPTUNUS, *Ortmann*.GONIONEPTUNUS SUBORNATUS, *Ortmann*.

*Gonioneptunus subornatus*, Ortmann, Die Decapoden - Krebse Strassburger Museums, pt. vi., in Zool. Jahrb., vii., 1893, p. 79, t. iii., fig. 9.

*Portunus (Charybdis) truncatus*, De Haan, Fauna Jap., Crust., 1835, p. 43, pl. xviii., fig. 2.

Stations 37, 41.

A small male is here referred to this species; the carapace measures 17.5 by 24 mm.

The armature of the lateral borders and of the chelipedes agree with Ortmann's description, and the specimen in every character with De Haan's figure of the male.\*

The front is divided into four lobes; the median pair are pretty close to each other, and are separated by a shallow v-shaped space; a wide, rounded, granular sinus divides the inner from the outer lobe, and a narrower, deep, smooth sinus exists between the latter and the inner angle of the orbit.

The carapace is clothed with short hairs, 0.6 mm. in length and 0.1 mm. or less apart; they are curled or directed towards the front; anteriorly they are simple; posteriorly they are more or less beset with short branchlets, which are confined to the upper third; the subterminal portion has a reddish band, and is unbranched.

The carapace bears four granulose elevations, almost in a transverse line: two are situated on the mesobranchial, and two submedian on the cardiac region; there are also a pair of short granular ridges posterior to the submedian interruptions in the main transverse ridges.

These granulose elevations are not mentioned either by De Haan or Ortmann. They are, however, plainly indicated in De Haan's figure.\*

Since the above was written two other examples have been found—a male and a female; the carapace of the latter measures 15.5 by 23 mm.; that of the former 21 by 30 mm. (spines excluded); the specimens do not differ materially from the above. There is, however, one character worthy of note—the posterior margin of the carapace is slightly keeled, sinuated and minutely granular, and the lateral angles have a prominent, rounded, compressed lobe.

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\* De Haan—Fauna Jap., Crust., 1835, pl. xviii., fig. 2.

Three examples were procured—two males and one female—between Botany and Wata Mooli, in 50 to 71 fathoms.

This species has not hitherto been met with outside of Japanese waters.

*Family* THALAMITIDÆ.

GONIOSOMA, *A. Milne-Edwards.*

GONIOSOMA MILES, *De Haan.*

*Goniosoma miles*, De Haan, Fauna Jap., Crust., 1835, p. 41, pl. xi., fig. 1. A. Milne-Edwards, Arch. Mus. Hist. Nat., x., 1861, p. 378.

Stations 21, 22, 24, 25.

The denticulations on the lower distal border of the sixth joint of the posterior legs are very variable in number. In the figure quoted above there is only one on each joint. In some of the "Thetis" specimens there are as many as three on each side, and in a young example, with a carapace measuring 20 by 30 mm., they are absent.

The spaces between the antero-lateral teeth are fringed with long hairs, and there is also a submarginal fringe commencing on the inferior base of the fifth spine and continued to a point over the origin of the second ambulatory leg.

Eight specimens were obtained off Newcastle, in from 21 to 48 fathoms.

Length of carapace of largest example ♂	... 47 mm.
Breadth       "       "       "	... 61 "

Hitherto only recorded from Japan.

THALAMITA, *Latreille.*

THALAMITA PRYMNA, *Herbst.*

*Thalamita prymna* (Herbst), A. Milne-Edwards, Arch. Mus. Hist. Nat., x., 1861, p. 360. Miers, Chall. Rep., Zool., xvii., 1886, p. 197. De Mann, Journ. Linn. Soc., Zool., xxii., 1888, p. 75, pl. iv., figs. 5-6.

Station 14.

Two very small examples were obtained off Norah Head, in 25 to 32 fathoms.

PLATYONYCHUS, *Latreille*.PLATYONYCHUS BIPUSTULOSUS, *H. Milne-Edwards*.

*Platyonychus bipustulosus*, H. Milne-Edwards, Hist. Nat. Crust., i., 1834, p. 437, pl. xvii, figs. 7-10.

Station 23.

Two specimens—one male and one female—obtained at Newcastle Bight, in 16 to 19 fathoms.

## CATAMETOPA OR OCYPODIIDEA.

*Family* OCYPODIDÆ.*Subfamily* CARCINOPLACINÆ.PILUMNOPLAX, *Stimpson*.PILUMNOPLAX ABYSSICOLA, *Miers*.

*Pilumnoplax abyssicola*, Miers, Chall. Rep., Zool., xvii., 1886, p. 228, pl. xix., fig. 2.

Station 37.

Six male examples are referred to this species. They agree in the main with the description and figure above quoted; the only point of difference is in the granulation of the carapace, which appears to be much finer than in the type. The words "very finely granulated" are applied to the chelipedes only; the carapace is referred to as being "everywhere granulated."

The granulation of the carapace is exceedingly fine and very peculiar; the granules are scarcely perceptible to the unaided eye; a one inch or two-thirds objective is requisite to see them

distinctly ; they are of two kinds, and consist of numerous minute, round granules, and a series of flat, smooth, oblong, scale-like plates, about 0·04 mm. in their larger diameter. The scales are isolated, rarely in contact ; the posterior margin is imbedded ; the anterior is slightly elevated, and when the carapace is viewed at certain angles the edges of the scales appear like a series of short transverse lines.

The following measurements are taken from the larger example :—

Breadth of front	...	...	...	...	2·4 mm.
Length of carapace	...	...	...	...	6 "
Breadth of "	...	...	...	...	7 "
Length of right chelipede	...	...	...	...	9 "
" " merus	...	...	...	...	3 "
" " carpus	...	...	...	...	2·5 "
" " palm	...	...	...	...	4·2 "
Depth of "	...	...	...	...	2·8 "
Length of first right ambulatory leg	...	...	...	...	10 "
" " merus	...	...	...	...	4 "
" " carpus	...	...	...	...	2 "
" " propodus	...	...	...	...	2·5 "
" " dactylus	...	...	...	...	2·6 "
" " third ambulatory leg	...	...	...	...	11·4 "
" " fourth	"	"	...	...	9 "

Obtained off Botany, in 50 to 52 fathoms. Previously recorded from Fiji, "off Matuku, Fiji Islands, in 315 fathoms."\*

*Subfamily* OCYPODINÆ.

OCYPODA, *Fabricius*.

OCYPODA CORDIMANA, *Desmarest*.

*Ocypoda cordimana*, Desmarest, Consid. sur les Crust., 1825, p. 121. Kingsley, Proc. Acad. Nat. Sci. Phil., 1880, p. 185. Miers, Ann. Mag. Nat. Hist., (5), x., 1882, p. 387, pl. xvii., figs. 9-9a. De Mann, Notes Leyden Museum, iii., 1881, p. 248.

Two examples obtained at Botany Bay.

\* Miers—Chall. Rep., Zool., xvii., 1886, p. 229.

*Family* GRAPSIDÆ.*Subfamily* GRAPSINÆ.GRAPSUS, *Lamarck*.GRAPSUS VARIEGATUS, *Fabricius*.

*Grapsus variegatus* (Fabr.), H. Milne-Edwards, Hist. Nat. Crust., ii., 1837, p. 87.

One specimen of this extremely common shore crab was obtained at Port Stephens.

## OXYSTOMATA OR LEUCOSIIDÆ.

*Family* CALAPPIDÆ.*Subfamily* CALAPPINÆ.MURSIA, *Desmarest*.MURSIA ARMATA, *De Haan*.

*Mursia armata*, De Haan, Fauna Jap., Crust., 1839, p. 73, pl. xix., f. 2.

*Mursia curtispina*, Miers, Chall. Rep., Zool., xvii., 1886, p. 291, pl. xxiv., fig. 2.

Stations 35, 41.

A male and a female of this species are in the collection.

The examples agree with Miers' description and figure in every character except two.

The lateral spines on the carapace are a little longer and are somewhat obliquely directed backwards, not straight as they are represented in both of the figures quoted above. The sub-orbital lobe or tooth is triangular in outline, and acute—not broad near the summit and thence suddenly narrowed to a sub-acute point, as it is depicted by Miers in figure 2a.

The carapace of the male measures 22 by 26 mm. ; the lateral spines are about 7 mm. in length. In the female the carapace is 18 by 21 mm., and the lateral spines about 6 mm.

Port Hacking and Wata Mooli, in 22 to 71 fathoms.

### Family LEUCOSIIDÆ.

#### Subfamily ILIINÆ.

#### EBALIA, *Leach.*

#### EBALIA TUBERCULOSA, *A. Milne-Edwards.*

*Persephona tuberculosa*, A. Milne-Edwards, Journ. Mus. Godeffroy, i., 4, 1873, p. 86.

*Phlyxia granulosa*, Haswell, Proc. Linn. Soc. N.S.W., iv., 1880, p. 54, pl. vi., fig. 3.

*Ebalia tuberculosa*, Miers, Chall. Rep., Zool., xvii., 1886, p. 306, pl. xxv., fig. 1.

Stations 13, 35, 37, 49, 57.

One hundred and sixty specimens of this species were obtained.

The carapace in the largest male measures 9 by 8.5 mm., and in the largest female 8 by 8 mm. In the former the chelæ are slightly longer than in the latter.

In a few of the adult females the tubercles on the carapace are low and obscure ; in the males and young they are well developed, and agree with those depicted in Haswell's figure on plate 6, fig. 3.

The granules on the carapace are somewhat variable ; in a few of the larger females they are quite flat ; in the males and young they are often prominent and bead-like, especially on the front, hepatic, and the elevation portions of the branchial and central regions ; on the antero-lateral margins they frequently become subspiniiform.

Station 13 :	25 specimens,	off Cape Three Points,	41-50 fathoms.
„	35 : 20	„ off Port Hacking	22-38 „
„	37 : 50	„ off Botany Bay	50-52 „
„	49 : 20	„ off Port Kembla	63-75 „
„	57 : 45	„ off Wata Mooli	54-59 „

EBALIA (PHLYXIA) UNDECIMSPINOSA, *Kinahan*.

- Ebalia (Phlyxia) undecimspinosa*, Kinahan, var. *orbicularis*, Miers, Chall. Rep., Zool. xvii., 1886, p. 309.  
 ? *Bellidilia serratocostatis*, Kinahan, Journ. Roy. Dublin Soc., i., 1858, p. 129.  
 ? *Bellidilia undecimspinosa*, Kinahan, Journ. Roy. Dublin Soc., i., 1858, p. 128, pl. iii., f. 2, var.  
*Phlyxia orbicularis*, Haswell, Proc. Linn. Soc. N.S.W., iv., 1880, p. 54, pl. vi., fig. 2.

Stations 22, 23, 50.

Seven examples—six males and one female.

The carapace in the largest male measures 31 by 29 mm., and the right chelipede is 85 mm. in length. In the female the carapace is 17.5 by 17 mm., and the right chelipede 25 mm. in length.

Newcastle Bight, in 26-40 fathoms; Shoalhaven Bight, in 15-18 fathoms.

EBALIA (PHLYXIA) CRASSIPES, *Bell*.

- Ebalia (Phlyxia) crassipes*, Bell, Trans. Linn. Soc., Zool., xxi., 1855, p. 304, pl. xxxiv., fig. 2. Haswell, Proc. Linn. Soc. N.S.W., iv., 1880, p. 53; Aust. Mus. Cat. v., Crust., 1882, p. 124. Miers, Zool. Coll. "Alert," 1884, p. 252; Chall. Rep., Zool., xvii., 1886, p. 307.

Station 35.

A small male example was obtained off Port Hacking, in 22-38 fathoms.

MEROCRYPTUS, *A. Milne-Edwards*.MEROCRYPTUS LAMBRIFORMIS, *A. Milne-Edwards*.

- Merocryptus lambriformis*, A. Milne-Edwards, Journ. Mus. Godeffroy, i., 4, 1873, p. 85, pl. ii., fig. 1. Miers, Chall. Rep., Zool., xvii., 1886, p. 320.

Stations 5, 35.

Two examples only—a young male and an adult female. The carapace in the latter measures 12 mm. in length, and 11 mm. in breadth in front of the lateral processes.

Off Narrabine, in 64-84 fathoms; off Port Hacking, in 22-38 fathoms.

## A N O M U R A.

## DROMIDEA.

*Family* DROMIDÆ.CRYPTODROMIA, *Stimpson.*CRYPTODROMIA LATERALIS, *Gray.*

*Cryptodromia lateralis*, Gray, Zool. Miscell., 1847, p. 40. Stimpson, Proc. Acad. Nat. Sci. Phil., 1858, p. 77. Henderson, Chall. Rep., Zool., xxvii., 1888, p. 5.

Station 44.

A solitary example of this species was obtained off Coogee, in 49 to 50 fathoms.

*Family* PARATYMOLIDÆ.PARATYMOLUS, *Miers.*PARATYMOLUS LATIPES, *Haswell.*

*Paratymolus latipes*, Haswell, Ann. Mag. Nat. Hist., (5), v., 1880, p. 303, pl. xvi., figs. 3-5; Aust. Mus. Cat. v., Crust., 1882, p. 143.

Stations 28 and 33.

Six specimens, including one adult female with ova.

Newcastle Bight and off Manning River, in 22 to 27 fathoms.

*Family* HOMOLIDÆ.HOMOLA, *Leach.*HOMOLA ORIENTALIS, *Henderson.*

*Homola orientalis*, Henderson, Chall. Rep., Zool., xxvii., 1888, p. 19, pl. ii., fig. 1.

Stations 24, 25.

Two specimens—a male and a female—were obtained; one at Station 24, in 21-48 fathoms, and the other at Station 25, in

42-48 fathoms. The female example agrees with Henderson's description generally. The nine gastric prominences are, however, broadly conical and subspiniform; not "rounded tubercular processes."

The male differs from the female in many important characters, which may be enumerated as follows:—

The gastric and first antero-lateral spines are larger; they arise from broader bases and taper gradually to acute points. The spines on the inner border of the meral joint of the chelipedes are almost equal in size to those on the outer and upper, and the internal and external surfaces are more or less studded with subspiniform granules. The chelæ are much larger; the fingers proportionately shorter, stouter and marked on both sides with numerous deep pits, from which arise tufts of long yellowish setæ.

The hand bears numerous rounded and some spiniform granules; the upper border of the palm has a narrow irregular band of small rounded granules, and there is a single row of nine larger ones on its internal aspect; the internal surface has three longitudinal rows—one central and two subcentral, and rather nearer the centre than the borders; the external surface has also three short rows, which are confined to the proximal third; the median row is the most distinct, and extends a little beyond the others. The whole of the lower border is covered with a broad band of spiniform granules; those on the inner margin are larger, seriatly disposed, and about ten in number. The upper borders of the meral joints of the first three pairs of ambulatory legs are armed with from eight to ten strong curved spines; the lower borders carry from six to nine, which are shorter and less curved than those on the upper.

The anterior angle of the merus joint of the external maxillipedes bears a few small spinules on its distal third; they commence on a level with the summit of the rounded lobe on the external border.

The "Challenger" examples were obtained at Ki Island, at a depth of 140 fathoms, and off Zebu, Philippine Islands, in 95 fathoms.

Length of carapace of female	...	...	30	mm.
Breadth of " "	...	...	23	"
Length of right chelipede	...	...	50	"
" " merus	...	...	15	"
" " carpus	...	...	9.5	"
" " propodus	...	...	21.5	"
Depth of palm...	...	...	7	"
Length of fourth right leg	...	...	72	"
" " merus	...	...	22.5	"

Length of carpus	...	...	...	...	14	mm.
"  "  propodus	...	...	...	...	21	"
"  "  tarsus	...	...	...	...	13·5	"
Length of carapace of male	...	...	...	...	35	"
Breadth of	"  "	...	...	...	27	"
Length of right chelipede	...	...	...	...	88	"
"  "  merus	...	...	...	...	25	"
"  "  carpus	...	...	...	...	18	"
"  "  propodus	...	...	...	...	39	"
Depth of palm	...	...	...	...	14	"
Length of fourth right leg	...	...	...	...	92	"
"  "  merus	...	...	...	...	28	"
"  "  carpus	...	...	...	...	19	"
"  "  propodus	...	...	...	...	24	"
"  "  tarsus	...	...	...	...	17·5	"
Length of largest gastric spine	...	...	...	...	3·5	"
"  "  smallest	"  "	...	...	...	2	"
"  "  first antero-lateral spine	...	...	...	...	5·5	"
"  "  eye peduncle	...	...	...	...	14	"

L A T R E I L L I A, *Roux.*LATREILLIA AUSTRALIENSIS, *Henderson.*

*Latreillia australiensis*, Henderson, Chall. Rep., Zool., xxvii, 1888, p. 24, pl. ii., fig. 24.

Stations 37, 38, 39, 40, 41, 42, 48.

Thirty-five examples were obtained off Botany, in 50 to 78 fathoms, off Wollongong, in 55 to 56 fathoms.

## RANINIDEA.

*Family* RANINIDÆ.L Y R E I D U S, *De Haan.*LYREIDUS TRIDENTATUS, *De Haan.*

*Lyreidus tridentatus*, De Haan, Fauna Jap., Crust., 1841, p. 140, pl. xxxv., fig. 6.

Stations 22, 25, 57.

There is one adult male in which the carapace measures 42 mm in length and 25 mm. in breadth at the lateral spines.

Three specimens were obtained at Newcastle Bight and Wata Mooli, in 26 to 59 fathoms.

## PAGURIDEA.

Section PAGURODEA.

### LAMINIBRANCHIATA.

Family PAGURIDÆ.

DIOGENES, Dana.

DIOGENES MILES (*Fabr.*), *De Mann.*

*Diogenes miles*, De Mann, Jour. Linn. Soc., Zool., xxii., 1888, p. 232, pl. xv., figs. 7-9.

Station 50.

There are five examples which agree in every character with the figures and description quoted above.

The specimens exhibit some trace of the original colour; the basal halves of the propodal and tarsal joints of the ambulatory legs are of a reddish-brown tint; the distal portions are creamy-white; the tarsi change to a slaty-grey towards the extremities.

Total length about 40 mm.; length of body, 30 mm. Shoal-haven Bight, in 15 to 18 fathoms.

Two other specimens are in the Museum collection from Jervis Bay. The form named *Diogenes merguensis*, De Mann, is not represented in the Museum collection.

PAGURUS, *Fabricius.*

PAGURUS STRIATUS, *Latreille.*

*Pagurus striatus*, Latr., Hist. Nat. Crust., vi., 1802-1805, p. 163.  
De Haan, Fauna Jap., Crust., 1849, p. 206, pl. 49, fig. 1.

Stations 9, 12, 13, 22, 25.

About thirty examples of this species were obtained.

The following measurements are taken from an adult male:—

Length of body, from front to end of telson	..	150 mm.
„ „ carapace in the mesial line	... ..	55 „

Width between the lateral denticles of the front...	12 mm.
Total width of frontal margin ... ..	21 "
Length of ocular peduncle ... ..	15 "
"  "  peduncle of outer antenna ... ..	19 "
"  "  acicle ... ..	11 "
"  "  left chelipede ... ..	85 "
"  "  third right leg ... ..	122 "

The colour in alcohol is as follows:—Scales and bases of spines on the upper surfaces of limbs, mauve; lower surfaces and tips of spines, red; setæ fringing the scales, bright yellow; inner distal surface of palm and the fingers, vermilion; the merus-joints with one and the eye stalks with two bands of the same tint. A similarly coloured oblong calcified plate is present in the membrane of the mero-carpal joints of the chelipedes; the plate is also present in the second and third pairs of legs, but it is much less in size and uncoloured.

Cape Three Points and Newcastle Bight, in 23 to 48 fathoms.

#### CLIBANARIUS, *Dana*.

#### CLIBANARIUS STRIGIMANUS, *White*.

*Clibanarius strigimanus*, White, Proc. Zool. Soc., 1847, p. 121; Ann. Mag. Nat. Hist., (2), i., 1848, p. 224. Miers, Zool. Ereb. & Terr., Crust., 1874, p. 3, pl. xi., fig. 4. Henderson, Chall. Rep., Zool., xxvii., 1888, p. 60.

Stations 12, 13, 25.

Twenty-one large examples of this well-marked species were obtained at Cape Three Points and off Newcastle, 23 to 50 fathoms. The largest adult male yields the following measurements:—

Length of carapace ... ..	73 mm.
Width of frontal margin ... ..	26 "
Length of ocular peduncle ... ..	22 "
"  peduncle of outer antenna ... ..	23 "
"  acicle ... ..	14 "
"  peduncle of inner antenna ... ..	30 "
"  left chelipede ... ..	100 "
"  third right leg ... ..	175 "

The anterior portion of the carapace is as broad as long, the surface is rather uneven and marked by numerous shallow sub-circular pits, from 1 to 2 mm. in diameter, and the sides of the carapace bear a few tufts of setæ. The front has a thickened margin,

which extends from the obtuse rostral tooth to the small lateral denticles, opposite the inner bases of the outer antennæ.

Eye stalks with several tufts of hairs on their upper surfaces; the subapical and basal tufts are much larger than the intermediate ones.

The basal joint of the second antenna has a small spine at its outer distal angle; the acicle is compressed at the base and bordered on each side by three or four spinules; the superior surface and the outer margin bear some tufted hairs; the inferior surface is smooth, glabrous, and concave near the base.

The third joint of the external maxillipedes is armed on its inner acute margin with eighteen black denticles, subequal in size and in distance apart.

Meral joints of the first three pairs of legs spinose on their lower borders. Upper borders of the second and third with a few spinules disposed in short transverse rows and mixed with long hairs. The first has the upper distal surface and the margin strongly spinose. The succeeding joints are more or less covered on their upper and external surfaces with spines having a calcareous base and a corneous apex; as the distal extremities are approached the corneous portion becomes more conspicuous and forms more than half of the spine.

The inner surface of the hand and mobile finger has some of the spines elongated, appressed throughout, and disposed side by side longitudinally, forming seven or more transverse rows. These modified spines constitute a series of corrugations, which when rubbed together produce a sound like that made by passing the point of a penknife across the teeth of a comb.

It is possible that these peculiar processes may be used for other purposes than that of producing sound; they may possibly be used for holding objects between the hands or to prevent the latter from being forcibly moved either up or down when attacked by an enemy. The slightest pressure brings the two corrugated surfaces together, and they interlock so neatly that it requires considerable force to raise or depress the claws.

Mr. Waite informs me that when turned out on deck the Hermit Crabs, both *Pagurus striatus* and *Clibanarius strigimanus*, would extend their bodies and limbs far out of their shells and walk about. If, however, the shell or a limb was touched, or even if a hand was passed within range of their vision, they would instantly withdraw with a snap, their limbs rattling like old bones; for the space of a few seconds they then produced a loud stridulating sound; when recovered from their alarm they would recommence their peregrinations.

EUPAGURUS, *Brandt.*EUPAGURUS LACERTOSUS, var. NANA, *Henderson,*

*Eupagurus lacertosus*, var. *nana*, Henderson, Chall. Rep., Zool., xxvii., 1888, p. 64, pl. vii., fig. 1.

Stations 2, 9, 28, 33, 35, 37.

One hundred and ten examples of this species were obtained, the range extending from Manning River to Botany Bay, and the depth from 22 to 52 fathoms.

PAGURISTES, *Dana.*

## PAGURISTES TUBERCULATUS, sp. nov.

(Figs. 11, 11A.)

Stations 28, 33.

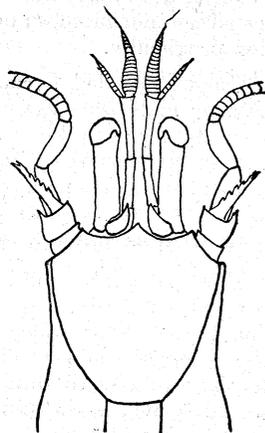
Anterior region of carapace slightly rugose, front bisinuate with three equal but little prominent teeth; a narrow thickened border extends from the apex of the median tooth, on either to the hinder base of the lateral ones. Ocular scales acute, 0.35 mm. long, 0.15 mm. wide, and 0.1 mm. apart.

Ocular peduncles slender, thicker at the base than at the summit, slightly constricted in the middle, with a single line of setæ on the upper surface. Length 1.4 mm., diameter 0.35 mm.

Basal joints of first antennæ 0.4 mm. in length, second joint 0.5 mm., third joint 0.8 mm., larger flagellum 1 mm. and smaller 0.6 mm.

First exposed joints of the second antennæ stout, 0.4 mm. in length, with a single spine on its inner and three on its outer prolongation; second joint slender, 0.35 mm. in length; third joint, 0.6 mm.

Flagellum short, 2.8 mm. in length, consisting of sixteen articuli; from the lower third the joints gradually increase in



FRONTAL REGION x 8.

Fig. 11.

length to the summit. Each joint bears on its upper margin three or more long curved setae. The setae are branched on one side, giving rise to two short hairs equal in length; they are opposite below; but become alternate towards the summit.

Antennal acicle slender, 0.65 mm. in length, with seven or eight spinules on the inner aspect of the upper surface, and an unequal pair at the apex.

Chelipedes in adult male unequal, the right being much the smaller. The left chelipede is 10 mm. in length. The merus



LEFT CHELIPEDA X 8.

Fig. 11a.

The external border bears a series of subspiniform granules and terminates distally in an obtuse denticle. Superior distal margin with three or four small spinules. Lower surface setose, external granulose, inner smooth, polished and marked with two transverse red blotches near the distal end and a cuneate impression proximally.

Carpus rounded, except the superior border, which is slightly angular and bears seven spinules. The superior and external surfaces are granulose; a few of the granules are subspiniform and shortly seriate. The lower, inner and inferior surfaces are smooth. Hand 4 mm. long, its greater diameter 2 mm. and the lesser 1.8 mm. Inner surface of palm with a few scale-like granules from which arise some short, stiff setae.

External surface and both borders of the palm more or less covered with rounded granules disposed as follow:—A close double row on the upper border and another rather indistinct on the lower; the latter widens out proximally and extends upwards to the middle of the hinder margin of the palm; here commences a ridge which is continued to the tip of the slightly bent lower finger; the ridge bears a series of tubercles, each of which is surmounted by two or more granules; another similar row of tubercles is present in a line with the inter-digital space.

Fingers acute, crossed and calcareous at the tips, meeting along their edges when closed; external surfaces sulcate, outer aspect

of inner edges lined with small granules, the inner sides slightly hairy; mobile finger smooth internally; upper border with about fourteen rather high, obtuse granules and a few setæ.

Right chelipede about 6 mm. long; merus joint similar to that of the left; carpus with five strong spinules on the upper border; hand very short, the palm has four closely placed spinules on its upper border; the lower border and the inner surface rounded, with a few scales and some short setæ; external surface and fingers clothed with long hairs; fingers acute, corneous at the tips and slightly setose.

Ambulatory legs of the right side unequal, the first 8.5 mm. in length, the second 10 mm.; ischium joint of the first leg wider than long, fringed with hairs on the upper and lower distal borders; merus joint more than twice as long as deep; the upper border bears about fourteen curved spinules; propodus equal to the merus in length, subcylindrical, but laterally sulcated distally; upper border with twelve spinules, slightly larger than those on the preceding joint and inclined forwards.

Tarsus stout, slightly curved, compressed and grooved at the sides to within a short distance of the horny claw. The second leg differs from the first in having the tarsus and ischium joints longer; the latter is not quite twice as long as deep. The spinules are also smaller in size and number.

Ambulatory legs of the left side equal in length (8.5 mm.), the first similar to its fellow on the right side. The propodal joint of the second has a deep longitudinal sulcus on the external surface; it is bounded below by a prominent crest, which bears about sixteen subspiniform granules; the lower border is armed with ten or twelve spinules.

Tarsus sulcate and feebly carinate externally; there are a few spinules on the outer angle of the upper border and many on the lower, disposed in two rows; the inner row is continuous, the outer terminates at the distal third.

Fourth pair of legs stout; the rasp is elongate and sub-triangular in shape, with about five scales in a row at its broadest point.

Fifth pair of legs slender, fold or bent upwards over the hinder margin of the carapace.

First pair of abdominal appendages short, stout, slightly curved and bilobate on the inner aspect of their apices; the outer arcuate distal edges are armed with linear rasps, composed of numerous small curved spinules; there is a tuft of simple setæ on the inner side of the base of each appendage, and numerous simple hairs on the margins of the apical lobes.

Second pair of appendages equal and slender, first joint as long as the two following combined, third joint shorter than the second, thickly covered with branched setæ on its distal half.

Third appendage uniramous, margined with plumose hairs and bounded on each side at the base by a linear series of long much branched setæ.

Fourth and fifth similar to the preceding, except that there is only one basal group of setæ.

Penultimate segment of the abdomen with a submedian T-shaped impression; appendages very unequal, the basal joint on the left side tumid and grooved. Lateral margins of telson deeply incised and lobate about the middle; posterior margin strongly emarginate, with two unequal lobes; the right lobe is small and bears a few setæ and two or three spinules; the left is large and is bordered by some setæ and six or more strong spinules.

The females are somewhat smaller than the males, otherwise they do not differ from the latter except in the usual sexual characters.

The appendages of the first abdominal segment are short and two-jointed; the first is rather stout and equal in length to the second; the latter is strongly setose distally and similar in shape to the terminal joint of the second appendage in the male.

The second, third and fourth appendages are biramous, the fifth is uniramous.

*Colour.*—Outer antennæ and walking legs annulated with narrow reddish bands. Chelæ bright red, tips of fingers of larger hand white, body and limbs scantily clothed with brownish hairs.

Total length of body from tip of rostrum to end of telson 14 mm.

Numerous examples, including many ova-bearing females, were obtained at Stations 28 and 33.

Sixty-three specimens of this interesting species were obtained off Manning River and Newcastle Bight, in 22 to 27 fathoms.

#### SYMPAGURUS, *S. I. Smith.*

#### SYMPAGURUS DIOGENES, sp. nov.

(Plate xxxiv., fig. 3.)

Stations 35, 48.

☞ The anterior region of the carapace is slightly areolate; the calcification is limited to the sides and the front; the latter has

a broad, rounded, central lobe 3 mm. wide; the lobe is marked by a short rounded median ridge; its sides are slightly thickened, and it is bounded on each side by a sinus and a small obtuse tooth; from the latter the outer frontal margin slopes away obliquely backwards to the somewhat rounded angle. The upper surface is smooth; there is a pair of submedian tufts of setæ situated a short distance from the frontal margin, and a few other more or less linear tufts which follow the regional depressions, and a well marked submedian pair are present immediately posterior to the cervical groove.

Eye peduncles short, stout, sensibly constricted in the middle, and dilated towards the summit, with a single longitudinal row of hairs on the inner aspect of the superior surface. Cornea sub-renaliform when viewed from above. A small margined shield-shaped plate is situated between the inner bases of the ocular peduncles; its anterior margin is concealed beneath a low, broad, convex disc, which is surmounted by a short spine, about 0.07 mm. in length.

Ocular scales triangular, each with a tapering, acute, simple and inwardly inclined spinule.

First antennæ twice as long as the eye stalks; first joint stout, shorter than the second; third joint equal in length to the two preceding.

Peduncles of second antennæ a little longer than the eye stalks; first exposed joint with a small spine on its inner distal extremity and a much larger one on the outer; the latter bears one or two spinules; second joint equal in length to the first, moderately stout and somewhat swollen in the middle; a small spinule projects from the superior distal transverse margin; third joint the longest, but not equal to the first and second combined.

Flagellum about twice the length of the carapace, beset with a few long and numerous short setæ. Antennal acicle somewhat curved, nearly reaching to the level of the eyes, armed on the inner convex side with nine spinules and a few long setæ. External maxillipedes elongate and subpediform; the ischium joints have their margins carinate and denticulate; the denticles are about twelve in number, and consist of an alternating series of larger and of smaller acute teeth, all being more or less tinged with yellow at the tips.

The right chelipede of the adult female has the outer aspect of the ischium joint very short; the internal border is longer than the joint is wide; it bears a single row of setæ, a few seriate granules, and is somewhat subcarinate. The merus joint is trigonus, narrow proximally, and gradually increasing in diameter to the summit; the external and inferior surfaces are minutely

granulose; the granules are more or less connected at their bases by reticulated white lines, and generally the tip of each granule bears a few very short hairs; the internal surface has a subcordiform impression, the inner superior portion of which is limited by a bright red line. Inferior border evenly rounded, the superior angular, smooth; the latter has a small spinule at its distal extremity, and the former terminates in a small white rounded lobe; the internal border is strongly carinate, especially towards the apex; the basal half is straight, and carries two rows of granules; the distal half is curved, and bears a series of about twelve small denticles; there is a well-marked transverse groove on the superior surface near the distal margin.

Carpus subtriangulate, twice as wide distally as proximally; inner extremities excavated and adapted to the shape of the preceding and following joints; surfaces more or less granulose; superior border broadly rounded, sloping away on the left to short prominent inner border, and on the right to the central longitudinal ridge on the outer surface; inferior border rounded to within a short distance of its extremity, where it becomes suddenly angular, and terminates in an acute point. The outer distal margin presents a smooth narrow ridge, which commences at the lower articular condyle, and is continued to within a short distance of the upper one; the lower half of the ridge is bounded posteriorly by a shallow groove, the upper is hidden beneath a denticulated crest, the latter is a continuation of the granular ridge on the external surface. Another crest extends from the inner distal angle to the upper articular condyle; behind the latter there is a short longitudinal depression which marks the inner limits of the crests.

Hand compressed, its depth at the obliquely truncated extremity is about twice the transverse diameter of the central region of the palm. Lower border denticulate, acutely keeled, evenly curved throughout, the curvature tending upwards and inwards as the extremity of the ill-defined lower finger is approached. Upper border broad, rounded and closely granulose, with a short transverse, minutely denticulated crest at its distal extremity, and a longitudinal ridge on its outer aspect; the ridge bears a series of small subspiniform granules, and is bounded below by a shallow groove. Outer and inner surfaces of palm longitudinally convex, both closely granulose; the granules on the inner surface are smaller than those on the outer, and proximally they are more or less reticulately disposed; there is an indistinct longitudinal row of granules on the central region of the external surface, and at the distal margin and near the lower border the granules become subspiniform.

Superior border of mobile finger arcuate, keeled and obtusely denticulate; outer surface evenly rounded with numerous flattened

granules ; inner surface finely granulose, and longitudinally excavated in its upper half. Fingers acute, crossed and calcareous at the tips, their inner edges unevenly denticulate and almost in contact throughout when closed. The mobile finger is subvertical and nearly at right angles to the upper border when closed, its length being nearly equal to the truncated extremities of the palm and the ill-defined lower finger.

Left chelipede small, slender ; merus joint compressed, smooth ; superior border acute, with a single line of setæ ; outer aspect of inferior border with a short denticulated crest. Carpus elongate, a little compressed proximally, becoming subtrigonus distally ; inner surface smooth, slightly setose, outer distally granulose and setose ; lower border rounded, upper angular, with a line of subspiniform granules and a small spine at its distal extremity ; there is also a small spine on the lower half of the distal margin.

Hand compressed, equal to the carpus in length, breadth and depth ; palm as long as the mobile finger ; the inner surface is smooth and has a ridge-like elevation which is continuous with the inner angular side of the lower finger ; external surface longitudinally but indistinctly bisulcate, with three or four rows of granules, of which those situated on the external aspect of the upper surface are the largest.

Fingers long, acute and corneous at the tips ; external surfaces rounded, punctate and slightly setose, internal surfaces longitudinally excavated to the acute inner edges ; the lower finger is slightly bent downwards and inclined inwards towards the extremity.

Ambulatory legs moderately elongate, subequal, smooth, compressed and sparsely hairy ; the hairs are short, and mostly confined to the upper borders of the joints. The merus joint is equal in length to the propodus, and a little longer than the carpus ; the superior border of the latter terminates in a small spinule.

Tarsus as long as the carpus and propodus combined, curved, compressed and laterally grooved at the base ; upper and lower external borders punctate and shortly setose.

The fourth pair of legs is subchelate ; the rasp consists of a linear series of fifteen scales, occupying about four-fifths of the distal margin ; all the joints are more or less fringed with long curved hairs.

The fifth pair of legs is also similarly fringed with long hairs ; the rasp is oblong in shape, and there are about six scales in each row.

There is only one external genital opening—it is situated on the coxal joint of the third left leg.

Abdomen longer than the carapace; somites very distinct; the last two segments have their dorsal walls well calcified.

The first segment of the abdomen bears a pair of slender genital appendages; they are slightly compressed, acute at their apices, and measure about 3 mm. in length. The second, third, fourth and fifth abdominal appendages of the left side biramous; the branch on the fifth is very short, measuring about 2 mm. in length; sixth pair of appendages very unequal, the left one being much the larger. Telson slightly unequal, with a smooth rounded margin.

The male has a pair of genital appendages on the first abdominal segment; they are equal in length to those occurring in the female, but differ in shape towards their extremities, and are lancet-like and longitudinally channelled.

The second segment has a pair of subequal uniramous appendages; the three following segments have each a single biramous appendage on the left side.

General colour pale cream; eye peduncles light brown; cornea blackish-brown; proximal portion of the carpal joints of the first three pairs of legs with a narrow, transverse, bright red band; each band is more or less interrupted on the lower surface.

Chelipedes of a reddish tint, the colour fading to cream towards the extremities.

Proximal lamellæ of the gills oblong; inner apical margin evenly curved and trending outwards; outer border with a slight angular sinus, situated at about one diameter from the summit. As the distal end of the gill plume is approached the sinus gradually diminishes in size, and the outer apical border becomes obliquely truncated; the last series of distal plumes—about twelve rapidly diminishing pairs—are simple rounded filaments.

This species is very closely allied to *Sympagurus arcuatus*, Edwards and Bouvier,\* from which it differs in its larger size, in the shape of the gill lamellæ, in the granulation and shape of the larger hand, which is more transversely truncated at the extremity, and finally in having a small spine at the anterior end of the ocular segment, after the manner of *Diogenes*, hence the specific name.

Length of body from rostrum to tip of telson	70	mm.
"    "    carapace	17	"
Width of front	8	"
Length of right ocular peduncle	5	"
Diameter "    "    "    at base	1.8	"

\* Mem. Mus. Comp. Zool., xiv., 3, 1893, p. 67, pl. v., figs. 21-28.

Longer diameter of cornea ... ..	3	mm.
Length of right chelipede along the bent outer surface ... ..	40	"
Length of merus ... ..	7.5	"
" " carpus ... ..	11	"
" " lower border of palm and finger ...	17	"
Depth of palm ... ..	13	"
Transverse diameter of palm ... ..	6	"
Length of mobile finger ... ..	11	"
Length of second right leg ... ..	43	"

Two specimens—an adult female from Station 35, off Port Hacking, in 22 to 38 fathoms—and a young male from Station 48 off Wollongong, in 55-56 fathoms.

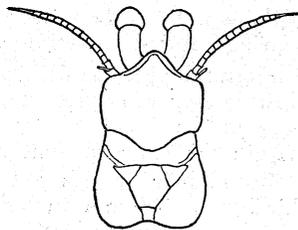
GLAUCOTHOË, *H. Milne-Edwards.*

GLAUCOTHOË HEXAGONATA, sp. nov.

(Figs. 12, 12a.)

Station 57.

Anterior region of the carapace rather convex; rostrum prominent, broadly triangular in outline; the subacute apex is slightly bent downwards, and projects between the bases of the ocular peduncles; the upper surface has a short median ridge bounded on each side by a shallow groove; the sides are thin, somewhat elevated, and adapted to the bases of the eye-stalks. Posterior region of carapace a little broader and about equal in length to the anterior portion.



CARAPACE x 8.

Fig. 12.

Cervical groove well marked; the cardiac area is rather broad, distinctly circumscribed and six-sided; at each lateral angle is situated a V-shaped plate with the base directed posteriorly.

Ocular peduncles 0.8 mm. long and 0.4 mm. in diameter; they are slightly curved, and a little narrower at the base than at the summit; cornea round, black, becoming greenish-blue at the junction with the peduncles. Peduncle and flagellum of first antenna about 1 mm. long; joints short, stoutish and subequal; smaller flagellum with three or four articuli, each tipped with a

few short hairs; larger flagellum consisting of six articuli, the first stout, glabrous and a little broader than long; the second and third subequal, twice as long as broad, each of which bears a dense tuft of long hairs; fifth joint narrow, and equal in length to the four preceding; sixth short, with an apical tuft of long setæ.

Peduncle of second antenna 0.7 mm. long; first joint stout, with a slight lobe on its inner distal angle.

Acicle subacute, three times as long as broad, reaching to the end of the short second joint, it bears a short spinule at its outer apical angle; third joint not quite equal to the first and second combined. Flagellum 1.6 mm. long, with twelve articuli, each of which bears four or five short hairs at the apex.

Chelipedes equal, the left 2.5 mm. long. Merus joint compressed, one-third longer than deep. Upper border carinate, armed with six very faint denticles, from which arise an equal number of short setæ; inferior border similar to the upper but shorter; outer border angular; lateral and inferior surfaces smooth.



LEFT CHELIPEDA X 8.  
Fig. 12a.

Carpus short, a little compressed, about equal in length to the depth of the merus; upper border arched and subacute; lower border extremely short; outer distal margin with a slightly thickened rim, which is bounded posteriorly by a narrow groove; surfaces with a few scattered hairs.

Hand short, compressed, longer than the merus; palm deeper than long; upper and lower borders rounded, equal in length; both, as well as the outer surface and the upper distal margin, bearing a few short setiferous denticles.

Fingers longer than the palm, slight, hairy and corneous at the tips; the upper is acute and bears two small denticles on its inner margin; the lower is obtuse and somewhat excavated, its inner margin has one large denticle situated about the middle.

Second pair of legs perceptibly stouter and longer than the third, about 3.9 mm. in length; ischium joint twice as long as broad; merus compressed, twice as long as the ischium; upper and lower borders thin, with a few scattered hairs; carpus deeper than wide, its lower border equal to the ischium in length; upper border rounded, with a faint transverse impression near the distal end, from which arise several stiff setæ; propodus equal to the tarsus, borders rounded, external surface with three or four rather ill-defined ridges disposed longitudinally.

Tarsus a little curved and compressed, tapering from the proximal third to the acute, dark brown, horny claw, lower border armed with five or six spinules which are strongly inclined forward towards the extremity. The third leg differs from the second in having the ischium joint broader than long.

Fourth leg 1.4 mm. long; the borders are sparsely setiferous; ischium and merus joints subequal in length; propodal rasp as long as the tarsus, oblong, with three rows of scales.

Fifth pair of legs slender, 1.6 mm. long; merus equal in length to the three following joints; rasp, small, interrupted; propodus with a series of six rasp-like spinules situated on the anterior distal border.

Pleon strongly convex, the segments rounded and distinct, the first narrow, the second, third and fourth equal, longer than the fifth; each postero-lateral angle has a rounded lobe, which is slightly notched at its origin anteriorly.

Pleopods unequally biramous, the outer and larger branch with eleven long plumose setæ, confined to the distal half of the margin; inner ramus slender, glabrous, about half as long as the outer, with a rudimentary rasp consisting of a line of four curved scales, equal in size and in distance apart, they are situated on the outer margin near the distal extremity.

Uropods rather large, equal; protopodite with a small spine on the inner distal angle; outer ramus nearly as long as the width of the telson, subtriangular in outline and margined throughout with plumose hairs; outer border nearly straight, distal obliquely truncated, with three rows of oval scales; inner ramus as broad as long, margin setose, distal border rounded with two or three rows of scales.

Telson subquadrate, the sides nearly straight, with six simple hairs, three on each margin about the middle; lateral angles rounded, distal margin slightly convex, with twelve long plumose setæ; they are confined to the inner two-fourths of the border, and the outer ones are more remote from each other than those nearer the centre; upper surface marked anteriorly with numerous fine transverse striations; at about the distal fourth the striæ bend towards the extremity and are longitudinally disposed in the central region.

Total length of body ... .. 7 mm.

Length of carapace in the median line ... 2.2 ,,

A solitary example was obtained off Wata Mooli, in 54-59 fathoms.

#### GLAUCOTHOË CARINATA, *Henderson*.

*Glaucothoë carinata*, Henderson, Chall. Rep., Zool., xxvii., 1888, p. 84, pl. ix., fig. 1.

Station 33.

A single male example which agrees with the description in every character except one, *i.e.*, the telson is truncated and does not present "a slight median emargination."

The specimen exhibits a few characters worth recording. The frontal process is bordered by a distinct and slightly thickened margin, the lateral ridges are, like the median ridge, rounded along their summits and are a little longer, but not quite so wide; the lateral depressions bounding the median ridge bifurcate at their posterior half; the branches from thence follow the contour of the ridges to their terminations.

Each dactylus of the ambulatory legs has at the lower proximal base a broad, transverse, convex prominence, the anterior margin of which is rounded, the posterior neatly emarginate; the outer angle is prolonged and extends upwards as a gradually narrowing ridge to the margin of the upper border. The whole surface of this peculiar prominence is minutely scaly, roughened and quite unlike the adjoining surface, which is smooth.

The lower distal extremity of the propodal joint has a slightly elevated rim, which is semicircular in outline, swollen, and bounded behind by a shallow groove; it has an elongate lobe on the outer side, which is, when the tarsi are drawn back—closely applied to the corresponding lobe on the outer side of the tarsus; the anterior concave surface of the rim and its lobe are roughened, scaly, and adapted to the scaly prominence on the base of the tarsus. The two roughened surfaces when superposed would have a brake-like effect, and form a kind of locking joint.

Judging by the appearance of the body and limbs, it seems highly probable that this species lives in the shells of *Dentalium* or shells of narrow dimensions; the second and third legs are parallel with and closely applied to the sides of the chelipedes. If such be the habitat, the function of the specially modified tarso-propodal joint may be easily explained. I venture to suggest that the function is opercular and that the tarsi are used to protect the entrance of the shell from would-be intruders. It appears probable that when the tarsi are drawn back and at right angles to the propodi—beyond which angle they cannot be forced without breaking—that the two roughened surfaces are brought into close contact and the joints locked; the claws would then form a kind of rigid four-railed fence across the aperture of the shell. The chelipedes are of such a length that the long, narrow fingers could be projected between the tarsi and give a warning nip to any organism attacking from without. The tarsal joint is slightly curved and about 2.5 mm. long; the lower border is armed with two or three strong calcified spines 0.1 to 0.2 mm. long and a few stiff setæ, and terminates in a stoutish black horny claw.

Shorter ramus of pleopoda with a rudimentary rasp of four curved scales.

The rami of the uropods have the margins more or less serrate, each serration tipped with a long plumose hair; the outer

basal third of the inner ramus is, however, smooth and almost glabrous.

The external distal third of the outer ramus is armed with about eighteen oval rasp-like teeth; there is also a row of fifteen occupying more than half of the outer distal margin of the inner ramus. The inner angle of the protopodite is produced into a strong spine. The lateral margins of the telson are slightly thickened, smooth, with a few short setæ; the distal margin is truncate, without any trace of emargination, and bears fourteen long plumose hairs.

Total length	...	...	...	...	20 mm.
Length of body	...	...	...	...	11 "
,, right chelipede	...	...	...	...	8 "
,, third right leg	...	...	...	...	11 "

Off Newcastle Bight, 24-27 fathoms.

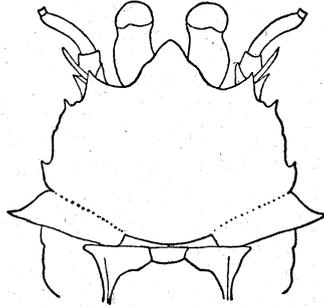
PORCELLANO-PAGURUS, *Filhol.*

PORCELLANO-PAGURUS TRIDENTATUS, sp.nov.

(Figs. 13, 13a, 13b.)

Station 57.

Carapace 7 mm. long and 5 mm. broad, smooth, glossy, slightly uneven and transversely convex, clothed with a few scattered tufts of short setæ, posterior region imperfectly calcified. Frontal margin smooth, a little thickened, with two wide semicircular emarginations and three prominent denticles; the lateral teeth are acute and directed forwards; the straight outer margin measures 0.6 mm. and the base 0.4 mm.; the rostral tooth is 1 mm. wide at the base and 0.9 mm. long; it is abruptly narrowed at its distal third and subacute at the apex.



CARAPACE X 6.  
Fig. 13.

The sides of the carapace bear two spines; the first is situated on the anterior surface of a rounded eminence, and is about its own length from the base of the external frontal tooth. The second spine is smaller than the first and arises from the anterior

angle of a short prominence immediately in front of the well marked cervical groove; the latter is bounded posteriorly by two subtriangular lamellæ, which are separated mesially by a space equal to their length; each lamella has the anterior margin depressed and follows the contour of the groove; the posterior margin is elevated, ridge-like, slightly sinuous, and terminates externally in a prominent triangular denticle, bearing one or two spinules and a few hairs.

Ocular peduncles exceeding the rostral spine by about half their length, short, stout, 1.5 mm. long and 0.75 mm. wide at the base, slightly constricted below the rounded blackish-brown cornea; the upper surface of the peduncle bears some scattered hairs and a few in tufts; of the latter there are two at its extremity and one seated on a small tubercle situated on the inner aspect about the middle.

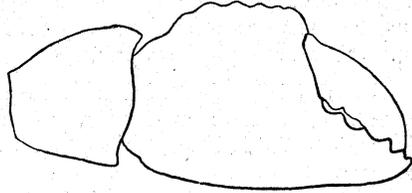
Peduncle of first antenna 2.5 mm. long; the first joint short and stout; second slender, more than twice as long as the first; third joint dilated distally, with a few long stiff setæ near the summit.

Smaller flagellum shorter than its supporting joint, consisting of nine subequal articuli, with two or three long setæ; larger flagellum strongly setose proximally; the four terminal joints are elongate, equal and glabrous, except the last, which has a few short hairs at the tip.

Peduncle of second antenna 2.3 mm. long, with a denticulated ridge below its origin which extends upwards and inwards over the bucal orifice. First joint with a short spinule on its outer distal angle and a large, stout, setiferous lobe on the inner. Antennal acicle subcylindrical, without spinules, but bearing a few hairs in the middle and at the summit; equal in length to the first joint and to the inner lobe-like prolongation, reaching as far as the extremity of the second joint; the third joint is more than twice as long as the acicle. Flagellum about as long as the body, sparingly clothed with short hairs.

External maxillipedes about 2.5 mm. long; ischium joint with a row of eighteen equidistant denticles on its inner margin, and a strong spine—projecting at a right angle—near the distal extremity. Merus a little longer than the ischium, with an erect spine at its externo-distal angle; the two following joints are subequal in length and slightly hairy; seventh joint tapering, blunt and densely setose. Second joint of the exopod narrow, elongate, and almost reaching to the base of the sixth joint of the endopod; it is abruptly narrowed near the summit, and bears a few long hairs on its inner margin, and three long curved bristles on its outer border; the terminal joint has a long marginal fringe.

Chelipedes unequal, the right much the larger, about 11 mm. in length. Merus joint trigonus, its greater diameter nearly equal to its length; surfaces smooth; inner and inferior borders minutely spinulose; superior border with a series of scale-like projections, the broadest of which is situated immediately posterior to a subterminal transverse groove.



RIGHT CHELIFEDE x 6.  
Fig. 13a.

Carpus compressed, wider distally than long, and equal in length to the merus; inner surface deeply excavated and adapted to the inner base of the palm; outer surface covered with round flat scales, of which some are in contact at the base and at the sides. Upper and lower borders rounded, bounded on their external aspect by faint ridges, that on the upper being the most distinct; both are invested with round flat scales, which are rather oblique and raised at their apices; the upper and lower distal extremities terminate in an angular tooth. Hand compressed, slightly convex, its depth equal to four-fifths of the almost straight, rounded lower border; the latter has on its external aspect a faint minutely granular ridge, bounded above by a narrow smooth groove, which extends from the lower point of articulation to the tip of the finger.

Upper border equal in length to the mobile finger, somewhat acute proximally, and clothed throughout with scales, similar to but smaller and less distinct than those on the carpal border.

Lower border, fingers and both surfaces of the palm minutely granulose and slightly setose. Fingers acute, calcareous and crossed at the tips, with a narrow hiatus in the proximal half when closed; inner edge of each with four distinct denticles and two smaller near their bases; a few stiff setæ arise from deepish pits, and alternate with the teeth on the external edge of the lower finger.

Upper finger angular at the base internally; outer and superior surface rounded.

Left chelipede 9 mm. long; meral and carpal joints similar to but more slender than those of the right. Hand elongate, smaller than the carpus; surfaces of palm granulose; lower border straight, with a faint longitudinal ridge.



LEFT CHELIFEDE x 6.  
Fig. 13b.

Fingers slender, longer than the palm, meeting along their finely denticulated edges when closed; upper border with a slight granular ridge.

Ambulatory legs stoutish, the second pair a little longer than the first owing to the greater length of the merus and tarsus. Meral joints compressed, one-third as deep as long; surfaces and upper borders more or less scaly-denticulate; the lower borders armed with subspiniform granules.

Carpal joints about 0.1 mm. longer than the depth of the meral, very narrow proximally, rounded and smooth below, with four denticulated ridges above, and a blunt tubercle at the distal extremity.

Propodal joints equal or longer than the tarsal, a little compressed distally; lower borders remotely dentate and setose; lateral surfaces scaly; upper borders closely denticulate.

Tarsal joints compressed, laterally caniculate in the basal half, each armed on the lower border with ten or twelve horny spinules, including the slightly curved claw at the extremity.

Fourth pair of legs moderately slender, about 3.5 mm. long; meral joints equal to propodal and tarsal joints combined; upper borders smooth, lower slightly granular and hairy; posterior surface with an irregular row of setiferous scales, some of which are half cup-shaped; superior distal edges prominent and fringed with long hairs. Carpal and propodal joints more or less beset with distant elevated scales, subtended by tufts of setæ.

Rasp consisting of a single row of about fourteen scales; its length is nearly twice that of the short acute tarsus.

Fifth pair of legs subdorsal, slender. 3.7 mm. long; each coxal joint has a tubular prolongation, directed inwards and downwards, and their apical margins are fringed with long setæ; propodal joint as long as the carpus, densely clothed with longish curved setæ; rasp longer than broad; tarsus short, thick, with numerous rasp-like teeth at the blunt extremity.

Abdomen short, broad and membranous; the anterior segments are indistinct; the terga are narrow, short and barely distinguishable; pleopoda not seen, probably absent or very rudimentary.

Sixth segment calcified, with a median longitudinal groove, and another one arranged transversely.

Uropods equal, strongly calcified; outer ramus 1.1 mm. long and 0.6 mm. wide; rasp oval, with six rows of scales; inner ramus 0.7 mm. long and 0.4 mm. wide; rasp with five rows of scales.

Telson longer than broad, with a slight transverse ridge; lateral margins and the rounded extremity with a thick raised border.

This species resembles *Porcellano-pagurus edwardsii*, Filhol,\* but it differs from Filhol's species in many characters, of which the following are the most noticeable:—The unequal chelæ, the prominent external denticles of the front, the less prominent lateral teeth of the anterior sides on the carapace, and the weaker character of the armature and sculpture of the ambulatory legs.

The fifth pair of legs in *P. edwardsii* is represented as chelate, but I failed to find any such character in the example under notice. When viewed under the microscope with transmitted light, the propodus is seen to terminate in two rounded denticulated lobes, one about as long as broad, and the other twice as long as broad; the latter probably represents the tarsus, but there is no trace of articulation at its base.

Two males of this rare and curious form were obtained off Wata Mooli, in 54-59 fathoms.

## GALATHEIDEA.

### *Section* GALATHODEA.

### *Family* GALATHEIDÆ.

#### GALATHEA, *Fabricius*.

#### GALATHEA PUSILLA, *Henderson*.

*Galathea pusilla*, Henderson, Chall. Rep., Zool., xxvii., 1888, p. 121, pl. xii., figs. 1, 1a and 1b.

Station 44.

Two examples of this species were obtained off Bondi. The larger specimen has a parasite attached to the lower surface of the abdomen—probably a species of Rhizocephala. The "Challenger" examples were infested with a similar form.

The specimens differ considerably from the description and figure given by Henderson. The rostrum is slightly depressed, about 1 mm. long (measured from the lateral spines at the base), and 0.8 mm. wide, the sides gradually sloping to a pair of small

\* Filhol—Mission de l'Île Campbell, iii., 2, 1886, Crust., p. 410, pl. xlix.

but distinct spinules, situated 0.2 mm. from the apex; there are also rudiments of another pair about 0.08 mm. nearer to the extremity than the first.

The lateral margins of the front are deeply concave, smooth, adapted to the eye peduncles, each bearing a pair of spines; there is one at the base of the rostrum and another at the external angle, which is scarcely visible from above; posterior to the latter is a slight groove, immediately in front of the first lateral spine.

The spine at the base of the outer antenna is about 0.6 mm., but does not exceed the cornea of the eye, and cannot be seen from above if the eye is in its normal position; the first exposed joint of the peduncle has a spine on the inner and another one on the outer angle.

The basal joints of the first antennæ are large, subquadrate, with straight contiguous inner borders, the pair forming an operculum behind which the upper portions of the peduncles are concealed; the distal margins of the basal joints are slightly sinuate, and each bears five or six spinules; there is a pair close together near the middle, and the rest are situated on the inner and outer angles; two or three of these spines can be seen from above projecting on each side of the rostrum between the latter and the inner borders of the eye-stalks; the larger spines extend about 0.25 mm. beyond the frontal margin. Figure 1*b* on pl. xii. in the "Challenger" Report represents the general outline and the relative proportions of the joints of the external maxillipede, but the description does not agree with those under notice; the ischium joint, besides being acutely produced at the outer distal border, has a distinct spine on its inner extremity. There is an oblique denticulated crest on the anterior surface which extends longitudinally from just above the base to the summit, which is the highest part of the crest. In the same line on the merus there is a short ridge, but here the denticles are replaced by long setæ; the outer distal spine is slightly curved inwards, but that on the inner is erect, not curved as is stated to be the case in the "Challenger" example.

The chelipede differs from that figured by Henderson (fig. 1*a*) in having a longer carpal joint; the relative proportions of the joints are as follows:—Merus 2 mm., carpus 1.4 mm., palm 1.8 mm., fingers 1.5 mm.; the latter are obtusely rounded and rather strongly denticulated at their distal margins; their outer surfaces are rounded, the inner excavated.

Total length of body	...	...	...	...	10 mm.
Length of carapace	...	...	...	...	5 "
" " left chelipede	...	...	...	...	8 "
" " second leg	...	...	...	...	6.5 "

GALATHEA MAGNIFICA, *Haswell*.

*Galathea magnifica*, Haswell, Proc. Linn. Soc. N.S.W., vi., 1882, p. 761; Aust. Mus. Cat. v., Crust., 1882, p. 162, sp. 306.

## Station 30.

A single female example of this pretty species was obtained off Botany Bay, at a depth of 43 fathoms. On looking up the type some little difficulty was experienced from the fact that the label on the bottle had been destroyed. As, however, this was the only bottle unlabelled without name or locality it appeared likely that it contained the missing type or types from which the description was drawn. The bottle is of a peculiar kind which was largely used for storing other type specimens by the author of the Catalogue of Crustacea.

The examples agree with the brief description, and some exhibit slight traces of the "brilliant purple stripe down the centre of the carapace."

The following description is drawn from the "Thetis" example, and supplemented by frequent reference to the numerous specimens from Broughton Islands:—

Carapace with about eight or nine striæ, fringed with rather long hairs; each segment of the pleon has two rows of similar setæ, one on the anterior margin and the other situated in a central transverse groove; the hairs are everywhere somewhat patent, and give the body a villose appearance, which is quite characteristic, and very different from that of any other species in the Museum collection.

The rostrum is 1.8 mm. long, and 1.4 mm. wide at the base; the sides have three pairs of spines which are subequal in length; the terminal spine measures 0.5 mm., and exceeds the distal pair by 0.3 mm.; each inner angle of the front terminates in a small spine situated at the base of the rostrum, and another one exists on each outer angle. The lateral margins of the carapace have six spines, the first and fourth being slightly larger than the others; each side of the carapace has a small lateral spine situated in a transverse line with the first lateral spine, about twice its own length from the latter, and the same distance or more from the spine on the outer angle of the frontal margin. The gastric area bears a pair of small widely separated spinules situated a short distance behind the base of the rostrum, and in a line with the tips of the median pair of rostral spines.

Basal joints of first antennæ a little longer than broad, armed distally with three large outwardly inclined spines, one on the outer angle and two near the inner, between which the second joint takes its origin.

The basal joint of second antenna has a spine on its outer distal extremity and another somewhat smaller one on its inner; the second joint has also a small spinule on its inner distal angle. The eye peduncle and cornea measures 1.2 mm. in length and is about 0.7 mm. in diameter.

Measured in a median line, the ischium of the third maxillipedes is longer than the merus, the outer distal extremity is somewhat produced but obtuse; the inner border terminates in a spine; the anterior (cutting) ridge has about twenty-eight closely placed denticles; the inner border of the merus bears two strong spines, one at the middle and the other at the distal extremity.

The left chelipede has the merus joint compressed in the proximal half, with almost smooth inner and outer surfaces; the upper border is armed with five or six spinules, three in a line near the base and a pair situated on a slight transverse ridge at a short distance from the distal margin; the latter has four spines, subequal in size and in distance apart, all being visible from above; there are also two widely separated spines on lower margin.

The lower border and inner surface of the carpus are smooth; the external surface is armed with eight spinules, disposed in two longitudinal rows of four each; another row of four occurs on the upper border, and there is a large spine on the interno-distal angle.

Hand compressed; inner and outer surfaces of the palm scaly; external aspect of the lower border bearing a series of six spinules; the distal is somewhat larger than the others; the upper border is armed with five spinules. Fingers slender, rather narrow and excavated internally at the extremities, the lower one terminating in two prominent white denticles, the upper with three very small ones; inner edge of the former finely crenate. Anterior and posterior surfaces of the merus joint of the second leg smooth; lower border with two spines, one near to and the other at the distal extremity; there is also another spine just above the latter on the distal margin. Upper border with seven spines; the distal one is large and prominent.

Carpus with three spines on the upper border and two on the external surface; lower border smooth, with a small spine on the distal extremity.

Propodus with two spines situated on the proximal portion of the upper border; the lower border bears four mobile spinules at about equal distances apart, commencing at the proximal third.

Tarsus compressed, a little curved, tapering to an acute horny claw; lower border armed with six chitinous spinules, which arise from small bracket-like projections.

Total length of body from tip of rostrum to end of telson ... ..	14	mm.
Length of carapace, rostrum excluded ... ..	5	"
Breadth of carapace... ..	5	"
Length of left chelipede (detached) ... ..	11	"
"    "    merus ... ..	3·5	"
"    "    carpus ... ..	2	"
"    "    palm... ..	3	"
"    "    mobile finger ... ..	2·5	"
"    second leg ... ..	8	"
"    merus ... ..	2·5	"
"    carpus ... ..	1·2	"
"    propodus ... ..	1·9	"
"    tarsus ... ..	1·2	"

\*GALATHEA AUSTRALIENSIS, *Stimpson*.

*Galathea australiensis*, Stimpson, Proc. Acad. Nat. Sci. Phil., x., 1858, p. 89, sp. 351. Haswell, Aust. Mus. Cat. v., Crust., 1882, p. 161, sp. 304. Miers, Zool. Coll. "Alert," 1884, p. 277, pl. xxxi., fig. (B.).† Henderson, Chall. Rep., Zool., xxvii., 1888, p. 118.

The following are a few important characters which appear to have been omitted in previous descriptions :—

The rostrum is depressed, about 0·9 mm. long and 0·7 mm. wide at the base; when viewed in profile from the side, its tip is in the same plane as the first antero-lateral spines; the central area is longitudinally grooved and the margins are somewhat inflexed; the tips of the gastric spines extend over the base of the rostrum.

The ischium joint of the third maxillipedes is longer by 0·1 mm. than the merus; the inner border is setiferous and has a distinct spine at its distal end; there is also a small obscure spinule on the outer extremity.

The rather oblique (cutting) ridge on the anterior surface bears about twenty-one denticles; the preceding joint has also a few indistinct ones.

The merus joint is armed on its inner border with two spines, one large about the middle and the other small and situated near to the distal margin.

Carpus with two or three small spinules on the outer border, subtended by tufts of setæ.

\* Species marked with an asterisk were not obtained by the "Thetis" expedition.

† This should be A according to the lettering of the plate.

The third lateral spine is the largest and more distinct than the same spine in *G. corallicola*, Haswell.

\*GALATHEA CORALLICOLA, *Haswell*.

*Galathea corallicola*, Haswell, Proc. Linn. Soc. N.S.W., vi., 1882, p. 761; Aust. Mus. Cat., v., Crust., 1882, p. 161.

In the type specimen the rostrum is 0·8 mm. long and 0·55 mm. wide at the base; it is slightly depressed, longitudinally grooved, and somewhat inflexed at the sides. The tips of the gastric spines reach to the base of the rostrum.

The ischium joint of the third maxillipedes is equal to the merus; the former has the inner and outer borders setigerous and a rather large spine at its inner distal angle; the outer is obliquely produced but is rounded at the extremity. The anterior (cutting) ridge bears twenty-five denticles; four or five are also present in the same line on the preceding joint, but they are very small and ill defined.

The inner border of the merus is armed with two stout spines, one near the middle and the other midway between it and the distal margin; the outer border has three spinules, of which the distal one is the largest; the carpus is also armed with three or four small spinules on its outer border.

Length of carapace (rostrum excluded) ...	4·5 mm.
Breadth of carapace... ..	5 "
Length of right chelipede ... ..	17·5 "
"  merus ... ..	5 "
"  carpus ... ..	3 "
"  hand ... ..	7 "
"  mobile finger ... ..	3 "

\*GALATHEA ACULEATA, *Haswell*.

*Galathea aculeata*, Haswell, Proc. Linn. Soc. N.S.W., vi., 1882, p. 761; Aust. Mus. Cat., v., Crust., 1882, p. 162.

The type of this species, from Holborn Island, has the striae very prominent and well defined. On the anterior half of the carapace they consist of a series of short curved ridges, and form a neat symmetrical pattern, whilst those on the posterior are long and continuous from side to side. There are four main ridges, posterior to each in the median space, and there is a series of short straight isolated ridges.

There is a pair of gastric spines which are about 0.3 mm. apart, their tips scarcely reaching to the base of the rostrum; several small spinules occur on the surface of the carapace near the antero-lateral border; the latter is armed by eleven spines, three on the front over the space between the eye-stalk and the outer antenna, and one on the side below the insertion of the latter; the remainder form a lateral linear series, the posterior one being situated on the angle of the penultimate ridge.

The rostrum is flat, straight, about 2.2 mm. long and 1.3 mm. wide at the base; the sides have six equal spines, three on each margin; the terminal spine is 1.1 mm. long and exceeds the distal pair by 0.7 mm.; there is a smaller pair of spines near the base of the rostrum, one on each inner angle of the front.

The third maxillipedes have the ischium and merus joints equal in length—measured from the base to the actual apex in each case. The inner distal extremity of the former terminates in a small spinule; the outer is somewhat obliquely produced but not acute; the longitudinal (cutting) ridge on the anterior surface bears about twenty-four denticles; there are also six or seven in the same line on the preceding joint. The merus has two strong spines on the inner border, one in the middle and the other situated between it and the distal margin. The outer border is rounded and smooth.

Length of carapace (rostrum excluded)	...	4.0 mm.
„ left chelipede	... ..	14 „
„ merus	... ..	5 „
„ carpus	... ..	3.2 „
„ hand	... ..	7 „
„ mobile finger	... ..	4 „

The specimens recorded under this name in the "Challenger" Report by Henderson are probably distinct. In the description the gastric spines are said to be absent, which is not the case in *G. aculeata*, Haswell.

#### GALATHEA, sp.

##### Station 57.

There are three examples of what appears to be a new species, but unfortunately they are imperfect; the larger limbs are wanting.

The carapace is 3.5 mm. long by 3 mm. wide; the striæ are fine and about ten in number; rostrum 1.2 mm. long and 0.7 mm. wide at the base, straight, rather deeply grooved, with three pairs of lateral spines; the lowest pair have their tips separated by a space equal to the base of the rostrum; the following pairs are much closer together, owing to the inflection of the margins, the

median pair appearing to arise from the upper surface rather than the sides; terminal spine 0.4 mm. long, exceeding the distal pair by 0.2 mm.; inner angles of the front spinose, one on each side of the base of the rostrum; outer angles obtuse.

Lateral margins of the carapace armed with six spines, the first larger than those following, its apex reaching to the external angle of the front; there are two spinules near its base, one on the upper surface of the carapace and the other on the margin; a third spinule is situated on the lower surface below the lateral margin. The gastric spines are absent.

Eye peduncle about 0.9 mm. long and 0.7 mm. in diameter.

Ischium joint of the third maxillipedes longer by 0.1 mm. than the merus; the outer border is acute and slightly setose; the distal extremity much produced and has a small obtuse spine at its summit; the inner border is also acute, bears numerous setæ, and terminates in a spine. The longitudinal ridge on the anterior surface is armed with sixteen denticles, and there are about six in the same line on the preceding joint.

The inner border of the merus bears three spines, one at the proximal third, one in the middle, and the other at the distal extremity; the outer border has two setiferous scales, one median and the other distal.

This form, should it prove to be new, adds a fifth species to the group, in which the character and spinulation of the rostrum agrees more or less with that of *Galathea australiensis*, Stimpson; the other three are *G. corallicola*, Haswell, *G. aculeata*, Haswell, and *G. magnifica*, Haswell. According to Miers,\* *G. corallicola*, from Port Molle, "scarcely differs from *G. australiensis* except in the absence of the gastric spinules." In the type and also in the rest of the specimens—about seven or eight—from Port Molle the gastric spinules are present. In the original brief diagnosis they are described as being absent.

*G. aculeata*, Henderson,† appears to be a distinct species and not *G. aculeata*, Haswell; the latter has the gastric spinules present, whereas in Henderson's example the "gastric spinules are absent." The brief descriptions given of the above-mentioned species are insufficient for correct determination, and during the comparative examination of the "Thetis" material numerous notes were taken with a view to rendering their identification less difficult in the future. These have been used in drawing up a brief account of each species. The third maxillipedes probably afford the least variable specific characters, and they have been described at some length. In measuring the ischium and merus

\* Miers—Zool. Coll. "Alert," 1884, p. 278.

† Henderson—Chall. Rep., Zool., xxvii., 1888, p. 120.

joints the actual relative length of each is often difficult to determine owing to the unequal production of the apical portion; and whether viewed from the superior or inferior surface the same remark applies to the upper spine on the inner border of the merus, which, when viewed from one side, appears to be seated on the distal margin, but seen from the other its tip is about level with the margin. The validity of the species enumerated is an open question, and cannot be satisfactorily determined until a larger series of each are available; the amount of variation in the parts relied on as specific characters may then be estimated.

Under these circumstances it has been deemed best to leave the closely allied forms as they were, and give a brief description of each. The species dealt with in this manner are *G. australiensis*, *G. corallicola* and *G. aculeata*, none of which were obtained by the "Thetis" expedition.

The two remaining forms—*G. magnifica* and the species under notice—have been treated as fully as the material would admit; both appear to be quite distinct from any other Australian forms.

They were obtained off Wata Mooli, in 54-59 fathoms.

#### MUNIDA, *Leach.*

##### MUNIDA HASWELLI, *Henderson.*

*Munida haswelli*, Henderson, Chall. Rep., Zool., xxvii., 1888, p. 139, pl. iii., fig. 5, 5a-5b.

Stations 37, 48, 56, 57.

About sixty examples of this species are in the collection, including many young and a few females bearing ova. The largest male is about the same size as the type. The right chela agrees with that figured by Henderson in the relative proportion of the fingers to the palm, and also in the number of spines, of which there are five on the upper border. It is stated in the explanation of figure 5a that the chela is "doubtfully referred to this species." It appears to have been correctly delineated, and well represents the right chela as seen in the majority of the "Thetis" specimens. In some of the larger individuals of both sexes the fingers are not straight, but bent outwards at the base, and have a wide gap between their proximal edges when closed. The spinulation of the external maxillipedes differs slightly from the description given by Henderson. The inner border of the merus joint has five spinules, of which the proximal is large, the distal moderate, and the three between small; the outer border has six spinules—the distal one of moderate size, the remaining five

become gradually less as the proximal end is approached. The inner margins of the sixth and seventh joints are clothed with numerous stout setæ, many of which are biserrate, the teeth being a little longer than broad at the base, and are confined to the distal half or third; there are two or three long smooth bristles at the extremity of the seventh joint.

Obtained off Botany and Wollongong, in 50 to 80 fathoms.

## MACRURA.

### Group NORMALIA.

#### Tribe SYNAXIDEA.

#### *Family* SCYLLARIDÆ.

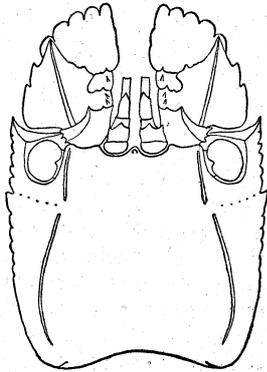
#### ARCTUS, *Dana*.

#### ARCTUS CRENATUS, sp. nov.

(Fig. 14.)

Station 57.

The carapace measures 5.2 mm. in length, its breadth anteriorly is 6.5 mm., between the orbits 3.5 mm., and at the posterior border 5.3 mm.; each lateral margin is armed with a series of fourteen obscure denticles, usually disposed in pairs; the posterior tooth of each pair is small and sometimes wanting; there are five denticles in advance of the shallow cervical incision; the remainder occur at equal distances apart, and extend to near the posterior end of the carapace. The front has a small obtuse rostriform process, surmounted by a tubercle; the margin has a raised border, which is continued on each side of the process along a wide sinus to a point external to the bases of the first antennæ; the border is here abruptly curved inwards, and terminates in a small tubercle; from the latter to the external angle of the orbit the margin is slightly deflexed.



CARAPACE x 5.  
Fig. 14.

Orbital border smooth, elevated; the cavity longer than broad; inner angle prominent, obtuse, outer angle with a very small tubercle; anterior extra-orbital angle acute, equal to the breadth of the orbit, and projecting about the same distance beyond it. Upper surface of carapace minutely and remotely hairy, central area punctate, nearly smooth, hepatic and branchial regions more or less granulose. There is a pair of prominent lateral carinæ commencing at the inner angle of the orbit from the latter point to the ill-defined cervical groove; the course of the carinæ is straight, from thence they are slightly curved outwards, and terminate near the hinder margin; each keel is capped by a series of short ridges, which are slightly higher at their anterior end, but are scarcely dentiform.

The gastric region is moderately elevated, and is bounded in front and laterally by a sharply defined narrow groove; anteriorly there is a short ridge, and posteriorly a broadish tubercle, and a smaller one on each side near its outer limits.

Cardiac region somewhat higher than the gastric, with a submedian pair of short granular ridges anteriorly, and a widely separated pair of granules posteriorly. Hinder margin of carapace with a transverse line of four or five granules situated near the centre.

Pleon smooth, without any distinct arborescent markings; the first three segments with a well-marked median notch on the posterior border, second to fifth slightly carinate centrally; the second is rather higher than the rest, and somewhat granulose; sixth segment with an obscure pair of widely separated lobes on the posterior border.

There are four pairs of pleopoda, but the first pair are wanting; the rami are long, narrow and setiferous; the inner ramus is equal in length to the peduncle, and bears a single stylamblys, which is a little longer than the ramus, somewhat swollen apically and tipped by a series of small papillæ.

The distal margin of the calcified portion of the outer ramus of the uropod is truncated and bidentate; that of the inner ramus is oblique and tri- or quadridentate. The telson is marked by a pair of short, elevated, longitudinal ridges, situated proximally and rather nearer the margins than the centre; the calcified portion has a deep, broad, central emargination, and each distal border is transversely truncated and bispinose; the spines are subequal; there is one on the inner and another on the outer angle.

Eyes dark brown, with lighter reticulations; cornea 0.9 mm. in diameter; the outer margin of the orbit is separated from the external border of the carapace by a space about 0.3 mm. wide.

The first antennæ are 3.3 mm. in length; the basal joint is stout, compressed, and has a short process on its superior distal extremity, which bears an obtuse spine; its length without the process is equal to the second joint; the third joint is two-thirds the length of the second; it is somewhat dilated distally, and terminates superiorly in an acute point.

Outer flagellum one-third shorter than the inner, consisting of eleven articuli; the basal pair are broad, long and glabrous; the first is twice as long as the second; the third to the eighth equal in length, gradually diminishing in diameter, and densely setiferous; ninth very narrow, elongate; terminal pair equal in length. Inner flagellum with thirteen articuli, all subequal in length except the first two, which are twice as long as those succeeding.

Second antennæ 2.6 mm. long, and 2.1 mm. wide; the basal joint has several spines on the superior surface; three spines occur on the produced outer border, and two on the distal margin—one in the middle, and the second midway between it and the inner border. The second joint has two spines in a longitudinal line near the inner border; the distal margin bears three spines, one on and another near to the inner angle; the third is situated at the outer angle, and marks the termination of a slightly curved diagonal crest; the outer border has two denticles—one in the middle and the other in a transverse line with the inner angle. Third joint small, with a ridge-like spine near its inner border. The distal margin of the fourth joint is slightly ciliated, and has five evenly rounded teeth, the internal one being rather narrower than the rest; the outer border is smooth, and the inner bears two small denticles.

The ischium joint of the external maxillipedes has a distinct, smooth, longitudinal ridge on the inferior surface near the inner border; a similar ridge occurs in the same line on the merus; the former joint is longer than broad; its length exceeds that of the latter, and also that of the exopod; the merus tapers rapidly beyond the middle, especially on the inner border.

Carpus as broad as long, nearly circular in outline; its outer border, distal margin and superior distal surface closely covered with plumose hairs.

Propodus shorter than the preceding joint; its width is equal to the length of the tarsus; the latter terminates in a small spinule; a few stiff setæ are scattered here and there on the inner borders of the last two joints.

The anterior legs are stout, and much shorter than those succeeding; the propodal joint varies greatly in length; in the first leg it is shorter than the tarsus, in the second the two joints

are subequal, in the third and fourth the propodus is somewhat longer, and in the fifth it is nearly twice as long as the tarsus.

There is a pair of strong backwardly directed spines at the inner bases of the coxal joints of the posterior pair of legs; similar spines are present in *Arctus immaturis*, Bate.\*

Two male examples were obtained off Wata Mooli, at a depth of 54 to 59 fathoms.

## DENDROBRANCHIATA.

### Group NORMALIA.

#### Tribe PENÆIDEA.

#### Family PENÆIDÆ.

#### PENÆUS, *Fabricius*.

#### PENÆUS CANALICULATUS, *Oliver*.

*Pencæus canaliculatus*, Oliver, *Encycl. Method.*, viii., 1811, p. 660.  
Bate, *Chall. Rep., Zool.*, xxiv., 1888, p. 245, pl. xxxi.,  
pl. xxxii., fig. 4, pl. xxxvii., fig. 2.

Stations 22, 23, 41, 50.

Examples of this common species were obtained off Newcastle and Shoalhaven Bights, in 15 to 52 fathoms.

#### PENÆUS MACLEAYI, *Haswell*.

*Pencæus macleayi*, Haswell, *Aust. Mus. Cat.*, v., *Crust.*, 1882,  
p. 201, No. 375.

Station 50.

Two specimens were secured off Shoalhaven Bight, in 15-18 fathoms.

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\* Bate—*Chall. Rep., Zool.*, xxiv., 1888, pl. x., fig. 3.

## PHYLLOBRANCHIATA.

### Group NORMALIA.

#### Tribe CRANGONIDEA.

#### *Family* CRANGONIDÆ.

#### Genus PONTOCARIS, *Bate*.

#### PONTOCARIS PROPENSALATA, *Bate*.

*Pontocaris propensalata*, Bate, Chall. Rep., Zool., xxiv., 1888, p. 496, pl. xc., figs. 2, 3.

Station 37.

A single imperfect example of this species was obtained off Botany Bay, at a depth of 50 fathoms.

The Challenger specimen was obtained off Ki Islands at Station 192, at a depth 140 fathoms.

## STOMATOPODA.

#### *Family* SQUILLIDÆ.

#### PSEUDOSQUILLA, *Guérin*.

#### PSEUDOSQUILLA STYLIFERA, *H. Milne-Edwards*.

*Gonodactylus stylifera*, H. Milne-Edwards, Hist. Nat. Crust., ii., 1837, p. 530, pl. xxvii., figs. 9, 14. Gay, Hist. Chile, Zool., iii., 1849, p. 225, pl. ii., fig. 3.

*Pseudosquilla stylifera*, Miers, Ann. Mag. Nat. Hist. (5), v., 1880, p. 112. Bigelow, Proc. U.S. Nat. Mus., xvii., 1894, p. 502, p. 505, fig. 3.

Station 21.

Three examples of this species were obtained off Newcastle-Bight, in 28 to 40 fathoms. They exhibit a few characters worthy of notice, and they differ slightly from the published figures.

The rostral plate is a little longer than broad, and attains to but does not overlap the bases of the ocular peduncles. In Gay's

and also in Milne-Edwards' figure the rostrum is depicted as covering the bases of the eye-stalks. In Bigelow's figure it is represented as just reaching their bases.

The carpal joint of the raptorial limbs has a small acute spine on its superior distal extremity. The propodal joint has two mobile spines situated proximally on the inner side of the upper border; the posterior spine is much the larger; the proximal two-thirds of the outer aspect of the superior border is finely denticulated.

Miers states that the "basal prolongation of the uropoda terminates in a large flattened lobe, which is denticulate on its inner margin and ends in a spine." In the examples under notice the inner margins are quite smooth throughout, and they are represented as being smooth in Bigelow's figure.

The penultimate joint of the outer ramus of the uropoda has a small spine at the distal extremity inferiorly, and four mobile spines on its outer distal angle, of which the proximal one is small; those following rapidly increase in size, the fourth often being one-third as long as the terminal joint.

The terminal segment agrees exactly with the figure given by Bigelow.

Outer laminae of uropoda brilliant violet when alive; in formol, pale violet, the marginal fringe crimson.

Length of largest specimen from the tip of the rostrum to the end of telson, 130 mm.

This and the following species have not hitherto been recorded from Australian waters.

*Habitat*.—Chile; San Pedro, California.

### SQUILLA, *Fabricius*.

#### SQUILLA ARMATA, *H. Milne-Edwards*.

*Squilla armata*, H. Milne-Edwards, Hist. Nat. Crust., ii., 1837, p. 521. Gay, Hist. Chile, Zool., iii., Crust., 1849, p. 223. Kirk, Trans. N.Z. Inst., xi., 1878, p. 401. Miers, Ann. Mag. Nat. Hist. (5), v., 1880, p. 26. Chilton, Trans. N.Z. Inst., xxiii., 1890, p. 60. Bigelow, Proc. U.S. Nat. Mus. xvii., 1894, p. 515, figs. 9-10.

#### Station 8.

One female example of this species was obtained off Barranjoey, in 25-28 fathoms; it measures 80 mm. from the top of the rostrum to end of the telson.

*Habitat*.—Chile; New Zealand.

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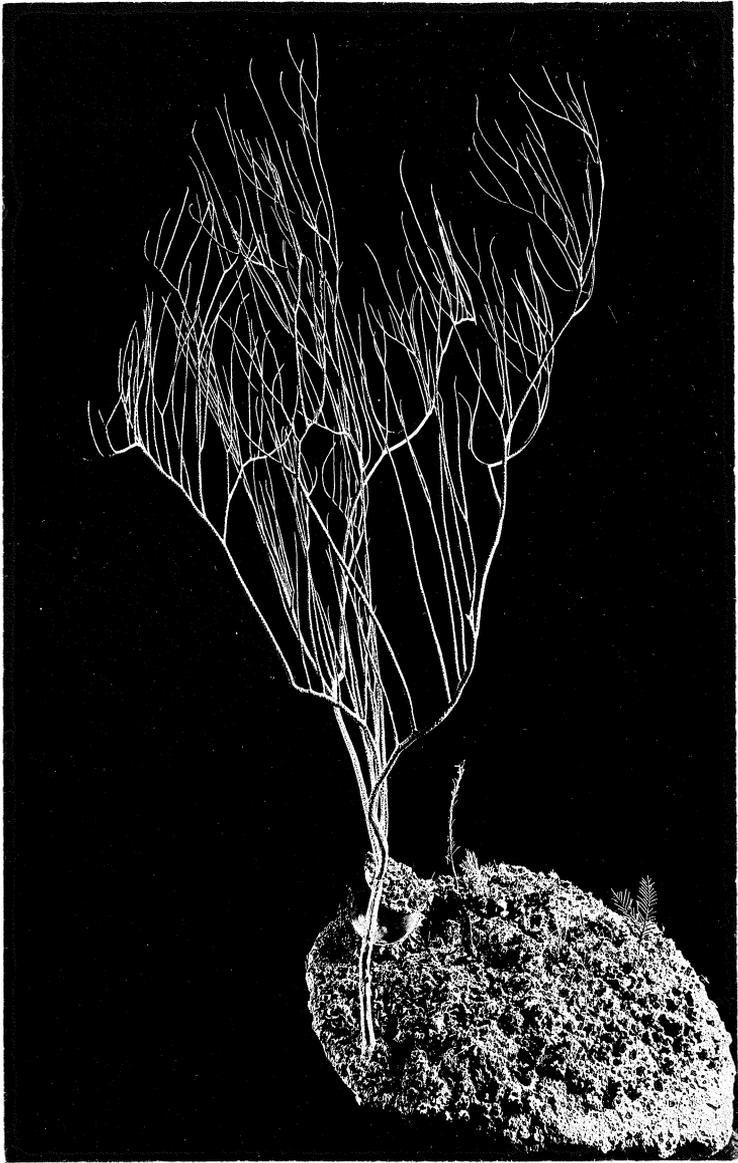
NOTE.—The figures in the text have been reproduced by zincography from the author's drawings.

EXPLANATION OF PLATE XXXII.

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Stone from Long Reef, near Manly, with attached *Gorgonia*, &c.

From a photograph by the Author. The figure has been reversed under the heliographic process.



T. WHITELEGGE, Photo.

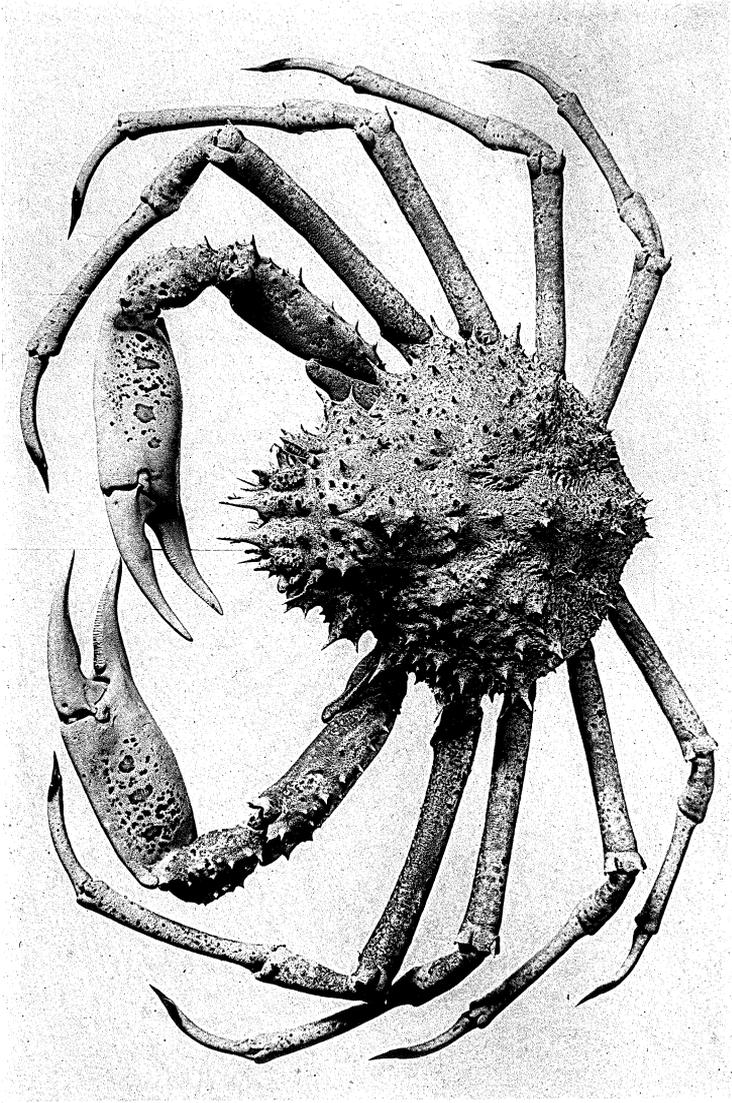
EXPLANATION OF PLATE XXXIII.

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*Chlorinoides waitei*, Whitelegge.

Adult male, reduced to about one-third.

From a photograph by the Author. The figure has been reversed under the heliographic process.



T. WHITELEGGE, Photo

EXPLANATION OF PLATE XXXIV.

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*Paramithrax tuberculatus*, Whitelegge.

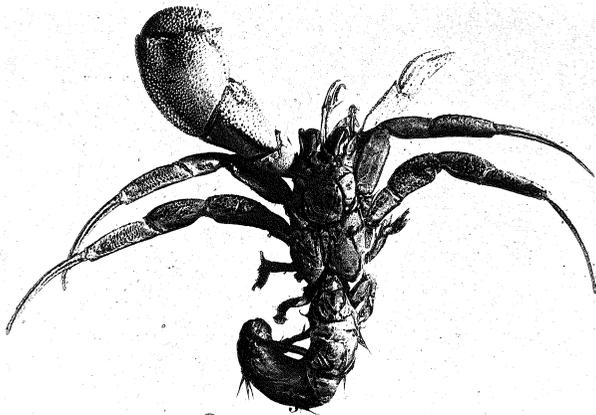
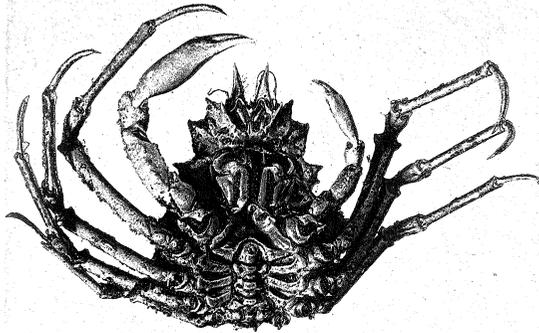
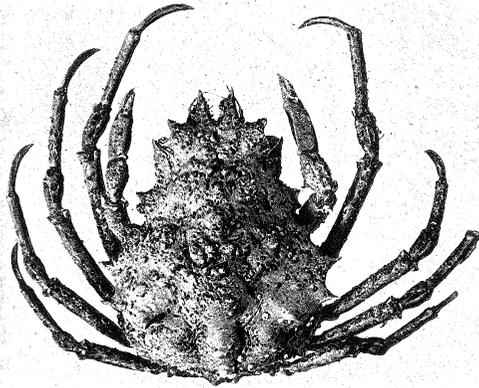
Fig. 1.—Adult female, slightly reduced.

Fig. 2.—Adult male, slightly reduced.

*Sympagurus diogenes*, Whitelegge.

Fig. 3.—Adult female, slightly reduced.

From photographs by the Author. The figures have been reversed under the heliographic process.



EXPLANATION OF PLATE XXXV.

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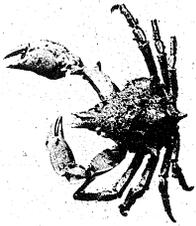
*Pilumnus australis*, Whitelegge.

- Figs. 1-2.—Adult males, natural size.  
Fig. 3.—Adult female, natural size.  
Fig. 4.—Hand of adult male, natural size.

*Pugettia mosaica*, Whitelegge.

- Fig. 5.—Adult male, about natural size.  
Fig. 6.—Side view of female, natural size.  
Fig. 7.—Adult male, natural size.

From photographs by the Author. The figures have been reversed under the heliographic process.



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