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Imago ♂ (in alcohol). Plate XIX., figs. 6*a–g*.

Upper lobes of the eyes red, lower pitchy black; ocelli light-grey; epistome dark-red, four yellow spots on each side, under the ocelli. Thorax pitchy black. Abdomen dark-grey, with lighter median line. Two grey spots on segments 2–6. Fore leg very long and slender, light red-brown spot at each end and at the centre of the femur, the segments marked with blackish-brown; second and third legs similarly marked. Setæ light-grey, with broad black rings at alternate segments, the rings gradually spreading towards the extremity. Wings vitreous, base fulvous; veins brownish-black in marginal and submarginal areas, with cross-veinlets greatly thickened. Marginal and submarginal areas lightly tinged toward extremities. Brownish-grey spot behind the bulla. Length of body, ♂, 10 mm.; length of setæ, 15 mm.; length of wing, 10 mm.; length of fore leg, 15 mm.

Imago ♀. Plate XVIII., figs. 5*a–g*.

Very similar.

ART. XXI.—*A Revision of the* Crustacea Anomura *of New Zealand.*

By GEO. M. THOMSON, F.L.S.

[*Read before the Otago Institute, 22nd November, 1897.*]

Plates XX., XXI.

IN the "Catalogue of the Stalk- and Sessile-eyed Crustacea of New Zealand," published in 1876, Miers gives a list, with descriptions, of thirteen species of *Anomura*, belonging to nine genera. Of these, *Remipes marmoratus* and *Pagurus imbricatus* do not belong to New Zealand at all, having been collected by Hombron and Jacquinot at Raffles Bay, which is in Northern Australia. *Pagurus pilosus*, also of M.-Edwards, belongs to Dana's genus *Paguristes*. In regard to the remaining species, two of them—*Eupagurus cristatus*, Edw., and *E. spinulimanus*, Miers—have not again been identified, but I retain them here provisionally.

The number of species included in the present list is thirty-five, belonging to sixteen genera.

The Crustacea of this group are not well represented in the seas of New Zealand—at any rate, in the littoral zone, which is the only one which has been investigated up to the present time. In individuals, such species as *Petrolisthes elongatus*

and *Grimothea gregaria*—as it is convenient still to call this form, referred to *Munida*—are enormously abundant; but hermit crabs have not been met with at all freely.

I have had the privilege—thanks to the kindness of Dr. Benham and Captain Hutton—of examining all the species belonging to this group of Crustacea which are preserved in the Otago and Canterbury Museums, and Sir James Hector has kindly sent me specimens from Wellington. I have also to thank Mr. H. Suter, of Christchurch, for intrusting to me all his specimens for examination. In all cases the small amount of material available shows that hermit crabs and their allies are not commonly met with.

With the increase of trawling-vessels it ought soon to be possible to explore the coastal zone to a depth of 50 fathoms or more, and this may disclose a number of forms which are unknown at present.

In the classification adopted I have followed Henderson in the "Report of the *Anomura* collected by H.M.S. 'Challenger,'" 1888. I have not given the synonym where this has already been given by Miers and Henderson, as their works are readily available.

ANOMURA.

DROMIDEA.

Fam. DROMIDÆ, Dana.

Carapace subglobular. Legs of moderate size, cylindrical; 4th and 5th pairs short and (especially the last) subdorsal in position. Eyes capable of retraction into well-defined sockets. The males have the vasa deferentia produced as tubular prolongations from the coxal joints of the 5th pair of legs.

Genus Cryptodromia, Stimpson.

Carapace convex, pubescent. Palate with a slight elevation on each side. Chelipedes with their apices calcareous. All the legs are more or less nodose; the last two pairs are subchelate, the penultimate joint ending in a spiniform process.

Cryptodromia lateralis, Gray. Plate XX., figs. 1 and 2.

Miers, Cat. N.Z. Crust., p. 57, &c.

This species, according to Henderson, ranges from Australia and New Zealand to the coasts of Japan. In Miers's catalogue it is described as from New Zealand (Coll. Brit. Mus.), and Heller (Voy. of the "Novara") obtained it at Auckland.

I have not met with it myself, nor do any specimens appear to exist in any of the museums of the colony. I am

indebted to the authorities of the Australian Museum, Sydney, for Australian specimens, which have enabled me to figure the species.

PAGURIDEA.

Fam. I. PAGURIDÆ, Dana.

Hermit crabs, in which the branchiæ are laminate in form, the central stem bearing two rows of flattened leaflets. All inhabit shallow seas.

1. First and second abdominal segments without genital appendages.	
a. Fourth pair of legs chelate.	
Front with rostral projection; ocular peduncles slender; chelipedes subequal	1. *Clibanarius*.
b. Fourth pair of legs subchelate.	
Front with rostral projection.	
Chelipedes unequal, the *right* usually the largest	2. *Eupagurus*.
Chelipedes subequal	3. *Aniculus*.
Chelipedes unequal, the *left* the largest	4. *Stratiotes*.
2. First and second abdominal segments with genital appendages (the first segment only in the female)	5. *Paguristes*.

Fam. II. PARAPAGURIDÆ, Smith.

Hermit crabs, in which the branchiæ consist of a central stem bearing two rows of rounded filaments, gradually decreasing in size towards the apex. All inhabit very deep sea.

Chelipedes stout, very unequal, the right larger; males without a protruded vas deferens, and having genital appendages on the first two abdominal segments	1. *Parapagurus*.
Chelipedes slender, the right slightly larger; males with a protruded vas deferens, and without the genital appendages on the first two abdominal segments	2. *Pagurodes*.

Genus incertæ sedis.

Carapace produced into a long rostrum; abdomen bearing one pair of appendages on its anterior portion, furnished with plates at its posterior extremity. Living among Algæ, and not seeking the protection of an empty shell	*Porcellanopagurus*.

Genus 1. CLIBANARIUS, Dana.

Front acute in the middle. Ocular peduncles slender, the basal scales small and close together. Antennal acicle short, the flagellum naked. Chelipedes similar, subequal; hand small, fingers opening horizontally, excavated internally and horny at the tips. Ambulatory legs smooth, often with longitudinal colour-markings, penultimate pair chelate.

1. **Clibanarius cruentatus**, Edwards.

1848. *Pagurus cruentatus*, M.-Edw., Ann. Sc. Nat., x., p. 62.
1876. *Clibanarius cruentatus*, Miers, Cat. N.Z. Crust., p. 67.
1885. *Clibanarius cruentatus*, Filhol, Mission de l'ile Campbell, p. 424, pl. 42, fig. 1.

This species was found in the northern portion of New Zealand by Quoy and Gaimard, but was unknown to Miers, who gives a very brief diagnosis of it from Milne-Edwards.

Filhol (*l.c.*) has given a good representation of this species from the original specimens, and has given the following description of it: "This species is very remarkable on account of its general colour, which is a blood-red, dotted over with a great number of little white spots. The front is angular in its anterior portion, and the front border of the carapace hides the ophthalmic segment. The outer antennæ are long and naked; the portion of the joint supporting them and corresponding to the palp is feebly developed, and covered with hairs on its outer margin. The arms are small and equal. The carpos is much reduced, and presents a somewhat strong spine at the anterior extremity of its upper margin. The hand is furnished with spines on the whole of its upper edge and along the whole extent of its outer face. All these very acute prominences are of a white colour, and they give insertion at their base to some hairs of a reddish colour. The ambulatory feet are not spinous, and they are covered with hairs inserted in little bunches on the white spots. The dimensions are—Length, 20 mm.; breadth, 5 mm." Filhol does not seem to have collected this species, nor have I heard that any one else has seen it in New Zealand.

2. **Clibanarius barbatus**, Heller.

Miers, Cat. N.Z. Crust, p. 67.

This species occurs in the British Museum, apparently from Auckland, and was found in that locality by Heller. I have not seen it, nor does it appear to have been collected by any one else since Heller's time.

In the report on the "Challenger" *Anomura*, Henderson, speaking of *Paguristes subpilosus*, says (p. 78), "A New Zealand species of *Clibanarius* — the *C. barbatus* of Heller— apparently presents many points of resemblance, but the dactyli of the ambulatory limbs are described as scarcely shorter than the corresponding propodi." It is to be regretted that he did not compare the specimens which, according to Miers, occur in the British Museum.

Genus 2. Eupagurus, Brandt.

Front usually slightly rostrate. Ocular peduncles slender, with small basal scales. Antennal acicle elongated and

slender; flagellum long and naked. Chelipedes unequal, the right usually the largest; fingers closing vertically. Penultimate pair of legs subchelate.

A. Front of carapace produced to an acute angle on the median line.

Propodos of right chelipede—

a. Without hairs.

Outer face furnished with six rows of rounded tubercles	1. *E. novæ-zealandiæ.*
Thickly covered with conical tubercles, lower margin curved and denticulated	2. *E. kirkii.*
Propodos fastened nearly at right angles to carpos, surrounded by a continuous denticulated crest ..	3. *E. cookii.*
Surface nearly quite smooth.	
Propodos of left chelipede ovoid and granular	4. *E. hectori.*
Propodos of left chelipede with an acute spinose central crest ..	5. *E. lacertosus.*

b. More or less covered with hairs.

Outer surface with six longitudinal rows of tubercles	6. *E. traversi.*
Outer surface granular, margins slightly toothed	7. *E. stewarti.*

B. Front of carapace not produced on median line.

Propodos of right chelipede—

Broad, covered on outer side with scattered tubercles among matted pubescence, especially on median elevation ..	8. *E. rubricatus.*
With two lines of spinules among short, dense hair	9. *E. spinulimanus.*
With six rows of round-topped tubercles buried in thick hair	10. *E. edwardsi.*

C. Incertæ sedis.

a. Chelipedes very short, propodos of right chelipede surrounded by a single denticulated crest	11. *E. campbelli.*
b. Right chelipede with carpos completely spinous, propodos surrounded on the upper face by three denticulated crests ..	12. *E. thomsoni.*
c. Carpos of right chelipede with thin upper and lower margins, having the form of a denticulated crest	13. *E. cristatus.*

1. **Eupagurus novæ-zealandiæ**, Dana. Plate XX., figs. 3–5.

1843. *Pagurus cristatus*, Dieffenb. N.Z., ii., p. 266.
1847. *Pagurus cristatus*, List Crust. Brit. Mus., p. 59.
1852. *Bernhardus novi-zealandiæ*, Dana, U.S. Expl. Exped., xiii., Crust., part i., p. 440, pl. xxvii., fig. 1.
1876. *Eupagurus novæ-zealandiæ*, Miers, Cat. N.Z. Crust., p. 63.
1885. *Eupagurus novæ-zealandiæ*, Filhol, Miss. de l'ile Campbell, p. 412.

Front of carapace with the median prolongation and the lateral angles subequally produced; back with a few scattered tufts of hairs.

Ocular peduncles slender, about three-fourths as wide as the carapace in front; basal scale produced on the inner side into a short lobe, ending in several small spines.

Antennules with peduncle reaching to or slightly exceeding the ocular peduncles.

Antennæ with peduncle subequal to the ocular peduncles; basal joint produced on its hairy outer side to about the middle of the penultimate joint, obtusely toothed at its apex, and bearing at its antero-internal angle a short acute spine; acicle slightly shorter than ocular peduncles, somewhat curved outwards, and with about five tufts of hair on the inner edge; flagellum reaching to end of right chelipede.

The right chelipede has the meros nearly smooth, but with a small fringe of hairs on its upper distal margin; carpos somewhat rounded above, broadening distally, with numerous conical tubercles (in small specimens only granules) more or less arranged into five longitudinal rows, and mixed—especially towards the outside—with a few tufts of short hairs. Seen from the side the meros is nearly quadrangular, while the carpos is deeply triangular, the upper face forming the base; its outer side is smooth, and the distal extremity is margined by a row of rounded tubercles. On the inner side the carpos is produced into a pyramidal tubercle. The propodos is about equal in width to the carpos, is ovate in form, nearly quite glabrous, and is covered with rounded tubercles, forming with the margins six longitudinal rows; of these, the 2nd from the upper margin is continued into a strong ridge-like row of tubercles on the dactylos, the 3rd and 4th unite to form a single ridge on the immobile finger, the 5th is very short; the fingers are strongly toothed on the inner side.

The left chelipede is much smaller than the right, and is somewhat slender; the carpos bears a single row of spines on its upper edge, with numerous tufts of hairs; the propodos, which is scarcely larger than the dactylos of the right chelipede, has about two rows of rounded tubercles on its upper edge, and a few tufts of hairs on its inner edges.

The ambulatory legs are long, furnished with numerous tufts of coarse hairs, especially on the margins and towards the extremities. In the posterior pair the hairs on the dactyli tend to assume the appearance of a thick fringe on either margin.

The colour of large specimens is dark-grey, greyish-green, or brown, often relieved with blue at the base of the joints of the six anterior legs, the tips of the antennæ, and the granules on the chelipedes.

Size: Length of body, 62–77 mm.; length of carapace alone, 13–14 mm.; length of ocular peduncles, 7–8 mm.; length of right chelipede, 45–60 mm.; length of left chelipede, 28–37 mm.; length of 3rd leg, 40–65 mm. The last measurement is taken from a rather large specimen from Stewart Island. Miers gives the length as from $1\frac{1}{2}$ in. to 2 in., which is a common enough size for shallow-water specimens; but Filhol is wrong when he makes use of relative size as a distinction between this species and his *E. edwardsi*. Many of my Dunedin specimens do not exceed about 20 mm. in length.

Distribution.—New Zealand and Falkland Islands.

Habitat.—This species appears to be common in both Islands. Dana found it in the Bay of Islands, and Heller at Auckland. I have numerous specimens from Wellington (*Sir James Hector*), Otago Harbour, and Stewart Island, where Filhol also obtained it.

2. Eupagurus kirkii, Filhol. Plate XX., figs. 8–10.

1885. *Eupagurus kirkii*, Filhol, Miss. de l'ile Campbell, p. 416, pl. li., fig. 5.

Front of carapace produced on the median line into an acute short rostrum; angular projections on each side hardly defined. Back of carapace almost quite glabrous.

Ocular peduncles slender, about as long as the width of the carapace in front; basal scale produced into a small nearly naked tooth on the inner margin.

Antennules with the peduncle one-fourth shorter than the ocular peduncles.

Antennæ with the peduncle scarcely longer than the ocular peduncle; outer spine of basal joint reaching to half the length of, and acicle as long as or slightly exceeding, the ocular peduncles; flagellum scarcely as long as right chelipede.

Chelipedes very unequal, more or less covered with fine scattered hairs.

Right chelipede with meros compressed, its upper margin slightly ridged but smooth, its upper distal edge furnished with a short spine and a few fringing hairs, below it is broadened and excavated to receive the next joint, its outer and inner lower margins spinose; carpos rather rounded above and broadening distally, its inner upper margin spinose, with numerous short spines scattered over the rather pubescent upper surface; propodos quite glabrous on its outer face, which is thickly covered with conical tubercles, upper margin somewhat thin and crest-like, two rather prominent tubercular ridges are on the outer face, while the lower margin forms

a curved and strongly denticulated crest; the short dactylos has tubercles similar to those on the propodos.

Left chelipede more hairy and much smaller than the right; carpos with a few spines on its upper margin; these become very strong at the distal end; propodos with a very strongly serrated crest along the outer side, and another much less produced and curved along the lower margin; the dactylos is two-thirds as long as the propodos, is slightly curved, and only impinges against the latter at its apex.

Ambulatory legs long and sparingly furnished with hairs, the dactyli of both pairs furnished on their lower edge with a row of pectinate spines.

Colour: My spirit specimens are more or less striped and marked with red and white, the markings being very prominent in longitudinal lines on the ambulatory legs.

Size: Length of body, 29 mm.; length of carapace alone, 6 mm.; length of ocular peduncles, 4 mm.; length of right chelipede, 25 mm.; length of left chelipede, 20 mm.; length of 3rd leg, 31 mm.

Distribution.—Only found in New Zealand.

Habitat.—At Massacre Bay (*Filhol*), Dunedin, and Stewart Island.

3. **Eupagurus cookii,** Filhol. Plate XX., figs. 11–13.

1885. *Eupagurus cookii*, Filhol, Miss. de l'ile Campbell, p. 417, pl. li. fig. 2.

Front of carapace produced on the median line into an acute short rostrum, the angular projections on each side hardly defined. Back of carapace with a very few tufts of hairs.

Ocular peduncles slender, scarcely dilated at the end, about as long as the width of the carapace in front; basal scale produced into a small nearly naked tooth on its inner margin.

Antennules having the peduncles one-fourth shorter than the ocular peduncles.

Antennæ with peduncles longer than the ocular peduncles, last joint long and naked; basal joint produced on its outer side to about the length of the penultimate joint; acicle reaching to the end of the ocular peduncles; flagellum reaching to the end of the right chelipedes.

Chelipedes very unequal in size.

Right chelipede with meros compressed and rounded above, below it is hollowed out to receive the flexion of the succeeding joint, and both its outer and inner lower margins are fringed with a close-set row of spines; carpos much compressed, its upper margin produced into a very prominent spinose crest, the outer side rounded and furnished with a

few long hairs, the inner side nearly smooth; the propodos is articulated to the carpos almost at right angles, and perhaps is thus intended to close the aperture of the shell in which the animal lives, the whole surface is covered with rounded granulations. The margins form a very prominent continuous denticulated crest, the upper (inner) margin being nearly straight from its base to the end of the mobile finger, while the outer is nearly semicircular. A median longitudinal ridge on the outer face and a second near its inner margin produce a deep hollow between them.

Left chelipede very thin and much compressed; the meros closely resembles that of the right side; the carpos is not distinctly crested, but its upper edge bears a row of curved spines; the propodos has its upper margin greatly produced into a thin denticulated crest which passes outwards and downwards in a strong curve; the nearly straight dactylos is about three-fourths as long as the propodos, and is closely applied along its lower edge.

Ambulatory legs with very few hairs, dactyli in both pairs, with a row of sharp spines along the lower margin.

Size: Length of body, 27 mm.; length of carapace, 6 mm.; length of ocular peduncles, 3·5 mm.; length of right chelipede, 21 mm.; length of left chelipede, 18 mm.; length of 3rd leg, 20 mm.

Distribution.—Only found in New Zealand.

Habitat.—Cook Strait (*Filhol*); on Wanganui Bar, 10–20 fathoms (*S. H. Drew*); Dunedin; Stewart Island, 8 fathoms.

A mutilated specimen of what I take to be an immature example of this species was sent me by Captain Hutton. It was found in a worm-tube, and was taken at a depth of 110 fathoms, at Bounty Island. The length of the right chelipede was barely 3 mm.

4. **Eupagurus hectori**, Filhol.

1885. *Eupagurus hectori*, Filhol, Miss. de l'ile Campbell, p. 419, pl. li., fig. 1.

The front is spinous at its anterior portion, and the lateral margins of the anterior portion of the carapace are rounded.

Antennæ having the acicle greatly developed; flagellum long (in the figure they are shown as greatly exceeding the chelipedes).

Right chelipede has the "carpos triangular, with the base below. Its outer and inner faces are somewhat strongly convex; its upper edge is thick, almost rounded. This latter portion has, as in the outer face of the carpos, some slightly defined granulations. The hand is strong, its upper margin very short, while its extended lower edge is regularly convex. The whole external surface of the hand as well as the carpos

is glabrous." Dactylos with some obtuse denticulations along its lower or inner border, with short stiff hairs between.

Left chelipede has the carpos with an enlarged upper edge bearing two series of tubercles and tufts of hairs; propodos ovoid, its upper surface and that of the dactylos granular.

Ambulatory feet long, with a few hairs on the upper and lower edges of the joints; carpos of the anterior pair spinous on the upper edge.

Abdomen without plates.

Length of the male, 20 mm.; breadth of carapace, 5 mm.

Habitat.—Filhol states that the species occurs somewhat rarely along all the coasts of the colony, but becomes more abundant towards the south, especially in Stewart Island.

I have recently received from Stewart Island a few immature specimens which appear to belong to this species.

5. **Eupagurus lacertosus,** Henderson.

1888. *Eupagurus lacertosus*, Henderson, Rep. Anom. Chall. Exped., p. 63, pl. vi., fig. 7.

E. lacertosus, var. *nana*, *l.c.*, p. 64, pl. vii., fig. 1.

Median frontal process of carapace prominent and acute, lateral projections less marked, each tipped by a small spine.

Ocular peduncles moderately slender.

Antennules with the second joint of the peduncle subequal with the eye-stalk.

Antennæ having the peduncles exceeding the eye-stalks by almost the whole length of the ultimate joint; acicle long and slender.

Chelipedes unequal, both relatively of large size, with a granular and spiny surface.

Right chelipede with the upper surface of the carpos covered with tubercular spines, inner border furnished with a row of acute spines the two anterior of which are bifid; propodos about one-third longer than carpos, upper surface granular, leaving two oblique tubercular ridges.

Left chelipede with two rows of acute spines on its upper edge, and a large bifid spine near the centre of the anterior and upper border; propodos with an acute central carina, armed with tubercular spines.

Size: Length of body, 33 mm., but Australian forms taken from shallower water, and distinguished by Henderson as var. *nana*, do not exceed 12 mm. in length.

Distribution.—South-east coast of Australia and Tasman Sea.

Habitat.—In the Tasman Sea, to the west of Cook Strait, near the Australian cable line, in 275 fathoms.

I do not know this species.

6. **Eupagurus traversi,** Filhol. Plate XXI., figs. 1–3.

1885. *Eupagurus traversi*, Filhol, Miss. de l'ile Campbell, p. 422, pl. l., figs. 5 and 6.

Front of carapace produced into an acute point on the median line, lateral angles not so well defined. Back of carapace almost destitute of hairs.

Ocular peduncles rather less than width of front of carapace, slender; basal scale rather slightly developed, produced on the inner side into a small ciliated spine.

Antennules with the peduncles reaching only a very short way beyond the eye-stalks.

Antennæ having the peduncles reaching slightly beyond the ocular peduncles; basal joint with a minute spine on the inside, and having the outer spine reaching half-way to the extremity of the eye-stalks, acicle barely reaching to the extremity of the eye-stalks; flagellum not reaching to end of the right chelipede, joints coloured red and white in alternate groups.

Chelipedes very unequal.

Right chelipede with the meros rounded and smooth above, with a single spine on the distal end of the upper margin, and a fringe of small spines on the lower distal border; carpos short, narrow, but widening distally, upper and outer surface with a very few spines buried among long hairs; propodos slightly wider than carpos, with six rows of spinose tubercles on the outer face buried among long hairs, inner face rugose, almost free from hairs; fingers with very strong teeth on their opposed surfaces.

Left chelipede narrow and much compressed; meros and carpos very hairy, each with two closely approximated rows of tubercles on the upper margin; fingers curved, with strong terminal teeth.

Ambulatory feet rather hairy, especially towards the extremities; second pair with a single spine at the extremity of the upper edge of the carpos; dactyli ending in very acute dark-coloured claws.

Size: Length of body, 27 mm.; length of carapace, 6 mm.; length of ocular peduncle, 4 mm.; length of right chelipede, 15 mm.; length of left chelipede, 12 mm.; length of 3rd leg, 19 mm.

Distribution.—Confined to New Zealand.

Habitat.—Cook Strait (*Filhol*), Kenepuru Sound (*J. McMahon*), Lyttelton, Dunedin, Stewart Island (*Filhol*).

Filhol states that "the ophthalmic segment is almost completely hidden under the anterior margin of the carapace," and states that this character, *inter alia*, serves to distinguish the species from *E. edwardsi* and *E. novæ-zealandiæ*. In

every other respect his description agrees so well with the numerous specimens in my possession that I have no doubt of the identity of my species with his; but the character does not seem to me at all a conspicuous one, nor do I attach any importance to it from a classificatory point of view.

7. **Eupagurus stewarti**, Filhol.

1885. *Eupagurus stewarti*, Filhol, Miss. de l'ile Campbell, p. 418, pl. li., fig. 3.

Front of carapace with three angular projections, that in the median line prominent.

Ocular peduncles long; eye a little enlarged transversely.

Antennæ long; flagellum covered with fine long hairs.

Right chelipede rather strongly developed; upper face of carpos almost flat, inner edge toothed and spinous, outer granular, the whole surface bearing a few scattered slightly elongated hairs; propodos almost quadrilateral, and very different from that of any other New Zealand species, its upper and lower margins slightly toothed and whole upper surface granular, and bearing a few hairs; dactylos evenly crenulated and hairy along the upper margin, which is much extended, and bent sharply at its anterior rounded extremity.

Left chelipede with the carpos triangular, and furnished on the anterior two-thirds of its upper margin with somewhat strong spines.

Abdomen without plates.

Size: Length of the body (in the male), 20 mm.; breadth of the carapace, 4 mm.

Distribution.—New Zealand.

Habitat.—Stewart Island (*Filhol*).

I do not know this species.

8. **Eupagurus rubricatus**, Henderson.

1888. *Eupagurus rubricatus*, Henderson, Rep. Anom. Chall. Exped., p. 69, pl. vii., fig. 4.

Front of carapace smooth, frontal projections scarcely indicated, median obtusely rounded.

Ocular peduncles rather stout, with the corneæ dilated; basal scales with the terminal portion slender and acuminate.

Antennules with the distal end of the second joint of the peduncle not reaching the end of the eye-stalk.

Antennæ have the peduncle slightly exceeding the eye-stalk; acicle reaching nearly to the end of the peduncle, basal joint with a minute spine on its inner margin, outer prolongation spinulous, and reaching as far as distal end of the penultimate joint.

Chelipedes unequal, and of moderate size.

Right chelipede with a single spine on the distal end of the upper border; carpos with a number of conical spines scattered over the inner half of the pubescent upper surface; propodos much broader than, and nearly twice as long as, the carpos, upper surface covered with a matted pubescence, among which are scattered white rounded tubercles, especially on an irregular central elevation, inner and outer margins fringed with long hairs and a row of blunt spines; dactylos with several rows of rounded tubercles.

Left chelipede with a double row of spines on the upper surface of the carpos; propodos placed at an angle to the carpos, outer border strongly convex, armed with strong spines, surface pubescent and tubercled as in the right chelipede; dactylos densely pubescent on the upper surface, ending in a minute horny claw.

Ambulatory legs with the carpi moderately spiny in front, dactyli longer than the propodi, each ending in a yellow horny claw, borders fringed with delicate horny spines, especially towards the apex.

Size: Length of carapace, 13 mm.; length of right chelipede, 28 mm.; length of left chelipede, 21 mm.; length of 3rd leg, 36 mm.; length of ocular peduncle, 5·8 mm.

Distribution.—New Zealand.

Habitat.—About sixty miles east-north-east of East Cape, in 700 fathoms.

Only a single mutilated specimen (abdomen wanting) was in the "Challenger" collection.

9. **Eupagurus spinulimanus**, Miers.

1876. *Eupagurus spinulimanus*, Miers, Ann. Mag. Nat. Hist., ser. 4, xvii., p. 222.
1876. *Eupagurus spinulimanus*, Miers, Cat. N.Z. Crust., p. 63, pl. i, fig. 6.
1885. *Eupagurus spinulimanus*, Filhol, Miss. de l'ile Campbell, p. 423.

Miers characterizes this species as having the front of the carapace without a median projection, the flagella of the antennæ with series of three and five joints alternately annulated with red and white, the chelipedes clothed with short dense hair, with the carpos and propodos spinulous.

Right chelipede with a series of larger spines on the upper inner margin of the carpos; propodos with the spinules arranged in two longitudinal lines.

Ambulatory legs hairy, hairs more dense on the dactyli, which are longer than the propodi; propodi of second pair with a row of spinules on the upper margin.

I have never met with this species, nor does Filhol appear to have come across it.

10. **Eupagurus edwardsi,** Filhol. Plate XX., figs. 6, 7.

1885. *Eupagurus edwardsi,* Filhol, Miss. de l'ile Campbell, p. 412, pl. lii., figs. 1 and 2.

Front of carapace sinuate, not at all produced on the median line, but with the angular projection at the sides fairly pronounced. Tufts of hair on the back and sides of the carapace.

Ocular peduncles subequal with width of the front of the carapace, slender, hardly dilated above; basal scales slightly developed, produced on the inner side into a spine furnished with hairs on both margins.

Antennules having the peduncle slightly exceeding the eye-stalks.

Antennæ with peduncle scarcely reaching the apex of the eye-stalk; basal joint short, with a very small spine on the inner side, and produced on the outer side into a hairy spine, which is almost as long as the penultimate joint of the peduncle; acicle rather shorter than ocular peduncle, and with tufts of hair on the inner margin; flagellum not reaching to end of the right chelipede, with the joints coloured red and white in alternate series of two or three up to seven.

Chelipedes very unequal.

Right chelipede having the meros compressed, its upper distal margin ending in a spine and a few fringing hairs, the outer side nearly smooth, and having a few spines and hairs on the lower margin; carpos widening distally, its inner face bearing a few hairs, its outer covered with thick tufts of hairs; the upper edge is sharply defined by seven or eight strong spines, while numerous shorter ones are mingled with the hairs on the upper half of the outer face of the joint; the propodos is much broader than the carpos, and is covered with a thick felt of hairs, which are produced like fringes on the margins; among these hairs there are placed about six rows of tubercles (counting the margins), of which the second forms a ridge which continues along the outer side of the dactylos, and the fourth also forms a similar ridge along the immobile finger (these tubercles are usually pink or violet in colour, are rounded above, and stand on a contracted pedicel); the inner face of the propodos is nearly quite smooth, the inner (opposed) faces of the fingers are strongly toothed.

The left chelipede has a somewhat similar meros, also with a single spine on its upper distal margin; the carpos has two rows of spines on its upper surface, with numerous tufts of hairs, which become very dense towards the distal end; the propodos is much compressed, oval in form, thickly covered with a felt of hairs forming a dense fringe on its

lower and outer margin, and bearing three rows of tubercles on the outer face—one central and two marginal, the inner face is furnished with scattered tufts of long hairs; the dactylos is nearly straight, and is about half as long as the propodos.

The ambulatory limbs are furnished on both margins of the joints with tufts of hairs, which become very dense on the dactyli, at the extremities of which they are mingled with acute spines; the carpos of the second pair also bears a row of spines on its upper edge.

Size: Length of body, 77 mm.; length of carapace, 14 mm.; length of ocular peduncle, 11 mm.; length of right chelipede, 55 mm.; breadth of right chelipede, 14 mm.; length of left chelipede, 43 mm.; length of 3rd leg, 56 mm.

Distribution.—New Zealand.

Habitat.—Stewart Island (*Filhol*); Dusky Sound (*R. Henry*); Ocean Beach, Dunedin.

I have only one specimen from each locality, and that from the last named is only about one-third the size of the one described.

11. **Eupagurus campbelli**, Filhol.

1885. *Eupagurus campbelli*, Filhol, Miss. de l'ile Campbell, p. 421, pl. lii., fig. 5.

Filhol says of this species: "It seems to me very different from all the forms as yet described from other parts of New Zealand. It is characterized by the form of its arm, which is remarkably short. The carpos of the right chelipede is swollen and considerably enlarged towards its anterior extremity. The propodos is short and massive, its outer or upper face surrounded by a tolerably well marked but slightly prominent crest. The fingers are very slightly developed, and are furnished with slight denticulations on their margins. The outer border of the carpos of the left chelipede is straight at its origin, but soon bends outwards and becomes strongly convex; the propodos is much reduced, is triangular in form, and acute at its apex."

Habitat.—Perseverance Bay, Campbell Island, 10–12 fathoms.

I do not know the species.

12. **Eupagurus thomsoni**, Filhol.

1885. *Eupagurus thomsoni*, Filhol, Miss. de l'ile Campbell, p. 423, pl. li., fig. 6.

Filhol very briefly describes this species as follows: "The right chelipede is very strong; its carpos is completely spinous. The propodos presents on its upper face a crest furnished with obtuse and close denticulations; this crest is continued an-

teriorly till it joins the outer or lower margin of the propodos. Two other crests, less prominent but furnished with finer and more pointed tubercles, surround the upper face of the propodos. The inner edge of this part is strongly spinous. The inner edge of the carpos of the left chelipede is very convex, lamellar (?), and toothed."

Habitat.—Cook Strait.

I do not know the species.

13. **Eupagurus cristatus,** M.-Edw.

1836. *Pagurus cristatus*, M.-Edw., Ann. Sci. Nat., ser. 2, vi., p. 269.
1837. *Pagurus cristatus*, M.-Edw., Hist. Nat. Crust., t. ii., p. 218.
1876. *Eupagurus cristatus*, Miers, Cat. Crust. of N.Z., p. 62.
1885. *Eupagurus cristatus*, Filhol, Miss. de l'ile Campbell, p. 412.

Front margin of carapace prominently produced on the median line.

Chelipedes granulous or slightly spinous; carpi having the upper and lower margins in the form of a denticulated crest; propodi slightly compressed, with one or two thin prominent ridges.

The description given by Milne-Edwards is too imperfect for identification, and I do not know the species, nor could Miers distinguish it. Yet Filhol says, "This species is not very common in New Zealand. I have found it in Cook Strait, and ranging as far south as Stewart Island." It is very unfortunate that he did not give a description and figure of it, for it is quite unknown to other carcinologists.

Genus 3. Aniculus, Dana.

Front acute in the middle. Ocular peduncles long and slender. Antennal acicle short and stout, the flagellum naked. Chelipedes very short, subequal; fingers opening vertically, excavate internally, black and horny at the tips. Antepenultimate pair of ambulatory legs subchelate.

1. **Aniculus typicus,** Dana.

Miers, Cat. N.Z. Crust., p. 64.

This well-marked species occurs, according to Miers, on the shores of various islands in the Pacific, and on the coast of Australia. It was obtained by Heller at Auckland, but does not seem to have been met with since in New Zealand. I have a specimen collected at Funafuti, which was kindly forwarded to me by the authorities of the Australian Museum (Sydney).

Genus 4. STRATIOTES, nov. gen.

Front with a distinct rostral projection. Ocular peduncles long and slender, the basal scales small and situated close together. Antennal acicle short and straight; flagellum ciliated. Chelipedes unequal, the left larger; fingers moving vertically, scarcely excavated. Penultimate pair of legs subchelate.

This genus appears to be allied to *Diogenes*, Dana, but the latter is distinctly characterized by the movable rostriform process situated between the ocular peduncles.

Stratiotes setosus, nov. sp. Plate XXI., figs. 4–6.

Pagurus setosus, Filhol, Miss. de l'ile Campbell, p. 490, pl. xlix., figs. 5–7.

Carapace with the front less than half its width, slightly produced into an angular point on the median line; lateral angular projections very slight, but defined by a short spine; sides of the front with a row of minute spinules; surface with tufts of hairs, especially on the sides.

Ocular peduncles straight, cylindrical, quite smooth, nearly as long as the whole width of the carapace; basal scale produced on its inner side into a short spinose lobe.

Peduncle of the antennules slightly longer than the ocular peduncles.

Peduncle of the antennæ not reaching to the end of the ocular peduncles; ultimate joint nearly naked; basal joint transverse, with a minute spine on its inner edge and produced on the outer edge; acicle lanceolate, very acute, reaching beyond the penultimate joint of the peduncle, with one or two spines near its base and numerous hairs on its surface and margins; flagellum reaching to the extremity of the right chelipede, furnished with a thick fringe of setæ.

Chelipedes very unequal, left much the larger.

The right chelipede has the meros sharply keeled above, ending in a sharp spine, outer and inner faces nearly quite smooth. The rest of the limb is covered, especially on its upper edge and outer side, with long densely tufted hairs, while the inner side is nearly smooth. The carpos, propodos, and dactylos are subequal in length, and their upper edge bears a row of strong spines, which diminish in size towards the end of the finger.

The left chelipede is very strong. The meros has a few strong spines on its distal upper edge and on both its lower margins. The carpos is short, with a rounded upper and outer side, furnished with numerous spines, which are especially strong on the upper margin, and are more or less hidden by short thick hairs, which are especially numerous towards

the distal end. The propodos and dactylos are thickly covered on the outside with conical protuberances, which on the basal half are buried in thick hairs; both fingers are quite naked on the inside.

Ambulatory limbs long and very hairy, especially on the margins of the joints.

I cannot specify the colour of the species, all my spirit specimens being of a uniform yellowish-brown colour.

Size: Length of body, 70 mm.; length of carapace alone, 21 mm.; length of ocular peduncles, 10 mm.; length of right chelipede, 29 mm.; length of left chelipede, 39 mm.; length of 3rd leg, 52 mm.

Habitat.—I have received this species from Wellington (*Sir James Hector*), from Lyttelton (*Captain Hutton*), and from Cook Strait (*Filhol*).

Filhol (*l.c.*) has figured this species on plate 49, figs. 5 to 7, and at p. 490 briefly describes it under the name of *Pagurus setosus*, as follows: "I thought at first of referring to *Pagurus pilosus* a species of Crustacean of which I had gathered two specimens in Cook Strait. I have figured one of them somewhat enlarged, but further examination showed me that I was wrong in the first instance, and that the form of Crustacean which I had found was identical with a *Pagurus*, also occurring in New Zealand, and figuring under the name of *Pagurus setosus* in the collections of the Paris Museum. The description of this species, which appears to be rare, has never yet been given. The outer antennæ are long, and are covered on their external margin with long and fine hairs. The upper and outer margins of the hand present a series of large tubercles. The feet are furnished on the anterior and posterior margins of the different articulations with extremely delicate long hairs. The specimen which I have figured is magnified three times."

Genus 5. Paguristes, Dana.

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

1. **Paguristes pilosus,** M.-Edwards.

Pagurus pilosus, Milne-Edwards. (See Miers's Cat., p. 66.)

Miers has reproduced Edwards's description in the Cat. N.Z. Crust. The original specimens are in the collections of the Paris Museum. One specimen was apparently found among the "Challenger" *Anomura*, near Wellington, in 10 fathoms. Henderson says of it, "A male specimen, from which the left chelipede and ambulatory limbs have disappeared, apparently belongs to this species. The hairs on the chelipede and other parts are characteristically branched."

I do not know the species.

2. **Paguristes subpilosus,** Henderson.

Rep. Anom. Chall. Exped., p. 77, pl. viii., fig. 2.

Two specimens were found to the west of New Zealand, near the line of the Australian cable, at a depth of 150 fathoms (lat. 39° 32′ S.; long. 171° 48′ E.). These are the only specimens known.

Fam. II. PARAPAGURIDÆ, Smith.

Genus 1. PARAPAGURUS, S. J. Smith.

The generic characters are given very fully in the Chall. *Anomura*, p. 85.

Parapagurus latimanus, Henderson.

Rep. Anom. Chall. Exped., p. 91, pl. x., fig. 2.

A single male specimen was dredged in Cook Strait, near Wellington, at a depth of 10 fathoms.

I do not know the species.

Genus 2. PAGURODES, Henderson.

Pagurodes inarmatus, Henderson.

Rep. Anom. Chall. Exped., pl. x., fix 5.

Five specimens were obtained by the trawl from a depth of 1,100 fathoms, at a point about sixty miles east of Cape Turnagain. The same species was obtained off Marion Island, far to the south-east of Cape Colony, at a depth of 1,375 fathoms.

Genus incertæ sedis.

PORCELLANOPAGURUS, Filhol.

The only species is described as below by Filhol, but no generic character has been published.

Porcellanopagurus edwardsi, Filhol.

Filhol, Miss. de l'ile Campbell, p. 410, pl. xlix.

The following description is translated almost literally

from the original description: "I gathered this species at Campbell Island, at depths of from 4 to 5 metres, and on the coast of Stewart Island, under similar conditions. It is in form a very remarkable Crustacean, combining, as it were, the characters of the *Porcellanidæ* with those of the *Paguridæ*. It lives in the midst of Algæ, and does not seek, like the latter animals, a place of shelter in abandoned shells. The carapace is semi-oval in shape, and ends in front in a pointed rostrum, which is wide at its base and slightly convex on the sides. The upper margin of the orbit is smooth and raised a little behind. The ocular peduncles extend a little beyond the apex of the rostrum. Almost immediately behind the outer angle of the orbit the edge of the carapace carries two spines, the first being much smaller than the second, which is flattened and very convex on its outer edge. Behind this projection, about 1 mm. from its base, there is placed a much stronger, more distinct spine, which is obtuse at its apex. In front of it is a very small tubercle, which makes a slight projection on the outer border of the carapace. Behind this spine there is a second, which projects transversely outwards and backwards. Its posterior edge is straight, the anterior convex. The apex, whether simple or bifid, is always thickly furnished with fine hairs (*mousse*). Behind this projection the edge of the carapace is straight, and is continued back as far as the articulation of the abdomen. The dorsal surface of the carapace is everywhere covered with fine granulations. The abdomen is somewhat membranous, translucid, and only furnished with plates at its posterior extremity. It bears, in the anterior portion, a pair of short and slender feet. The anterior antennæ are as long as the ocular peduncles, and are terminated by a bunch of hairs. The outer antennæ are very long and slender. The first pair of feet are strongly granular, and the outer and inner faces of the hand and of the fingers are covered with fine tufts of hairs arranged longitudinally. The following pairs of feet are covered with somewhat fine granulations, which on the anterior margin of the 3rd and 4th joints are produced into small spines. The last joint ends in a hooked claw, and its posterior margin bears fine short hairs along its whole length. In the largest specimens collected by me the carapace measures 13 mm. in length and 11 mm. in width."

GALATHEIDEA.

Fam. PORCELLANIDÆ, Henderson.

Carapace broadly ovate, smooth, regions faintly defined; front usually trilobed, processes never of great length. Chelipedes broad and often flattened; ambulatory limbs robust and of moderate length. Antennules concealed; antennal

peduncle directed backwards. External maxillipedes with the ischium broad and meros provided with a prominent internal lobe. Abdomen small, bent under the thorax, to which it is closely applied; females with two (or three) pairs of slender uniramous ovigerous appendages on the 4th, 5th (and 3rd) segments; males with one pair of genital organs on 2nd segment.

I. Basal joint of antennal peduncle short, partially concealed in the orbital cavity, not reaching the superior margin of the carapace.	
a. Sides of rostrum entire, lateral margins of carapace with a single post-ocular spine, or smooth	1. *Petrolisthes*.
b. Sides of rostrum spinose, lateral margins of carapace spinose	2. *Petrocheles*.
II. Basal joint of antennal peduncle forming an acute and somewhat flattened projection external to the orbit, and joined to the margin of the carapace, second joint placed at some distance from the orbit	3. *Porcellana*.

Genus 1. PETROLISTHES, Stimpson.

1858. *Petrolisthes*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 65.
1876. *Petrolisthes*, Miers, Catal. N.Z. Crust., p. 59.
1882. *Petrolisthes*, Haswell, Catal. Austral. Crust., p. 145.
1888. *Petrolisthes*, Henderson, Rep. Anom. Chall. Exped., p. 104.

Carapace subovate, depressed, usually slightly longer than broad; front triangular, with the sides entire; lateral margins more or less undulated, not spinose. Eyes rather large. Chelipedes broad and flattened. Ambulatory legs with short robust dactyli, ending in a single claw.

Sides of carapace entire, front quite entire ..	1. *P. elongatus*.
Sides of carapace with a spine or small tooth, front with small spines	2. *P. novæ-zelandiæ*.

1. **Petrolisthes elongatus**, M.-Edw. Plate XXI, fig. 8.

1837. *Porcellana elongata*, M.-Edw., Hist. Nat. Crust., ii., p. 251.
1843. *Porcellana elongata*, White, Dieffenb. N.Z., ii., p. 265.
1874. *Petrolisthes elongatus*, Miers, Zool. "Erebus" and "Terror," Crust., p. 3, pl. iii., fig. 3.
1876. *Petrolisthes elongatus*, Miers, Catal. N.Z. Crust., p. 60.

Carapace nearly smooth, covered with fine granulations and rather convex, rotundate in form, with thin entire lateral margins, which end in a subacute tooth outside the eyes; front triangular, entire, depressed, with a median groove, apex subacute or obtuse.

Basal joint of antennules hardly visible from above.

Outer maxillipedes with all the joints smooth on the outer margins.

Chelipedes large, granular; meros with a strong obtuse tooth on its upper margin; carpos with the outer and upper margin thin and nearly entire or with a slightly defined tooth at the proximal end, lower margin with about three shallow teeth near the apex or quite entire; propodos wide, with strong curved fingers.

Ambulatory legs compressed, with the meros smooth and much dilated, especially in the two last pairs; propodos with numerous longish hairs, that of the anterior pair spinose on the lower margin; dactylos short and very hairy.

Colour: Slaty-blue above, lighter below. T. W. Kirk, describing living examples (Trans. N.Z. Inst., vol. xi., p. 396), says, "Above dark-blue, greenish-blue, or sometimes even black; below green, getting much darker towards the posterior margin of the anterior legs; anterior face of wrist a bright red; mobile finger and antennæ deep brown."

Size: Length of carapace, 17 mm.; breadth of carapace, 16 mm.; length of antennæ, 27 mm. When the chelipedes are stretched as widely as they will go naturally the apices of the carpi are distant 49 mm. from one another, while the tips of the fingers are 90 mm. This is taken from the largest specimen in my collection.

Distribution.—Australia and Tasmania.

Habitat.—This is one of the commonest of the New Zealand shore-crabs, and always occurs close to and a little below high-water mark. It lives under stones, its flattened carapace and greatly compressed claws enabling it to lie very close to the ground in such localities. It is an active animal, with powerful weapons of defence in its chelipedes, with which it can give a sharp nip.

2. **Petrolisthes novæ-zelandiæ,** Filhol. Plate XXI., fig. 9.

1885. *Petrolisthes novæ-zelandiæ*, Miss. de l'ile Campbell, p. 408, pl. xlviii., figs. 4 and 5.

1885. *Petrolisthes stewarti*, Filhol, *l.c.*, p. 410, pl. xlviii., fig. 1.

Carapace somewhat coarsely granular, with a short spine (not always well defined) on each side at the level of the anterior part of the cardiac region, and an acute spine outside the eyes; a transverse depression crosses the carapace between the eye-sockets, and is defined posteriorly by a row of hairs; the front is slightly depressed, and is elevated into two rounded lobes on the inside of the eye-sockets, with a groove between them, the whole front being more or less armed with sharp teeth.

The basal joints of the antennules are furnished with numerous short teeth on their outer edges, and are visible from above in front of the carapace.

Eye-peduncles with one or more short spines.

Outer maxillipedes with the third joint spinose on the outer margin.

Chelipedes with a nearly square meros; carpos with the upper margin rather thin, crest-like, and obscurely toothed (a prominent ridge is sometimes present on the outer side), and the lower margin has three more or less defined teeth.

Ambulatory feet with the meros scarcely dilated, and with only a few scattered hairs on the upper edge of the carpos and propodos; dactylos rather elongated.

Size: Length of carapace, 8 mm.; breadth of carapace, 7·5 mm.; breadth between tips of the carpi of the chelipedes (fully stretched), 15 mm.; length of antennæ, 16 mm.

Habitat.—Cook Strait and Stewart Island (*Filhol*); Wanganui (*S. H. Drew*); Lyttelton, dredged (*Chilton*); Blueskin Bay, trawled, and Bay of Islands, dredged in 8 fathoms; Akaroa, dredged in 6 fathoms (*Suter*); New Brighton, from roots of *Macrocystis* (*Suter*).

This is evidently not a shore-living species, though apparently common in shallow water. There is a great deal of variation in the extent to which the spines are developed on the sides of the carapace and the chelipedes. The largest specimens seem always to be the smoothest, and the smaller ones more spinous. Considering how great the range of this variation is among my specimens, I cannot recognise any sufficiently distinctive character on which Filhol can separate his *P. stewarti*.

Some of Suter's New Brighton specimens have the limbs very roughly granular.

Genus 2. PETROCHELES, Miers.

1876. *Petrocheles*, Miers, Ann. Mag. Nat. Hist., ser. 4, xvii., p. 222.

1876. *Petrocheles*, Miers, Catal. N.Z. Crust., p. 60.

Carapace subovate, depressed, slightly longer than broad; front triangular and with its sides spinose; lateral margins with a series of spines. Chelipedes elongated, slender, with a series of spines on the anterior margin of the carpos.

The distinction between the two genera—*Petrolisthes* and *Petrocheles*—is a very trivial one, and Miers only classes them as sub-genera.

Petrocheles spinosus, Miers.

1876. *Petrocheles spinosus*, Miers, Ann. Mag. Nat. Hist., ser. 4, xvii., p. 222.

1876. *Petrocheles spinosus*, Miers, Catal. N.Z. Crust., p. 61, pl. i., fig. 5.

This well-marked species occurs in many parts of the colony, but apparently has not been met with very abundantly. Two specimens occur in the Otago Museum—one from Massacre Bay (*Captain Hutton*), and the other from Portland Island (*C. H. Robson*); I have received specimens from Waipapapa Point (*J. F. Erecson*), and from Taylor's Mistake (*H. Suter*).

Genus 3. Porcellana, Lamarck.

Carapace suborbicular or subovate, the length usually greater than the breadth. Frontal region prominent and dentate, the teeth usually well developed. Eyes of moderate size, the orbits deep. Chelipedes moderately flattened, the carpos short and usually provided with a single projecting lobe near the proximal end of the internal margin; the digits frequently contorted. Ambulatory limbs with the dactyli short and robust, ending in a single claw.

Porcellana rupicola, Stimpson.

A single specimen is recorded, and figured by T. W. Kirk in Trans. N.Z. Inst., vol. xi., p. 396, as taken at Lyall Bay, Wellington.

Fam. GALATHEIDÆ.

Carapace elongate, regions well defined and usually rugose; front produced into a prominent and acute rostrum. Chelipedes and ambulatory limbs elongated and frequently slender. Antennules exposed; antennal peduncle directed forwards. External maxillipedes subpediform, with the ischium and meros narrow, and frequently spinose internally. Abdomen broad and well developed, simply bent or folded on itself, not applied to the underside of the thorax, terminating in a large swimming-fan formed of the telson and the appendages of the 6th segment; females with four pairs of simple slender ovigerous appendages on 2nd, 3rd, 4th, and 5th segments (those of the 2nd and 4th sometimes rudimentary); males with two pairs of well-developed accessory genital organs on the 1st and 2nd segments (those of the 1st pair sometimes rudimentary or absent), and three pairs of short, usually flattened, appendages on the 3rd, 4th, and 5th segments (all of them sometimes rudimentary).

Genus 1. Galathea, Fabricius.

Rostrum flattened and of moderate breadth. Carapace with pubescent transverse striæ; the gastric region usually with a few spines; abdomen unarmed.

Galathea pusilla, Henderson. Plate XXI., fig. 7.

1885. *G. pusilla*, Henderson, Ann. and Mag. Nat. Hist., ser. 5, vol. xvi., p. 407.

1888. *G. pusilla*, Henderson, Rep. Anom. Chall. Exped., pl. xii., fig 1.

Carapace with about eight transverse striæ fringed anteriorly with very short hairs; lateral border produced into about eight small spines. The gastric region bears a pair of spines on each side close to the base of the rostrum. The rostrum is broadly triangular, slightly depressed, and near its apex bears a minute spine on each side; at its base there is a prominent spine on each side immediately above the ocular peduncle. As seen from above a spine appears to project between the ocular peduncle and the rostrum; this is a prolongation of the first joint of the peduncle of the antenna.

The ischium of the external maxillipedes has its outer border prolonged distally into an acute spine; the meros is much shorter than the ischium, the inner border is armed near its middle with a curved acute spine, and a similar projection is present at the distal end of the outer border.

The chelipedes are pubescent, and the joints bear several short curved spines; the fingers are slightly shorter than the palm, and their opposed edges are irregularly toothed.

The ambulatory legs have the anterior borders of the meri and carpi armed with short spines and hairs; the dactyli are more than half as long as the propodi, and have a series of minute thorny spines on the posterior margin.

The abdominal segments are comparatively smooth.

Length of the largest female, 13·5 mm.; of chelipede, 14 mm.; of carapace, 7 mm.; of rostrum, 2·5 mm.; breadth of carapace, 5 mm.

The above description, taken mainly from Henderson's account of the type specimens, agrees in all essential points with the specimens in my possession, only the latter appear to be more pubescent and spinose on the appendages.

Habitat.—The species was originally described from a male and two females taken by the "Challenger" off Twofold Bay (near the south-east point of Australia), at a depth of 150 fathoms.

Of the specimens in my collection, four ovigerous females were obtained by Captain Gray from the Cook Strait cable; ten (all immature except one adult female) were collected by S. H. Drew, of Wanganui; and one small one I took in the dredge in Paterson Inlet in 8 fathoms.

Genus 2. MUNIDA, Leach.

Rostrum slender and spiniform, with a strong spine on either side of its base. Carapace with the surface usually

spinulose. One or more of the abdominal segments usually with a series of spinules on the anterior dorsal margin.

1. **Munida subrugosa,** White.

Miers, Cat. N.Z. Crust., p. 68.

The synonymy is given by Henderson, Rep. Anom. Chall. Exped., p. 124.

This is a widely spread species, having been recorded in the "Challenger" *Anomura* from four localities in Patagonia, from Monte Video, and from the Falkland Islands. Miers notes the British Museum specimens as from the Auckland Islands. I have taken it with the dredge in Otago Harbour and Paterson Inlet in from 6 to 10 fathoms of water, and occasionally it has come up Otago Harbour in countless swarms, creeping up to the steps of the jetties and on to the submerged stones under the piers. It always appears to keep near the bottom, and is rather slow and sluggish in its movements till pursued, when it jerks itself rapidly backwards.

I am strongly inclined to think that the forms described by Leach as *Grimothea gregaria* are, as Miers suggests, only a developmental stage in the life-history of *Munida*—a stage intended for the dispersion of the species. Filhol (Miss. de l'ile Campbell, p. 426) seeks to separate the New Zealand form from the Chilian, and describes it under the name of *Grimothea novæ-zealandiæ*. But it seems to me useless to found specific distinctions on the characters of immature forms, and we know almost nothing of the life-history of these Crustacea.

Grimothea occurs in our seas, especially in the summer months, in enormous shoals, which frequently colour large areas a bright-red. These shoals consist often of immense numbers of individuals, of which such masses are thrown up on the beaches as at times to create a stench. The animals swim backwards in a jerking manner by whipping the tail-fin under the body, while at the same time they hold the chelipedes extended straight out in front of them. They constitute a very common article of food for both fishes and sea-birds. Even in midwinter, when none have been seen swimming about, I have got them in hundreds in the stomachs of red- and blue-cod and hapuku. Though I have examined hundreds of individuals I have always found the sexual appendages in a more or less undeveloped condition. *Munida* has the exo-skeleton rather hard, and exhibiting considerable complexity of imbricating scales and of spines on its surface, but, with the exception of its softer and thinner texture, *Grimothea* has the same spines and markings. The difference in the length and development of the external

maxillipedes, on which Leach founded the latter genus, and on which Miers and Henderson lay so much stress, is after all a comparative one. In several large males of *Munida* the joints all show the flattened and foliaceous form characteristic of *Grimothea*, as well as the densely fringing setæ, while in one large female the joints are completely foliaceous. To show the relative lengths of the parts in the two forms, I append a table of measurements of a few individuals taken at random. The length is measured from the point of the rostral spine to the extremity of the caudal fin; the rostral (median) spine is measured from the base in the front region of the carapace. The first three specimens of *Munida* were taken from Otago Harbour, the fourth from Paterson Inlet; those of *Grimothea* were all caught in Otago Harbour, but at different times. The measurements are in millimetres:—

—	Length.	Rostral Spine.	Right Chelipede.	Antenna.	External Maxillipede.
		Munida subrugosa.			
♂	54	9	59	35	21
♂	52	8·5	50	39	21
♀	45	7	45	24	20
♂	36·5	6	36	30	12
		Grimothea gregaria.			
♀	27	5	27	11	15
♀	23	5	24	12	12
♂	26	5	26	8	14
♂	22	4	23	10	13

I might multiply these examples by scores, but the result would remain much the same. The relative length of the body to that of the external maxillipedes is about 5 to 2 in *Munida* and 5 to less than 3 in *Grimothea*. The sexes are usually present in about equal proportions in shoals of *Grimothea*, a lot of seventeen taken at random from collections made in Dunedin and at the ocean beach north of Otago Heads gave eight males and nine females.

Out of a large number of specimens of *Grimothea* all had the pair of spines at the sides of the median line of the 2nd, 3rd, and 4th abdominal segments, said by Miers (*l.c.*) to be characteristic of *Munida*. On the other hand, several male specimens of the latter wanted the characteristic "spine on either side of the middle in the gastric region," while in some females they were but slightly developed.

Until, then, the life-history of these Crustaceans is worked out I am inclined to treat *Grimothea gregaria* as merely a stage in the development of *Munida subrugosa*.

2. **Munida gracilis**, Henderson.

Rep. Anom. Chall. Exped., p. 143, pl. xiv., fig. 4.

This species is characterized by its long upturned rostrum, which is about two-thirds the total length of the carapace, and by its very long slender chelipedes.

Two specimens were taken in the Tasman Sea west of New Zealand, near the line of the Australian cable, at a depth of 275 fathoms.

3. **Munida microphthalma,** A. M.-Edw.

Rep. Anom. Chall. Exped., p. 127, pl. iii., fig. 4.

This species has been found at three widely separated localities—viz., at five different stations in the West Indies, at depths varying from 390 to 1,030 fathoms; near Ascension Island, in the Atlantic, at a depth of 425 fathoms; and at a station north of the Kermadec Islands, at a depth of 600 fathoms.

Genus 3. Elasmonotus, A. M.-Edw.

This genus includes only deep-sea forms, which have the eyes more or less defectively developed and lacking pigment. They have a flattened rostrum and unarmed carapace.

Elasmonotus marginatus, Henderson.

Rep. Anom. Chall. Exped., p. 161, pl. xix., fig. 2.

Two ovigerous females were taken at Station 168 ("Challenger" Exped.), about sixty miles east of Cape Turnagain, from a bottom of blue mud, at a depth of 1,100 fathoms.

Genus 4. Uroptychus, Henderson (*Diptychus*, A. M.-Edw.).

A genus of deep-sea forms, mostly small, with the caudal swimming-fin reduced, and the limbs adapted to clinging among the branches of corals.

Three species were recorded from the seas to the north of New Zealand.

1. **Uroptychus spinimarginatus,** Henderson.

Rep. Anom. Chall. Exped., p. 176, pl. xxi., fig. 2.

Taken at Station 170, off the Kermadec Islands, at a depth of 520 fathoms. Also found south of the Philippines.

2. **Uroptychus politus,** Henderson.

Rep. Anom. Chall. Exped., p. 178, pl. vi., fig. 2.

Taken at Station 171, near the Kermadec Islands, at a depth of 600 fathoms.

3. **Uroptychus australis,** Henderson.

Rep. Anom. Chall. Exped., p. 179, pl. xxi., fig. 4.

Taken at both the preceding stations. Also met with off Port Jackson, and off the Island of Banda.

EXPLANATION OF PLATES XX., XXI.

PLATE XX.

Fig. 1. *Cryptodromia lateralis*, dorsal aspect; × 2.
Fig. 2. " ventral aspect; × 2.
Fig. 3. *Eupagurus novæ-zealandiæ*, front; × 2.
Fig. 4. " right chelipede of a large specimen seen from above; nat. size.
Fig. 5. " right chelipede, upper surface of hand; nat. size.
Fig. 6. *Eupagurus edwardsi*, front; × 2.
Fig. 7. " hand of right chelipede; × 2.
Fig. 8. *Eupagurus kirkii*, front; × 2.
Fig. 9. " right chelipede from above; × 2.
Fig. 10. " " upper surface of hand; × 2.
Fig. 11. *Eupagurus cookii*, front; × 3.
Fig. 12. " right chelipede seen from below; × 3.
Fig. 13. " " upper surface of hand; × 3.

PLATE XXI.

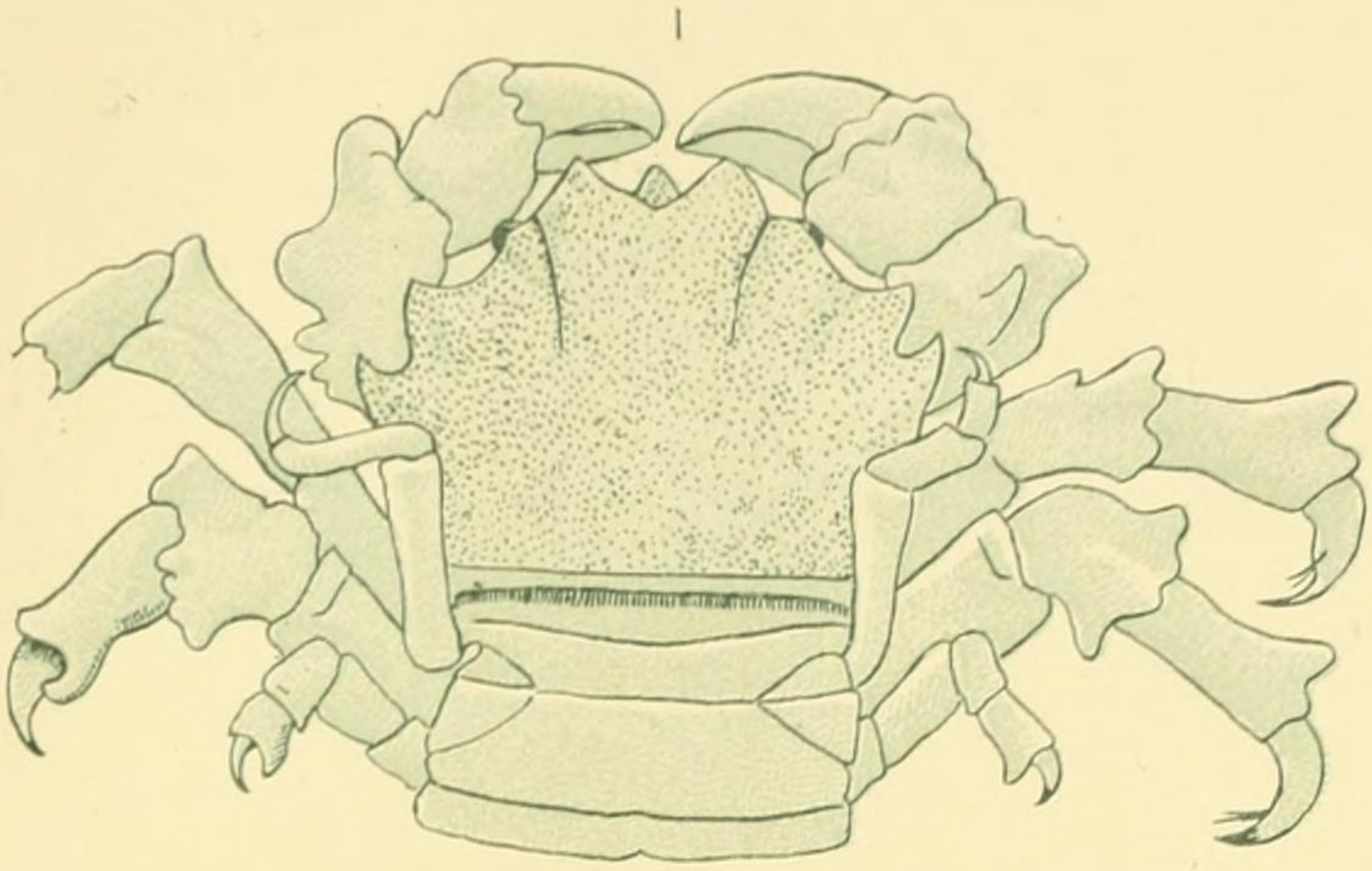
Fig. 1. *Eupagurus traversi*, front; × 3.
Fig. 2. " right chelipede from inside; × 3.
Fig. 3. " " from outside; × 3.
Fig. 4. *Stratiotes setosus*, front; × 2.
Fig. 5. " left chelipede from inside; × 2.
Fig. 6. " " carpos and propodos from above; × 2.
Fig. 7. *Galathea pusilla*; × 2.
Fig. 8. *Petrolisthes elongatus*; nat. size.
Fig. 9. *Petrolisthes novæ-zelandiæ*; nat. size.

ART. XXII.—*Synonymy of the New Zealand* Orchestidæ.

By GEORGE M. THOMSON, F.L.S.

[*Read before the Otago Institute, 15th November, 1898.*]

I HAVE been engaged for a long time past in endeavouring to clear up the confusion which exists as to the various forms of Amphipodous Crustacea belonging to the *Orchestidæ* (the shore-hoppers and their allies) found in New Zealand. Owing to the differences of structure in the males and females, and even among the males themselves at different periods of their development, and to the wide distribution of some of the species,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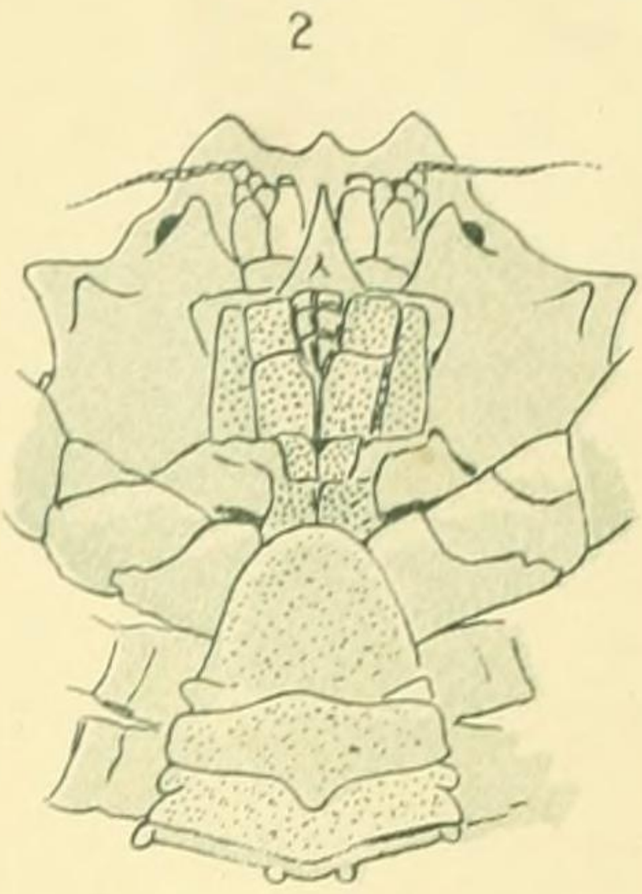
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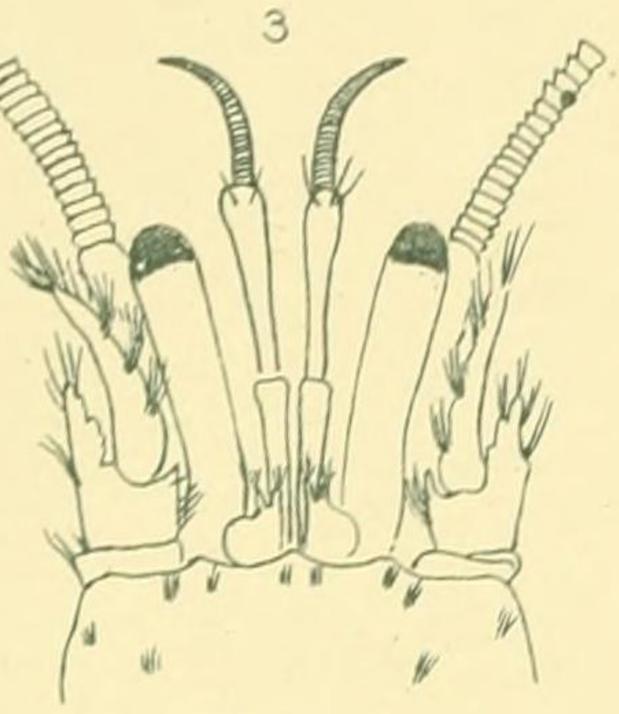
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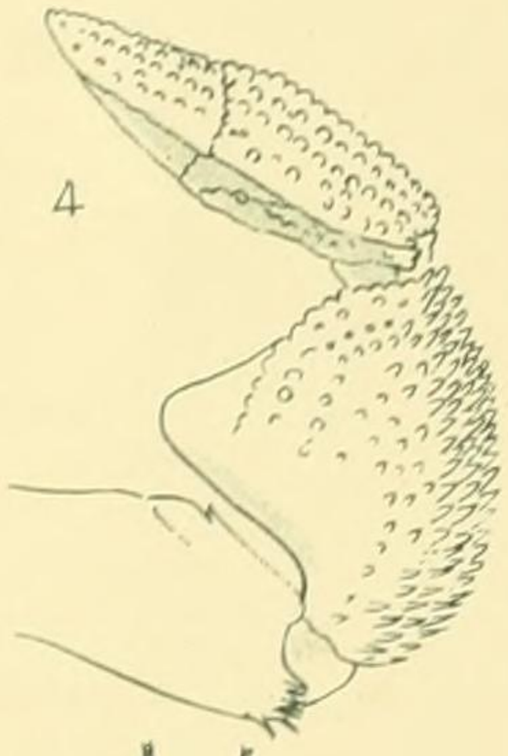
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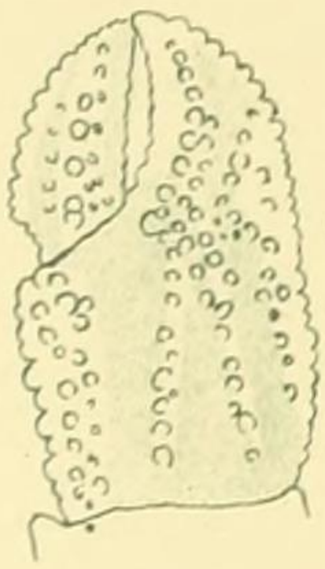
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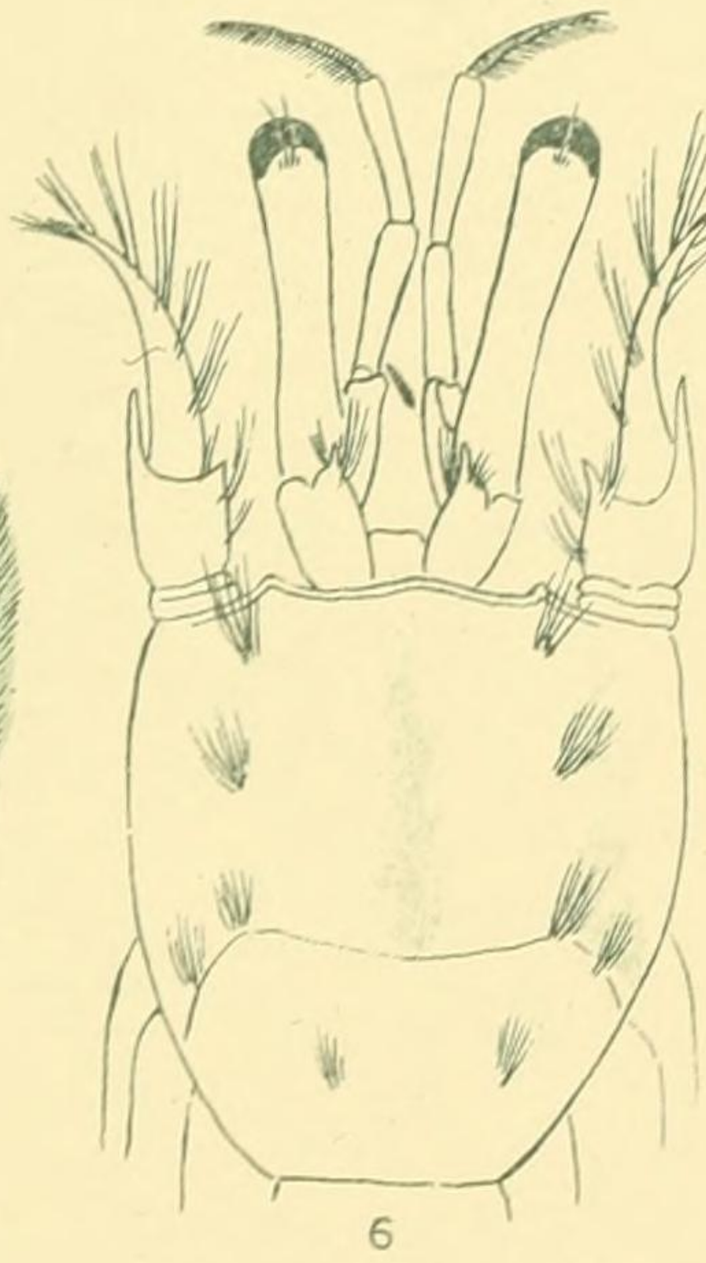
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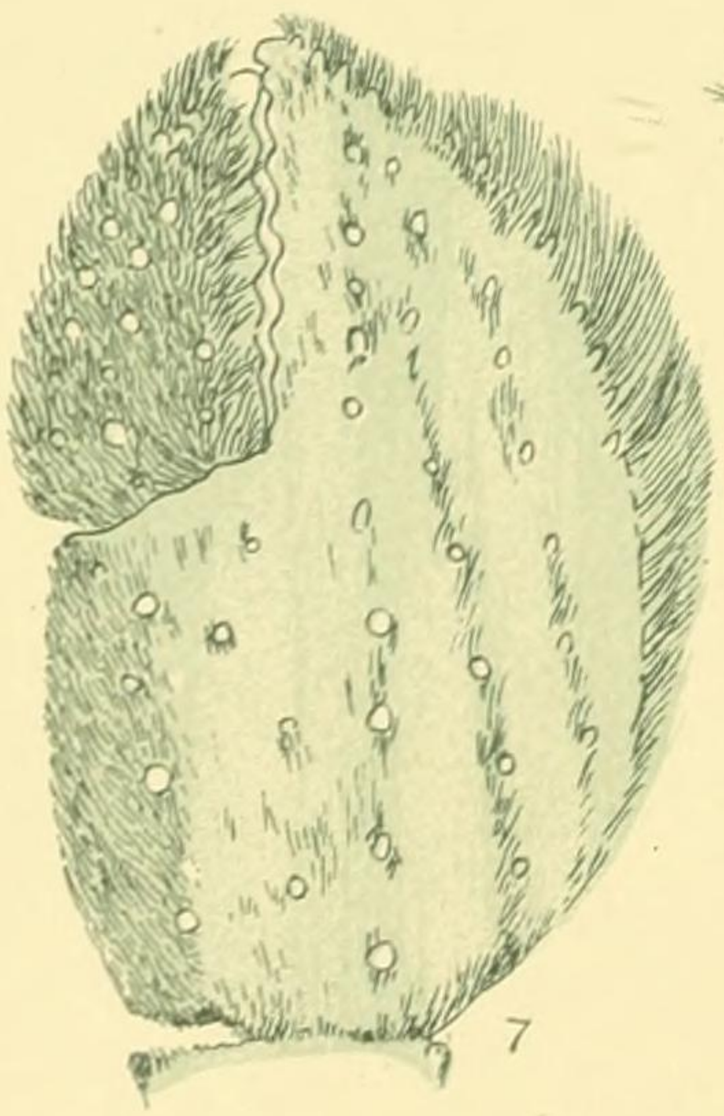
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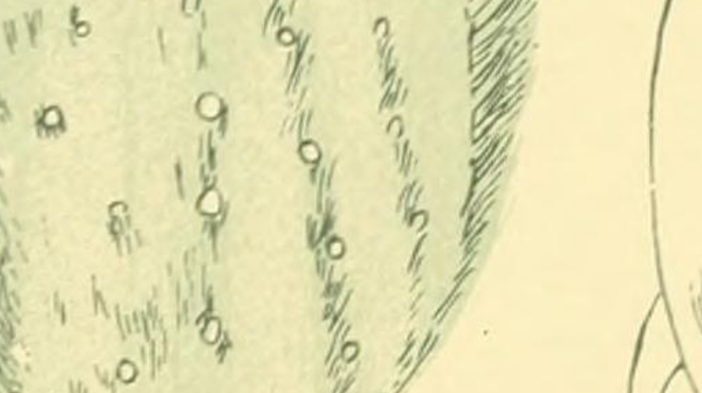
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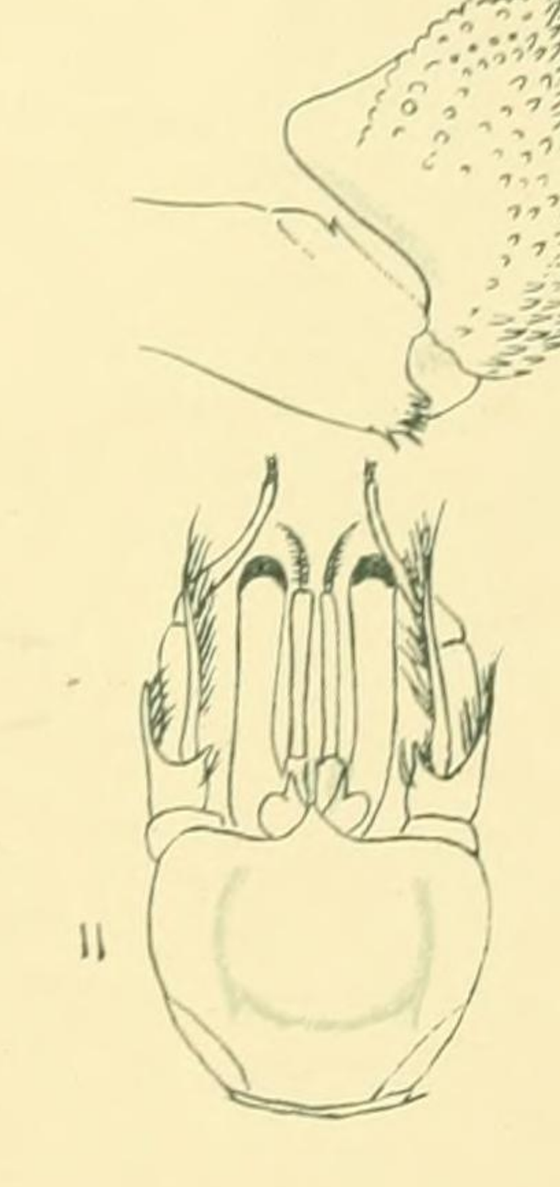
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CRUSTACEA ANOMURA.

(Thomson)