longitudinal line down the centre of the tail. Head pale pink. Branchiæ bright red, tipped with dead white.

Length about an inch, of which the tail is more than one-fourth.

CHAMOSTRÆA. The animal is described by Hancock in the "Annals of Natural History," series 2, vol. II., p. 106; and by Deshayes in the "Proceedings of the Zoological Society," 1853, p. 67.

MACTRA ÆQUILATERALIS. When alive the young shell is rosy purple, but the colour fades after death.

MESODESMA SPISSA. The siphons are divergent and thick; the branchial is much thicker than the anal, and fringed. The anal siphon is tapering.

ARTEMIS AUSTRALIS. The siphons are more than half the length of the animal, and slightly curved dorsally; the anal siphon is narrower and tapering.

CHIONE STUCHBURYI. The siphons are united throughout the whole length.

MYTILUS ATER. This appears to be the same as *M. crassus*, T. Woods, from Tasmania.

EXPLANATION OF PLATE VI.

A. *Limax molestus.* Alimentary canal.
B. „ „ Reproductive organs.
C. *Milax antipodum.* Alimentary canal.
D. „ „ Reproductive organs.
E. *Arion incommodus.* Alimentary canal.
F. „ „ Reproductive organs.

a. Buccal mass.
b. Stomach.
c. Hepatic ducts.
d. Aorta.
e. Anus.
f. Ovotestis.
g. Albumen gland.
h. Vas deferens.
i. Oviduct.
k. Spermatheca.
l. Penis sac.
m. Retractor muscle of penis.
n. Prostate gland.
o. Accessory gland.

ART. XXIII.—*Recent Additions to and Notes on New Zealand* Crustacea.

By G. M. Thomson, F.L.S.

[*Read before the Otago Institute*, 11th *May*, 1880.]

Plates VII. and VIII.

THE following notes and descriptions of new species have been made during the past two years, and supplement the papers read by me before this

Institute during the session of 1878.* As generic descriptions of Crustacea are not accessible to most of the readers of our "Transactions," I have thought it advisable to supply these in all cases where the genera are new to this country. The various species are mentioned in the following order, viz., Schizopoda, Isopoda, Amphipoda, and Phyllopoda.

Schizopoda.

Fam. MYSIDÆ.

Thorax covered by a carapace, which extends to the base of the ocular peduncles, and is produced into a rudimentary rostrum. Mouth situated near the base of the antennæ. Six pairs of thoracic feet, provided with a well-developed palp. Tail of five plates, forming a swimmeret, as in *Macroura decapoda.*

Genus **Mysis,** Latreille.

External antennæ beneath the eyes, bearing two terminal filaments. Internal antennæ beneath the external; first joint furnished with an elongated laminar appendage; two succeeding joints slender and cylindrical, terminated by a long, filiform, multi-articulate flagellum. Pedipalps two pairs, entirely pediform; first pair three-branched; second pair two-branched. Six pairs of thoracic feet, consisting each of two branches, decreasing in length from before backwards, and formed for swimming; last two pairs furnished with a flabelliform appendage. In the female these acquire a great development, and constitute two large semi-circular plates, folded below so as to form an oviferous pouch, in which the young pass through their first stage of development. Abdomen very slender, tapering, elongated, nearly cylindrical.

1. *M. denticulata,* G. M. Thomson, (Ann. & Mag. N.H., ser. V., Vol. VI., p. 1.)

Fig. 1.

Female.—Carapace rather slender and short, with a short, triangular, acute rostrum. Peduncle of the internal (upper) antennæ extending to the extremity of the scale of the external antennæ; second joint very short; third the widest. Scale of external antennæ somewhat broad, with a tooth at the outer angle, and long ciliæ on its inner side, and at its extremity. Middle lamella of the tail entire, toothed on each side, and with two strong teeth at the apex. Lateral laminæ exceeding the central one; the inner narrow-lanceolate, acute, and furnished with long hairs on each side; the outer obtuse, with the apical half narrowing, ciliated only at the extremity and on the inside, and with a few stout teeth about the middle of its outer margin. Length ·5 inch.

Hab.—Dredged in Dunedin harbour, 4–5 fathoms.

* See "Trans. N. Z. Inst." Vol. XI., p. 230, *et seq.*

ISOPODA NORMALIA.

Fam. ARCTURIDÆ.

Genus **Arcturus,** Latreille.

Body slender and cylindrical, fourth segment greatly elongated. Antero-lateral margins of the head produced forward. Eyes large, semi-globose. Superior antennæ very short. Inferior antennæ long. Four anterior pairs of legs slender and ciliated; abdominal legs short and very robust. Terminal segment of abdomen large, scutiform, and furnished below with two large opercular plates (somewhat similar to *Idotea.*)

1. *A. tuberculatus*, G. M. Thomson (Ann. & Mag. N.H., ser. V., vol. IV., p. 416). Fig. 2.

Male.—Body rather robust. Head very indistinctly separated from first thoracic segment, and together with the two succeeding segments produced upwards into acute tubercles. Fourth segment smooth, bearing a single stout spine at each extremity, the posterior one being bifid. Superior antennæ reaching beyond extremity of second joint of inferior; basal joint stout, second and third short, fourth as long as the two preceding, and bearing several articulated processes, consisting each of a basal joint, and a long lamellar appendage. (From want of sufficient specimens, I have not been able to investigate the function of these appendages). Inferior antennæ rather longer than four anterior segments of the body, not ciliated, but with rows of minute tubercles on the lower margin; first and second joints rather short; third and fourth long; flagellum three-jointed, finely serrated on its inner margin, and furnished with a few cilia. The inferior antennæ are the chief organs of progression in the animals of this genus, and also serve to catch the prey and bring it to the mouth; in this species they are apparently well-fitted for their functions.

The *female* differs from the above in having the whole body (except the margins of the lower antennæ) more or less tuberculate. The head and three posterior segments bear a row of tubercles on each side. The fourth segment is flattened on its posterior lateral margins; it bears on the median line at its anterior extremity a large three-pointed tubercle, behind which are three smaller tubercles placed transversely, the middle one being the smallest; on each side of the anterior margin are two tubercles, the lower of which is the largest. The oviferous pouch extends along three-fourths of the lower surface of this segment. The fifth segment of the body is extended downwards as if to form a supplementary pouch.

Length ·2 inch, exclusive of the inferior antennæ.

Hab. Dredged in Dunedin harbour, 4–5 fathoms.

(This may be *Leachia nodosa*, Dana.)

Isopoda Aberrantia.

Fam. TANAIDÆ.

Body narrow and elongated. First pair of gnathopoda (anterior feet) large, and furnished with a didactyle hand; second pair approximating to the pereiopoda. Eggs borne in a sub-pectoral pouch beneath the five central segments of the body. Abdomen terminated by two setaceous articulated appendages.

Genus **Tanais**, Audouin and M.-Edwards.

Cephalon and first segment of pereion confluent. Antennæ short, subequal. First pair of gnathopoda very large, didactyle; second pair slender and simple. Pleon five-jointed, fourth joint short, fifth terminated by a pair of *single-branched*, filamentary uropoda.

1. *T. novæ-zealandiæ*, G. M. Thomson (Ann. & Mag. N.H., ser. V., vol. IV., p. 418).

Fig. 3.

Body broader than deep, with transverse fascicles of rough (furry) hairs on the three anterior segments of the pleon. Eye very small, black, and circular, placed on a prominent lateral lobe of the anterior margin of the head. Superior antennæ three-jointed, setose at the extremity; first joint longer than the two succeeding. Inferior antennæ rather shorter than superior. First gnathopoda very stout, the immobile finger of the hand smooth on its inner margin, or only slightly denticulated. Second gnathopoda very slender. Posterior pleopoda bearing a smooth—not denticulated—sickle-shaped finger, with a few long cilia at its base. Terminal uropoda almost as long as antennæ, five-jointed, and with numerous setæ. Length ·18 inch.

Hab. Dredged in Dunedin harbour, 4–5 fathoms.

Genus **Paratanais**, Dana.

Cephalon fused with first segment of pereion. Eyes shortly peduncu-lated. Antennæ without a flagellum, (with rudimentary flagella, *Bell*); inferior pair more slender than the superior. Gnathopoda as in *Tanais*. Pleon with six segments; five anterior pairs of pleopoda, formed of ciliated swimming-plates; sixth segment terminated by a pair of two-branched substyliform uropoda.

1. *P. tenuis*, G. M. Thomson (Ann. & Mag. N.H., ser. V., vol. VI., p. 2.)

Body slender. Head (when seen from above) narrowing anteriorly, front margin nearly straight. Eyes triangular; peduncles so short as to be scarcely visible. Superior antennæ stout; inferior pair about two-thirds as long as superior, and slender. First gnathopoda stout; mobile finger smooth on the inner margin; immobile finger terminated by two or three

denticles, inner margin slightly convex and furnished with a few stout hairs. Second gnathopoda long and very slender, terminating in a filiform claw. Two anterior pairs of pereiopoda, comparatively slender, but little stouter than the second gnathopoda; succeeding pairs stronger. Last segment of abdomen somewhat triangular, with a truncate apex, terminated by two minute setæ. Terminal uropoda with the inner branch four-jointed, and more than half as long as abdomen; outer branch one-jointed, as long as first joint of inner.

Length .065 inch. A very minute species.

Hab. Dredged in Dunedin harbour. Also dredged in Paterson Inlet, Stewart Island, in ten fathoms.

AMPHIPODA NORMALIA.

Fam. ORCHESTIDÆ.

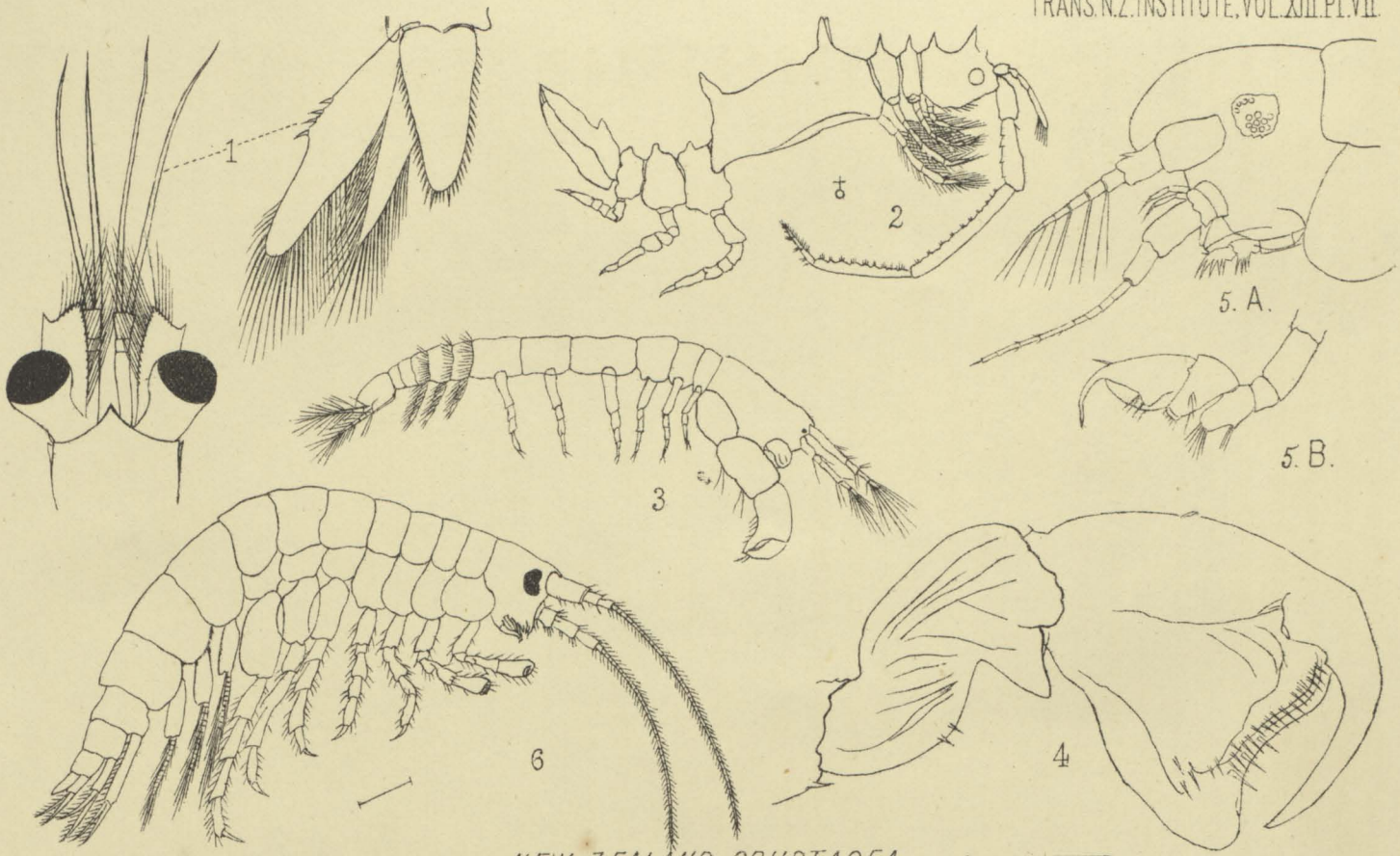
Genus **Orchestia.**

In Miers' Catalogue of New Zealand Crustacea seven species of this genus are mentioned, the descriptions being chiefly reproduced from Sp. Bate's Catalogue of Amphipoda in the British Museum. The first thing that strikes one on reference to this list is that of some species only females are described. They are as follows:—*O. aucklandiæ*, male and female; *O. novæ-zealandiæ*, female only; *O. telluris*, male and female; *O. sylvicola*, male and female (Sp. Bate only describes the male, but Miers has the description of the female also, though he does not say where or from what specimens he got it); *O. tenuis*, female only; *O. chilensis*, male and female; and *O. serrulata*, male and a doubtful female. As I have collected these animals for some years, it may prove of interest if I record my experiences here, though I feel that my observations are still in many respects very imperfect.

(1.) *O. aucklandiæ*, Sp. Bate. This is a very common littoral species in Stewart Island, where I have taken it in great numbers under stones between tide-marks. It is extremely active, running and jumping vigorously when pursued. The males are nearly an inch long, and have the first five segments of the pereion corrugated more or less, the anterior and posterior margins of the segments being strongly ridged.

(2.) *O. novæ-zealandiæ*, Sp. Bate. The description of this species in the Brit. Mus. Cat., and which has been transferred without material change to Miers' Cat. of N.Z. Crust., appears to have been drawn up from a single specimen, and its habitat is given very widely as "New Zealand, presented by Captain Bolton." I am inclined to think that this is a form of a polymorphic species, which also includes *O. sylvicola* and *O. tenuis*, and shall therefore refer to it again further on.

(3.) *O. telluris*, Sp. Bate. In the Brit. Mus. Cat., p. 21, the following note is appended to the description of this species:—"The specimens of



NEW ZEALAND CRUSTACEA. See Art. XXIII.

C.M. Thomson, del.

this species were taken under dead leaves in the woods by Mr. Hook during the voyage of the Erebus and Terror, and presented to the British Museum." As this is a littoral species, it is probable that the dead leaves were on the extreme edge of the bush, close to high water-mark. I have taken it in such localities myself in great abundance, both at Otago heads and at many spots in Stewart Island, but always within a few yards of the beach, and just where the sea and bush soil meet. In "Facts for Darwin," p. 27, Fritz Müller—somewhat led astray by the habitat given by Sp. Bate—says:—"I cannot refrain from taking this opportunity of remarking that (so far as appears from Spence Bate's catalogue), for two different kinds of males (*Orchestia telluris* and *sylvicola*) which live together in the forests of New Zealand, only one form of female is known, and hazarding the supposition that we have here a similar case.* It does not seem to me to be probable that two nearly-allied species of these social Amphipoda should occur mixed together under the same conditions of life."

This passage is unintentionally misleading, for *O. telluris* is by no means a terrestrial species. It lives in burrows in the sand just above tide-marks, and in the localities where it occurs may be seen hopping about in countless numbers. It certainly does not occur in the bush, strictly so called, but only on the very margin of it, where it joins the beach. Both male and female of this species are very distinct in form, in the former particularly the squamiform plate on the carpus of the fifth pair of pereiopoda, is a very characteristic mark.

(4.) *O. chilensis*, M.-Edw., is another very distinct species. It is the most strictly littoral of all the species, living under stones and in little pools between tide-marks, and never coming out on dry sand. It occurs in great abundance round our coasts, and is the commonest form in Otago harbour.

(5.) *O. serrulata*, Dana. While in Stewart Island in January last, I got four males and one female of this species under stones between tide-marks in Paterson Inlet. These agreed in all respects except size (they were under half an inch long) with the description in the Brit. Mus. Cat.

(6 and 7.) *O. sylvicola*, Dana, and *O. tenuis*, Dana.

In regard to the last of these species, the habitat given in the Brit. Mus. Cat. is "Bay of Islands, New Zealand, Dana." This would lead one to believe that the species was marine or littoral. I have collected *Orchestiæ* in great numbers for some years past from many localities, and have never found any answering to this species among either marine or littoral forms. In the bush, however, I have frequently gathered specimens which I have referred to it, though somewhat doubtfully. The same remark applies to

* Alluding to the two forms of male of *Orchestia darwinii*.

O. novæ-zealandiæ, which I believe I have gathered in the bush but never on the coast. *O. sylvicola* is recorded by Dana as having been obtained "from moist soil in the bottom of the extinct volcano of Taiamai, twenty miles from the sea, and about the joints of succulent plants." The Brit. Mus. specimen was obtained in the voyage of the Erebus and Terror, and "was found associated with *O. telluris*." As I have already said, this was probably on the edge of the bush near high-tide mark.

It is singular that Prof. Dana should have described the male only of *O. sylvicola*, for it has been frequently noticed, both by Professor Hutton and myself, that males are extremely rare. The examination of a large number of specimens of terrestrial *Orchestiæ* gathered in the bush and at the roots of plants in many localities distant from the sea, leads me to the conclusion that varying forms of the same species have been described under three names, namely, *O. novæ-zealandiæ*, fem., *O. sylvicola*, fem., and *O. tenuis*, fem. The principal characters employed in the identification of these species are:—

(1) the length of the superior antennæ; (2) the length of the inferior antennæ, together with the relative length of the flagellum to the peduncle, and the relative lengths of the ultimate and penultimate joints of the peduncle; (3) the sizes and shapes of the gnathopoda, and particularly of their terminal joints; and (4) the relative lengths of the three posterior pairs of pereiopoda. If the characters of the three species are arranged in tabular form it will be found that there is very little to choose between them.

Female.	*O. sylvicola.*	*O novæ-zealandiæ.*	*O. tenuis.*
Upper antennæ ..	Reaching beyond the extremity of penultimate joint of lower	Reaching beyond extremity of penultimate joint of lower	About as long as base of inferior
Inferior antennæ ..	More than half as long as body	More than half as long as animal	About half as long as body
Flagellum	As long as peduncle	Longer than peduncle and spinous	Much longer than base
Ultimate joint of peduncle ..	Twice as long as penultimate	Slightly longer than penultimate	
Posterior pereiopoda	Third pair nearly as long as fourth	Third pair as long as fourth and fifth	Very unequal; increasing regularly in length; fifth pair nearly twice longer than third.

I have not compared in the table the characters of the gnathopoda, but if these are examined and the wording of the descriptions rendered uniform, it will be found that there is little to choose among them. Further, the

distinctive points in the foregoing table are in organs liable to great modification, particularly at varying ages.

In the specimens gathered by me there was considerable diversity on the first point, even among specimens gathered from the same spot; there were great differences in the structure of the inferior antennæ; while there was considerable uniformity on the fourth and fifth points.

The specimens were from a number of different localities, and it is remarkable fact that, with few exceptions, females only were found. The commonest colour was a clear red-brown, but some were yellowish-red, others marbled reddish and pink, and others dark muddy brown.

(1.) From Otago Peninsula, among ferns, &c., in the bush. Thirty-one specimens of all sizes, all females, answering to description of *O. sylvicola*, female.

(2.) From Dunedin, among the roots of cocksfoot and other grasses on the town belt, about a mile from the bay. Thirty-nine specimens. These showed an extraordinary diversity: twelve were females agreeing with *O. sylvicola*, female; twenty-four were females much more similar to *O. tenuis*, female; while three were males. These last do not agree with the descriptions of the males of *O. sylvicola* having very remarkable propoda (fig. 4) to the second pair of gnathopoda. These resemble the corresponding organs of *O. aucklandiæ* more than any other species. The upper antennæ are as long as the peduncles of the lower, and in this and other characters they approximate most to the description of *O. tenuis*.

(3.) From Flagstaff hill near Dunedin, among bush, at an elevation of about 1,300 feet. Twenty-one specimens, all females, answering to *O. sylvicola*, female.

(4.) From Preservation Inlet, in the bush. Three specimens, females, corresponding most nearly to *O. tenuis*, female.

(5.) From Port Pegasus, Stewart Island, in the bush. Nineteen specimens, all females. Of these, nine approximated pretty well to *O. sylvicola*, female, while the other ten came nearer to *O. novæ-zealandiæ*, female, in all but the length of the third pair of pereiopoda which was in every case much shorter than the fourth and fifth pairs.

(6.) From Copper Island (Paterson Inlet) Stewart Island, in the bush. Thirty specimens, of which twenty-nine were females and one male, all agreeing well with the description of *O. sylvicola*.

(7.) From bush in the neighbourhood of Dunedin. Twenty specimens, of these nineteen were females and one male. The latter, while agreeing generally with *O. sylvicola*, male, differed in having the inferior antennæ very short, being little over a third of the length of the body; and in having the third pair of pereiopoda much shorter than the fourth pair.

The females were very variable, so that I am unable to refer them with certainty to any species. The antennæ vary greatly in length: thus the superior pair in some extend only as far as the extremity of the penultimate joint of the peduncle of the lower, while in others they extend as far as the extremity of the ultimate. In some cases the inferior pair are not one-third as long as the animal; in others they are more than half as long. Some exhibit a regular gradation in length of the 3rd, 4th, and 5th pereiopoda; others have the 4th and 5th equal, and the 3rd very short; while others again have the 3rd and 4th subequal and short, and the 5th very long.

From the examination of the foregoing specimens, numbering in all 163, I am strongly of opinion that they all belong to one variable species, the males of which have at least two forms of gnathopoda, and the females of which differ considerably in those very characters which have hitherto had specific importance attached to them. At present, our knowledge of this genus leads us to reduce the New Zealand species to five, namely:—

(1). *O. aucklandiæ*, Sp. Bate. Auckland, (Coll. Par. Mus.); Auckland Islands; Stewart Island. Littoral.

(2). *O. telluris*, Sp. Bate. New Zealand (Coll. Brit. Mus.) Common on sandy shores.

(3). *O. chilensis*, M.-Edw. Akaroa (M.Jacquinot). A common littoral form.

(4). *O. serrulata*, Dana. A littoral species. Bay of Islands, (Dana);—Stewart Island.

(5). *O. sylvicola*, Dana, (including *O. novæ-zealandiæ*, Sp. Bate, and *O. tenuis*, Dana). A strictly terrestrial form, always occurring among dank vegetation, bush soil, etc., and drowning very rapidly in water. Extremely common.

Fam. GAMMARIDÆ.

Sub-fam. STEGOCEPHALIDES. (Brit. Mus. Cat. Amph. Crust., p. 54).

Superior and inferior antennæ subequal. Coxæ of second pair of gnathopoda, and of the first and second pairs of pereiopoda, monstrously developed; second pair broader than the preceding. Pereiopoda subequal. Last three pairs of pleopoda styliform. Telson single.

Genus **Panoplæa**, G. M. Thomson.

(Ann. & Mag. N. H. ser. V., Vol. VI., p. 2).

In the course of dredgings during the last two summers, I have frequently obtained specimens of an Amphipod which at first I took to be a species of *Pleustes*, an Arctic genus, particularly as Mr. T. W. Kirk recorded *P. panoplus*, Kröyer, as having been collected on our coasts. Closer examina-

tion, however, convinced me that not only was the local species different from either of the described species of *Pleustes*, but that it also differed in generic character, though only to a small extent. Later on I obtained a second form allied to the first, and to include both these I have formed the genus *Panoplœa*, so named from the coat-of-mail which envelopes the first-discovered form. The genus differs from *Pleustes*, in having a well-developed squamiform plate on the ischium of the maxillipeds, and in the gnathopoda being slender, and more or less chelate. The general appearance of the animals comprising this genus is also very different.

The following is the generic character :—

" Coxæ of the four anterior segments well developed, those of the second pair excavated on the upper part of the posterior margin. Antennæ subequal, without a secondary appendage. Mandibles with an appendage. Maxillipeds with a squamiform process on the ischium. Gnathopoda feeble, almost chelate. Three posterior pairs of pleopoda double-branched. Telson simple, squamiform."

1. *P. spinosa.* G. M. Thomson (loc. cit., p. 3, pl. I., fig. 2).

Cephalon produced into an acute rostrum. Pereion broad, smooth, the dorsal margins of the last segment and of the first two of the pleon produced posteriorly into two spines. Coxæ of the gnathopoda narrow, but deep. Eyes reniform, pale reddish in colour. Superior antennæ longer than the inferior. Both pairs of gnathopoda very slender: first chelate, ischium and carpus long, propodos with a mobile finger articulating at some distance from the setose extremity; second pair nearly chelate, basos very long, propodos fringed with simple hairs on its inferior margin, dactylos articulating almost as in first pair. Pereiopoda increasing somewhat in size posteriorly, squamiform plates of the base of the last three pairs toothed on their posterior margins. Three posterior pairs of pleopoda subequal ; rami of the penultimate pair unequal. Telson subquadrate; extremity slightly excavate.

Colour varying from light to dark brown, thickly covered with black stellate markings. Length 0·45 inch.

Hab. Taken abundantly with the dredge in Dunedin harbour in 4–5 fathoms, among kelp and sertularians.

2. *P. debilis*, G. M. Thomson (loc. cit., p. 3, pl. I., fig. 3).

Coxæ less developed than in *P. spinosa.* Pereion tumid ; pleon slender, its first two segments and last of pereion produced on their postero-dorsal margins into spines. Cephalon produced into a very short rostrum. Eyes circular, black. Superior antennæ nearly as long as the body, rather longer than the inferior ; peduncle very short. Gnathopoda feeble, subchelate ; first pair small, basos long, fringed with a row of short spines on

the anterior margin, propodos long, dactylos small, transverse; second pair similar in form, but very long and slender. Pereiopoda as in *P. spinosa*, but with the margins of the squamiform plates smooth. Telson rounded at the extremity. Colour uniformly light brown (when examined under a low power of the microscope the whole body is seen to be dotted with reddish-brown star-like marks). Length 0·35 inch.

Hab. Taken along with the preceding species in Dunedin harbour.

Sub-fam. Phoxides. (Brit. Mus. Cat. Amphip. Crust., p. 79.)

"The cephalon is produced in advance, more like a hood than a rostrum. The superior antennæ are situated considerably in advance of the inferior. The integumentary structure is generally thin and semi-transparent; and I am inclined to think that most of the genera are burrowers, for which purpose the hood-like cephalon affords an efficient protection. The three posterior pairs of pleopoda are double-branched."

Genus **Amphilochus**, Spence Bate.

(Brit. Mus. Cat., p. 107.)

Cephalon anteriorly depressed. Eyes two, posterior to the superior antennæ. Superior antennæ without an appendage. Gnathopoda subchelate; in both pairs the carpus is produced along the inferior margin of the propodos. Pereiopoda subequal; coxæ of the third pair not so deep as the preceding. Telson single.

(Mandibles with an appendage, terminal joints of the maxillipeds spinous, not clawed.)

1. *A. squamosus*, G. M. Thomson (loc. cit., p. 4, pl. I., fig. 4).

Fig. 5A & B.

Body broad and thick anteriorly, slender posteriorly. When seen under a medium power of the microscope the integument—which is very thin—is seen to be covered with minute scale-like marks and spines, hence the specific name. The cephalon (fig. 5A) is depressed anteriorly between the bases of the superior antennæ. Eyes large, deep red in colour, but not easily made out owing to the numerous and dense reddish-black spots with which the greater part of the body is coloured. Superior antennæ shorter than inferior; peduncle shorter than flagellum, which is seven-jointed and carries two long setæ at the extremity of each joint. (The last joint of the peduncle bears a minute one-jointed appendage.) Inferior antennæ not one-fourth as long as body; flagellum slender, longer than the peduncle, smooth. Gnathopoda (fig. 5B) subequal and similar in form; meros and carpus produced into obtuse lobes, which are spinous at the extremity; propodos with a rounded palm, and a few spines at the point of impingement of the slender, falcate dactylos. Pereiopoda slender and subequal. Ante-penultimate pleopoda reaching almost to the extremity of the ultimate, smooth; penulti-

mate much shorter, and together with the posterior (ultimate) pair, having somewhat unequal rami. Length, 0·15 inch; colour, brown, covered with reddish-black round spots, chiefly on the pleon.

Hab. Dredged in Dunedin harbour, 4–5 fathoms, on sandy bottom.

Sub-fam. Gammarides.

Genus **Amphithonotus**, Costa.

(Brit. Mus. Cat. Amphip. Crust., p. 150.)

Body not laterally compressed. Cephalon produced into a rostrum. Antennæ slender, without secondary appendage. Mandibles having an appendage. Squamiform plates to the maxillipeds not largely developed. Gnathopoda similarly formed, subequal, having the carpi inferiorly produced. Pereiopoda subequal. Posterior pair of pleopoda double-branched. Telson single, cleft at the apex.

1. *A. levis*, G. M. Thomson (Ann. & Mag. N.H., ser. V., vol. IV., p. 330).

Fig. 6.

Animal quite smooth and not carinated on the back. Cephalon produced into a small falcate rostrum, which projects between the bases of the antennæ. Eyes large, subreniform. Superior antennæ slightly exceeding the inferior, about half as long as the animal; peduncle very short; flagellum long, slender, and multi-articulate. Peduncle of inferior antennæ longer than peduncle of superior. Appendage of the mandibles long, middle joint exceeding the other two. Maxillipeds having the appendages longer than their respective joints. Gnathopoda small, subequal, abundantly ciliated; propodos with a well-defined, nearly transverse, palm, against which the dactylos impinges closely. Pereiopoda subequal, posterior pair the longest. Pleopoda subequal; rami lanceolate, those of the penultimate and ante-penultimate pairs unequal in length. Telson tubular, notched at the apex. Length ·3 inch.

Hab. Dredged in Dunedin harbour in 4–5 fathoms.

Though agreeing closely in generic characters, this species is very distinct in appearance from *A. edwardsii*, as figured in the Brit. Mus. Cat., and also apparently from *A. spiniventris*, Costa.

Genus **Eusirus**, Kröyer.

(Brit. Mus. Cat., p. 154.)*

"Cephalon not rostrated. Pereion and pleon compressed. Superior antennæ long and slender, having a secondary appendage; inferior antennæ

* The species described by me, though too near *E. cuspidatus*, Kröyer, to be separated from it except as a variety, differs from the generic character in the following points:—The maxillipeds are certainly not unguiculate, the propodos being obtusely pointed and densely clothed at the extremity with hairs, and the dactylos being obsolete; the cephalon also has a small rostrum.

having the peduncle longer than the peduncle of the superior. Mandibles having an appendage. Maxillipeds unguiculate, having a small squamous plate to the coxa, basos, and ischium. Gnathopoda uniform, each having the propodos large, with the postero-inferior margin posteriorly produced; carpus attached to the propodos near the centre of its superior margin; infero-anterior margin produced along the inferior margin of the propodos. Pereiopoda slender, subequal. Posterior pair of pleopoda biramous. Telson long, narrow, cleft at the apex."

1. *E. cuspidatus*, Kröyer, var. *antarcticus*, G. M. Thomson (Ann. & Mag. N.H., ser. V., vol. VI., p. 4).

Pleon having the first two segments produced backwards on their postero-dorsal margins into teeth; fourth segment with a central dorsal sinus. (Two posterior segments of the pereion smooth, not produced into teeth.) Eyes reniform. Superior antennæ scarcely half as long as the animal; peduncle shorter than flagellum; flagellum minutely articulated, every third articulation produced downwards into a tubercle and furnished with a tuft of cilia; secondary appendage uni-articulate, almost obsolete. Inferior antennæ scarcely as long as the superior, having the peduncle much longer than the peduncle of the superior; flagellum scarcely longer than the last joint of the peduncle. Both pairs of gnathopoda having the carpus attached near the centre of the superior margin of the propodos, and produced along the inferior margin as far as the palm; propodos subquadrate; palm defined by a double row of hairs, which are alternately very short, point of impingement of the dactylos defined by a fascicle of short stout spines. Penultimate pair of pleopoda shorter than the preceding; ultimate reaching rather beyond the ante-penultimate. Telson long, narrow, grooved longitudinally, and cleft at the apex.

Length, ·35 inches. (The Greenland species is 1·25 inches long.)

Genus **Aora**, Kröyer.

(Brit. Mus. Cat. Amphip. Crust., p. 160.)

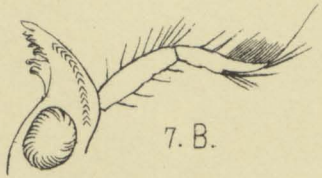
Superior antennæ longer than the inferior, and carrying a secondary appendage. Inferior antennæ having the peduncle much longer than the flagellum. First pair of gnathopoda much longer than the second, and having the meros produced inferiorly into a long tooth. Third pair of pereiopoda shorter than the first two, fourth much longer than the third, fifth much longer than the fourth. Posterior pair of pleopoda biramous. Telson tubular.

1. *A. typica*, Kröyer.

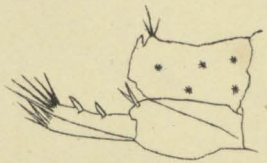
Lalaria longitarsis, Nicolet, Gay's Hist. de Chile.

Body smooth, eye small, black, and round. Superior antennæ nearly as long as animal; flagellum twice as long as peduncle; secondary

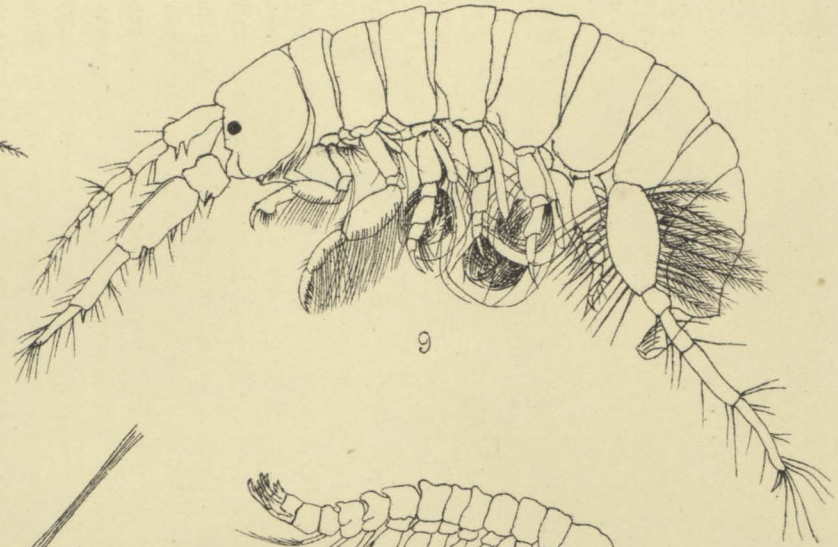
7. A.



7. B.



7. C.



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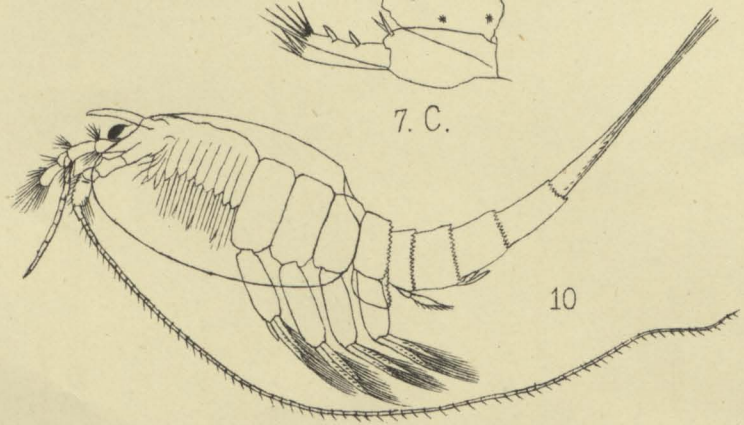

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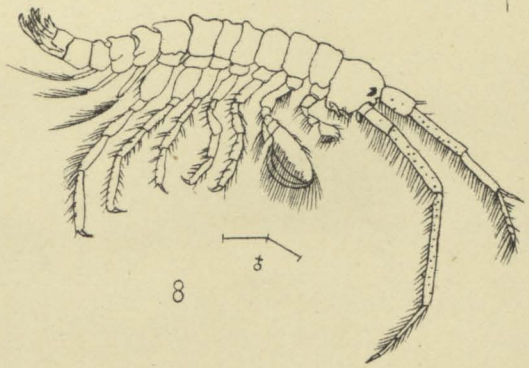

8

NEW ZEALAND CRUSTACEA. See Art. XXIII.

G.M. Thomson, del.

appendage very short and five-jointed. Inferior antennæ sparingly setose on the under surface; peduncle much longer than peduncle of superior; flagellum five-jointed, rather shorter than last joint of peduncle. Basos of first gnathopoda very long, produced into a tooth on its anterior margin; meros produced inferiorly as long as the carpus; carpus rather longer than the propodos; propodos enlarged anteriorly, with a single small tooth on its inferior margin, and covered with long hairs, which form a bunch at the articulation of the dactylos; dactylos slender, half as long as propodos. Second pair of gnathopoda not longer than succeeding pereiopoda, and very hairy. Third pair of pereiopoda short; fourth and fifth pairs much longer. Pleopoda subequal; telson quite smooth. Colour yellowish, with small black spots, chiefly on the lower parts of the body and appendages. Length ·3 inch.

Hab. A single specimen dredged in Otago harbour, in 4–5 fathoms.

The species was described originally from Chile (Valparaiso), but the description given in the Brit. Mus. Cat., p. 161, is meagre, and has accordingly been amplified.

Genus **Microdentopus**, Costa.

(Brit. Mus. Cat. Amphip. Crust. p. 163.)

Body long and slender. Superior pair of antennæ longer than the inferior, and carrying a secondary appendage. Mandibles furnished with an appendage. Gnathopoda subchelate, first pair larger than the second. Third pair of pereiopoda not longer than the two preceding; fourth pair much, and fifth pair very much longer than the others. Posterior pair of pleopoda biramous. Telson tubular, conical, and tipped with a double vertical apex.

1. *M. maculatus*, G. M. Thomson (Ann. & Mag. N. H. ser. V., vol. IV., p. 331).

Fig. 7A., B. & C.

Animal smooth, slender. Coxæ rather small. Superior antennæ considerably longer than inferior, two-thirds as long as body; second joint of peduncle long and slender; third short and furnished with a 5–6-jointed appendage; flagellum very slender, multi-articulate, sparingly ciliated. Inferior antennæ strong, subpediform, with a stout olfactory denticle, and furnished with numerous cilia; third joint of peduncle short, fourth and fifth very long; flagellum short, indistinctly 6–7-jointed.

Mandibular appendage (fig. 7B.) 2-jointed. Maxillipeds with strongly-toothed appendages. Gnathopoda moderate, covered with strong cilia; first pair rather the largest, carpus rounded on its inferior margin; propodos oblong, with a very oblique, curved palm, defined by a strong spine; dactylos strong and curved, finely toothed on the inner margin; second

pair similar, but with the palm transverse, and without the defining spine. Third pereiopoda shorter than preceding pair; posterior pair very long. Ante-penultimate pleopoda reaching to extremity of ultimate pair; base of the rami with a stout spine. Telson (fig. 7c.) when seen from above, with a broad apical notch, each side bearing a slender spinule. Lower part of body and appendages abundantly furnished with black star-like markings.

Length ·35 inch.

Hab. Dunedin harbour, not uncommon in 4–5 fathoms.

(Though dissimilar in many respects from *Aora typica*, there is such a strong resemblance in other points, that I should not be surprised if they prove to be male and female of the same species, in which case the generic character of *Aora* will require modification. Can it be a case of protective resemblance ?)

Melita tenuicornis, Dana.

Mæra tenuicornis, Sp. Bate.

Paramæra tenuicornis, Miers.

This species is not uncommon in the rock-pools along the coast. The animals are dark slaty-grey in colour, very slender and compressed in form, and swim very rapidly. The females are remarkable for possessing a hook-like process on the coxal lamellæ of the fourth pair of pereiopoda, almost exactly similar to that figured and described by Fr. Müller ("Facts for Darwin," p. 27) as occurring in *M. insatiabilis*, and which enables them to be readily seized by the gnathopoda of the males.

Genus **Megamæra**, Sp. Bate.

(Brit. Mus. Cat., p. 224.)

Dorsal segments of the pleon without fasciculi of spines. Eyes round. Superior antennæ long; inferior about half the length of the superior. Gnathopoda subchelate, the second pair being the larger. Posterior pair of pleopoda biramous. Telson double.

1. *M. fasciculata*, G. M. Thomson (Ann. & Mag. of Nat. Hist., ser. V., vol. VI., p. 5, pl. I. fig. 5).

Dorsal surface of the animal quite smooth. Eyes reniform. Superior antennæ nearly one-third as long as the animal; first and second joints of peduncle rather short, subequal, third joint very short; flagellum long, very-many-jointed, joints transverse and setose; secondary appendage very minute, one-jointed, and terminated by two or three setæ. Inferior antennæ shorter than superior, very similar in the form of the joints of the flagellum. First pair of gnathopoda with carpus and propodos subequal, and *fringed on their lower margin with fascicles of serrated or barbed hairs*; propodos broader at distal extremity than at the base, with a rounded projection at the extremity of the lower margin; palm quite transverse; dactylos not quite as

long as palm. Second gnathopoda larger; carpus increasing in width, with numerous fascicles of barbed hairs; propodos longer, lower margin with barbed hairs, upper with several transverse rows of simple hairs; palm rounded; dactylos curved. Pereiopoda somewhat increasing in length posteriorly, and with short spines. Posterior pleopoda considerably exceeding the preceding pair. Telson double. Length 0·5 inch.

Hab. Common along the coast; Sumner (near Christchurch), Dunedin, Stewart Island.

Fam. COROPHIIDÆ.

Sub-fam. Corophiides.

Cephalon and pereion broader than deep. Inferior antennæ sub-pediform, longer and more powerful than the superior. Coxæ small. Posterior pair of pleopoda simply sub-foliaceous or styliform, not armed with hook-like spines. Telson squamiform, unarmed.

Genus **Cyrtophium**, Dana.

(Brit. Mus. Cat. Amphip. Crust., p. 273.)

Pereion narrow, elliptical. Pleon inflexed beneath the pereion. Cephalon subquadrate. Eyes situated at the exterior angles, and a little prominent. Antennæ pediform, with very short flagella or none; the inferior pair a little the longer. Gnathopoda sub-chelate; second pair much the stouter. Posterior pair of pleopoda minute, simple, partly concealed by the telson; ante-penultimate and penultimate pairs with the rami unequal, not specially curved upon the outer side.

1. *C. cristatum*, G. M. Thomson (Ann. and Mag. N.H., ser. V., vol. IV., p. 331).

Fig. 8.

Male.—Eyes prominent. Pereion wider than deep, transversely ribbed, and tuberculate. Last segment of pereion and three anterior segments of pleon elevated dorsally into prominent crests. Antennæ with long cilia on their inferior margins; superior pair shorter than inferior; peduncle reaching the extremity of penultimate joint of peduncle of inferior, bearing a one-jointed appendage; flagellum very indistinctly 7–8-jointed; inferior pair very strong, about as long as body; second and third joints with spines on their anterior margins; fourth and fifth joints long; flagellum indistinctly three-jointed, the first joint being equal to the two succeeding. Mandibles with an appendage, the basal joint of which is much the shortest. Maxillipeds with appendages to the basos and ischium; dactylos spathulate. First gnathopoda with simple cilia on their inferior margins; carpus produced inferiorly into a rounded lobe; propodos narrowing anteriorly, palm very oblique, defined by three or four stout spines; dactylos strong, curved, and acutely toothed on its inner margin. Second gnathopoda large and powerful, furnished with numerous plumose hairs, which are particularly

abundant in two rows on each side of the palm; basos hollowed out in front, so as to receive the upper side of the propodos; meros acutely produced on its infero-posterior margin; propodos articulating on the upper margin of the carpus, oblong, that of the left side slightly the larger, and having the teeth more prominent on its upper margin; palm extending along the whole under-surface, with two or three denticulations; dactylos long, curved and smooth. Pereiopoda sub-equal, fifth pair the longest; setæ numerous and strong, not exceeding the diameter of the articulations to which they are attached. Telson conical, tipped with a few slender setæ.

The *female* differs from the male only in the greater width of the pereion, and in having the second gnathopoda relatively smaller, rounder, and wanting the plumose cilia. Length ·25 inch.

Hab. Dredged in Dunedin harbour in 4–5 fathoms, among Sertulariæ and seaweeds.

Genus **Corophium**, Latreille.

"Superior antennæ small, situated close together in advance of and above the inferior, having a multi-articulate flagellum. Inferior antennæ very large and powerful, subpediform; flagellum not multi-articulate. First pair of gnathopoda subchelate; second pair not subcheliform. Posterior pair of pleopoda very short, single-branched. Telson squamiform, simple." (Brit. Mus. Cat. p. 279.)

1. *C. contractum*, Stimpson.

Fig. 9.

"Antennæ equal in length, which is one-fourth that of the body; superior antennæ with four-articulate flagella; inferior antennæ very thick, with minute terminal articuli. Posterior pair of pereiopoda rather long, with long plumose setæ along the edges of the basa. Colour yellowish. Eyes black. Length $\frac{1}{4}$ of an inch.

Hab. "Japan."

The above description is taken from the Brit. Mus. Catalogue, p. 282, where it is quoted from the Proceedings of the Academy of Nat. Science, Philadelphia, for 1855. Meagre as it is, there is little doubt that it is identical with the species obtained by me. I have therefore given a figure of the animal, and a supplementary description, which applies only to the females.

Body much broader than deep. Eyes small. Superior antennæ with the first joint stout, produced on its inferior inner margin into two stout teeth; second joint equal to it in length, slender; third much shorter and hardly distinguishable from the flagellum, which is five-jointed, and terminated by a bunch of setæ. Inferior antennæ very strong, with a few strong teeth on its inferior margin on the inside. First gnathopoda small; basos with two long setæ; ischium, meros and carpus fringed with long setæ; propodos rounded towards the extremity, with a convex palm fringed with

short hairs; dactylos curved, as long as the palm. Second gnathopoda larger than first; carpus widely convex on its inferior margin, and together with the more slender propodos bearing fringes of long setæ; dactylos four-toothed at the extremity of its lower margin. Four anterior pairs of pereiopoda diminishing in length posteriorly, but with basa progressively widening. Fifth pair very long; only the setæ on its posterior margin plumose, those on the anterior being simple. Posterior pair of pleopoda reaching slightly beyond the telson, flattened, rounded, thickly covered with short hairs, and bearing a few long setæ. Telson broadly triangular, notched at the apex. Length ·14 in.

Hab. Dredged in Dunedin harbour, 4–5 fathoms.

ENTOMOSTRACA.

Phyllopoda (?).

Genus **Nebalia**, Leach.

Antennæ two pairs, large and ramiform; eyes two, pedunculated; feet twelve pairs, eight branchial and four natatory; carapace large, enclosing head, thorax and part of abdomen, almost as in a bivalve shell. (Baird's Brit. Entomostraca, p. 31.)

1. *N. longicornis*, G. M. Thomson (Ann. & Mag. N. H., ser. V., vol. IV., p. 418).

Fig. 10.

Carapace extending back to about the third abdominal segment on the sides, but with a wide dorsal sinus. Beak large and well-developed. Eyes situated on moveable peduncles, and formed of numerous crystalline bodies under a common cornea. The antennæ furnished with numerous hairs on their peduncles; superior pair with a peduncle of two joints, the last of which bears two appendages, consisting of (1) a short, triangular joint with spines on its outer margin, and an oval ciliated plate, and (2) a slender flagellum of several articulations, the number of which were not made out; inferior pair with a peduncle of three stout joints,—the second bearing a large tooth on its upper margin, the third furnished with rows of spines and hairs on its outer margin, and a bunch of hairs at its extremity,—and a slender flagellum, almost equal in length to the whole body, and consisting of between seventy and eighty articulations. Branchial feet completely concealed beneath the carapace. The third to the seventh (inclusive) abdominal segments with their posterior margins finely dentated. Peduncles of the natatory feet largely developed, their branches with a row of spines on each outer margin. Caudal appendages with a row of spines on each side, and terminated by several long and minutely plumose filaments. Carapace semi-transparent, whole body pale-yellow in colour. Length ·35 inch.

Hab. Dunedin harbour, 4–5 fathoms. Stewart Island, 10 fathoms.