

Telson as long as the sixth somite, tapering, furnished with seven separate, minute spinules on the dorso-lateral angles, and subequal in length with the outer rami of the rhipidura.

The male is more slender, but corresponds with the female in general features.

	Female.	Male.
Length, entire, . . . . .	110 mm. (4·3 in.).	91 mm. (3·5 in.).
„ of carapace, . . . . .	32 „	25 „
„ of rostrum, . . . . .	22 „	7 „
„ of pleon, . . . . .	78 „	66 „
„ of third somite of pleon, . . . . .	14 „	13 „
„ of sixth somite of pleon, . . . . .	19 „	16 „
„ of telson, . . . . .	19 „	16 „

*Habitat*.—Station 218, March 1, 1875; lat. 2° 33' S., long. 144° 4' E.; off New Guinea; depth, 1070 fathoms; bottom, blue mud; bottom temperature, 36°·4. Two specimens; one male, one female. Trawled.

This species corresponds in several respects with *Nematocarcinus productus* and *Nematocarcinus parvidentatus*, but differs in the relative lengths of the rostrum and carapace, as may be seen from the measurements given under each species.

Thus in *Nematocarcinus intermedius* the rostrum is two-thirds the length of the carapace, one-half in *Nematocarcinus productus* and about one-third in *Nematocarcinus parvidentatus*; on the shortest rostrum there are twenty-two teeth, and on the longest there is just the same number, although the rostrum is three times as long.

I am therefore compelled in the present state of our knowledge to consider the three to be distinct species.

The male specimen has the rostrum broken, which is to be regretted, since I am therefore unable to compare it with a smaller specimen that was taken in the same haul, and which I believe to belong to *Nematocarcinus tenuipes*, which differs from *Nematocarcinus parvidentatus* in the possession of a small tooth on the under surface of the rostrum near the apex, a feature that I sometimes think may be sexual rather than specific.

### *Stochasmus*,<sup>1</sup> n. gen.

Carapace one-third the length of the animal, dorsally compressed anteriorly, and produced to a rostrum that is armed with a series of spinules on the upper surface; furnished on the frontal margin with an antennal tooth and with one at the fronto-lateral angle.

Pleon laterally compressed and dorsally smooth. First somite as deep as the second,

<sup>1</sup> στοχασμός, a conjecture.

third somite projecting slightly over the anterior dorsal margin of the fourth. Sixth somite about twice as long as the fifth.

Telson nearly as long as the sixth somite, and furnished at the dorso-lateral margin with a longitudinal series of distant spinules.

First pair of antennæ having the peduncle subequal in length with the rostrum, and carrying two unequal long flagella.

Second pair of antennæ armed with a tooth at the lower distal extremity of the first joint, and carrying a scaphocerite that is subequal with the rostrum and armed with a stout tooth at the outer distal extremity.

Second pair of gnathopoda having the several joints long, and terminating in a slender curved dactylos.

*Observations.*—There is only one specimen of this genus in the collection, and that is imperfect. It corresponds with *Nematocarcinus* in all respects, excepting in the form of the second pair of gnathopoda.

*Stochasmus exilis*, n. sp. (Pl. CXXXII. fig. 14).

Carapace about one-third the length of the animal, having a rostrum about one-third the length of the carapace, and armed with more than twenty long spinules closely pressed together on the upper surface, and none upon the lower. The antennal tooth is long and slender and that at the fronto-lateral angle is short.

The ophthalmopoda are short.

The first pair of antennæ has the peduncle subequal with the rostrum; the first joint is excavate on the upper surface, and has a sharp-pointed stylocerite that is about half the length of the joint; it terminates in two long flagella.

The second pair of antennæ has the coxa armed with a long tooth on the lower distal angle, and carries a scaphocerite that reaches considerably beyond the apex of the rostrum and terminates in a tooth on the outer distal angle.

The second pair of gnathopoda is long and slender, reaching nearly to the extremity of the rostrum; it has a long meral joint, a long and slender carpos, and a propodos that is long and compressed, fringed with hairs on either side, and terminating in a narrow extremity that articulates with a curved and slender dactylos.

The pleon is laterally compressed and has the third somite posteriorly produced to a point on the dorsal surface. The sixth somite is about twice the length of the preceding.

The telson is nearly as long as the sixth somite, and is furnished on each side with six dorso-lateral spinules, with two long spines at the outer angles of the terminal extremity, and with several intermediate stiff hairs.

Length, entire, . . . . .	41 mm. (1.6 in.).
„ of carapace, . . . . .	11 „
„ of rostrum, . . . . .	4 „
„ of pleon, . . . . .	30 „
„ of third somite of pleon, . . . . .	6 „
„ of sixth somite of pleon, . . . . .	9 „
„ of telson, . . . . .	8 „

*Habitat*.—Station 84, July 18, 1873; lat. 30° 38' N., long. 18° 5' W.; off the Canary Islands; depth and bottom not recorded. One specimen.

Unfortunately only one very imperfect specimen was obtained; all the pereopoda are gone, and its relation to *Nematocarcinus* can therefore only be conjectured, but, as it differs in the important character of having a dactylos attached to the extremity of the second pair of gnathopoda, it is impossible to associate it with any species of that genus. In the other details of the portions preserved it closely resembles *Nematocarcinus*, differing from *Nematocarcinus cursor*, A. Milne-Edwards, only in the number and character of the spines on the rostrum.

#### *Notostomus*, A. Milne-Edwards.

*Notostomus*, A. Milne-Edwards, Ann. d. Sci. Nat., sér. 6, tom. xi. p. 7, 1881.

This genus was described by A. Milne-Edwards from specimens taken by Professor Agassiz in the neighbourhood of the West Indian Islands, but some specimens were previously taken by the Challenger, figured, and ready for publication. It is closely allied in structural characters to *Acanthephyra*, and is only separated by the convenience of classification in consequence of the external form of the carapace, which exhibits the carinated features as seen in the genus *Heterocarpus*, with which its branchial arrangement also corresponds.

The body of the animal is not very much compressed laterally, except along the dorsal ridge, which is elevated into a carina following the contour of the animal from the rostrum to the telson. From the apex of the rostrum, corresponding with its infero-lateral margin, a second carina longitudinally traverses the surface of the carapace along the upper line of the branchial region to the posterior margin of the carapace. The dorsal surface of the carapace is arched, especially over the frontal and gastric regions; the rostrum is horizontally straight.

The ophthalmopoda are widely separated at their base, and carry a large ophthalmus at their extremity.

The first pair of antennæ has the peduncle shorter than the rostrum, the first joint being long and excavate on the upper surface to receive the ophthalmopod, and carries a short, broad, and pointed stylocerite. The two following joints are short and carry one stout and one slender flagellum, the former gradually tapering to a fine extremity.



The pleopoda in all except the first pair consists of two long, narrow, flat branches, of equal length and fringed with ciliated hairs; to the inner side of the anterior branch is attached a long stylamblys, whereas in the first pair of the male the inner branch is reduced to a small, rudimentary, membranous plate.

*Geographical Distribution.*—The range of this genus is extensive in area and variable in depth. In the West Indies it was taken by Professor Agassiz off Grenada, at a depth of 626 fathoms, and in the Sea of Antilles at a depth of 955 fathoms. The several specimens in the Challenger collection were taken at depths varying from 2150 fathoms to about 500, but it appears to me that *Notostomus* must be considered to be a deep-sea form, inasmuch as those localities in which it was got in a depth less than 1000 fathoms were in the vicinity of deeper water. On the southern coast of Japan, where *Notostomus japonicus* was taken, the station was on the verge of the 1000-fathoms line, beyond which the water rapidly deepens to 2000 and 3000 fathoms. So again on the eastern coast of South America, the soundings north and south show that the Atlantic in this region deepens very rapidly to 1000 and 2000 fathoms. In the Sea of Banda and off the Island of Celebes, specimens were brought up from a depth of 1425 fathoms and 2150 fathoms respectively.

The range in area of this genus is very great and almost cosmopolitan. It has been taken in the Atlantic among the West Indian Islands, off the eastern coast of South America, and in the middle of that ocean as far south as Tristan da Cunha. In the east it has been taken in the sea south of New Guinea, along the coast of Celebes, and as far north as Japan.

*Notostomus patentissimus*, n. sp. (Pl. CXXXIII.; Pl. CXXXIV. figs. 1, 2).

Carapace arcuate, dorsally carinated from the posterior margin to the rostrum, which is short, and horizontally straight. The lateral walls of the carapace are traversed on each side by five longitudinal carinæ, three of which extend from the frontal to the posterior margin, and the other two commence at the anterior margin of the branchial region and terminate in the posterior margin of the carapace.

Pleon arched and dorsally carinated; first two somites carinated but not dentate, the four following all carinated and posteriorly produced to a strong dorsal tooth.

Telson laterally compressed, dorsally grooved, and subequal with the inner, but not so long as the outer, plates of the rhipidura.

Ophthalmopoda pyriform.

First pair of antennæ about as long as the carapace.

Second pair of antennæ about as long again as the animal and carrying a scaphocerite that is broader at the base than at the distal extremity, which reaches considerably beyond the apex of the rostrum, and is armed on the outer margin with a conspicuous tooth.

Second pair of gnathopoda reaching slightly beyond the extremity of the scaphocerite, and terminating in a sharp oblique point.

First pair of pereopoda slightly broader than the second. Third and fourth pairs having the propodos long, slender, and cylindrical, and the dactylos long and styliform. Fifth pair shorter than the preceding, and formed on the same plan, but terminating in a short, almost immature, dactylos, that is hidden in a brush of hairs.

The pleopoda are flat, narrow, and pointed.

Length, entire, . . . . .	109 mm. (4.2 in.).
" of carapace, . . . . .	45 "
" of rostrum, . . . . .	10 "
" of pleon, . . . . .	64 "
" of third somite of pleon, . . . . .	13 "
" of sixth somite of pleon, . . . . .	9 "
" of telson, . . . . .	17 "

*Habitat.*—Station 198, October 20, 1874; lat. 2° 55' N., long. 124° 53' E; south of the Philippine Islands; depth, 2150 fathoms; bottom, blue mud; bottom temperature, 38°.9. One specimen; female. Trawled.

The carapace has a dorsal carina and is suddenly elevated from the base of the rostrum, especially over the frontal region; the rostrum is slender and narrow, not reaching so far as the extremity of the scaphocerite, and furnished on the lower margin with seven or eight minute teeth, and on the upper surface with a considerable number of still smaller teeth, which extend from the apex to the posterior margin of the carapace. From the upper margin of the rostrum a small ridge extends on each side and is lost at a point about halfway between the orbit and the dorsal carina. From the lower margin of the rostrum another ridge passes backwards and outwards, and terminates between the orbit and just above the anterior extremity of the orbital carina, but is not confluent with it. The orbital carina commences immediately behind the ophthalmopod where it is continuous with the inferior and outer margin of the orbit, forming a notch between it and the upper or inner margin; from its commencement the ridge continues horizontally in a line along the upper margin of the branchial region to the posterior margin of the carapace. Corresponding with a depression of the hepatic region is an oblique transverse ridge—a line of muscular attachment that connects the cephalon with the pereion—which extends from the orbital and connects it with the outer antennal carina. The latter ridge commences in a prominent style-like tooth on the outer side of the second pair of antennæ, and terminates in the posterior margin of the carapace, forming a line parallel with the orbital carina. An intermediate carina between the orbital and outer antennal commences at the posterior margin, close to the termination of the orbital carina, but not confluent with it, and may conveniently be termed a semicarina; it proceeds downwards and then forwards in a line parallel with it until within a short distance of the transverse

hepatic ridge, where it terminates somewhat abruptly, corresponding almost completely with the length of the branchial region. Inferiorly, or below the antennal carina, is another that commences almost in connection with it, close to the posterior margin, following the curve of the postero-lateral margin of the carapace and then running parallel with the antennal carina, and dying out just before reaching the anterior margin. Another carina, the fifth on the same side, commences in the posterior margin, confluent with the antennal carina, and follows a line within, but subparallel to, the inferior margin of the carapace. These several carinæ, eleven in all including the dorsal, are more or less constant in the several species, and form a peculiar feature in the genus.

The first somite of the pleon has the anterior division strongly defined from the posterior, the dorsal surface of which is elevated, slightly carinated, and the posterior margin deeply notched in the median line. The lateral or coxal plates are very large and deep, the anterior being deeper in this species than in most others, and are broader at the inferior margin than at the dorsal surface of the somite. The infero-anterior angle projects forwards, and the anterior margin overlaps the sides of the carapace, the dorsal portion of which falls into the deep depression formed between the anterior and posterior division of the first somite of the pleon. The third and following somites have the two divisions confluent; the dorsal median line is carinated and the posterior margin is produced to a sharp-pointed tooth in all except the first two, which are regularly notched, the second somite not being quite so strongly excavate as the first.

The telson is dorsally grooved and laterally compressed, the margins being smooth and unarmed.

The whole surface of the animal is covered with small irregular corrugations, which, so far as I have observed, is a feature peculiar to this genus.

The ophthalmopoda stand near the margin of the carapace at the extremities of the ophthalmic somite, and are consequently placed widely apart at their base; they are pyriform and furnished on the inner side halfway between the articulation and the ophthalmus with a small bead-like tubercle. The ophthalmus is black and the margin even, except on the posterior side, where a small excavation exists producing a prominent point somewhat like an ocellus, but not structurally separate from the ophthalmus.

The first pair of antennæ has the first joint excavate to receive the eyes, and carries a sharp-pointed stylocerite; the two succeeding joints are short, and the last supports two unequal flagella that are longer than the carapace.

The second pair of antennæ carries a scaphocerite that reaches a little beyond the rostrum, terminates in a rounded apex, and is furnished on the external margin with a sharp tooth. The tooth on the under surface of the second joint is short and pointed.

The oral appendages offer nothing characteristically distinct from those of other species.

The second pair of gnathopoda is tomentose, as are, to a slight degree, all the appendages of the pereion. It appears to consist of only five joints, the ischium and

meros being probably united together, and the propodos suddenly truncated to a triangular point.

The first two pairs of pereopoda are subequal, the second pair being rather the longer and more slender, and the three posterior pairs have the propodos long and slightly cylindrical; the dactylos is styliform in the third and fourth, and almost obsolete in the ultimate pair, where it is surrounded by a brush of ciliated hairs on the anterior surface of the propodos and a row of spinules on the posterior.

The rhipidura has the outer plate longer than the inner, and is furnished with a tooth on the outer margin corresponding with the diæresis.

*Notostomus perlatus* was taken at the same station associated with this species, and it is difficult to realise that it is not the same species, but there are certain features peculiar to one and not to the other, and which I do not suppose to depend upon sexual difference.

*Notostomus murrayi*, n. sp. (Pl. CXXXIV. fig. 3).

The dorsal surface is less arched than in the two previous species, and the rostrum is longer, reaching quite or nearly to the extremity of the scaphocerite; the denticles are comparatively larger and more numerous on the frontal crest, and on the upper and lower surfaces of the rostrum. There are only two lateral carinæ, the orbital and the outer antennal, the semicarina being absent.

The telson is shorter than the outer plates of the rhipidura.

Length, entire, . . . . .	41 mm. (1.6 in.).
„ of carapace, . . . . .	15 „
„ of rostrum, . . . . .	3 „
„ of pleon, . . . . .	26 „
„ of third somite of pleon, . . . . .	4 „
„ of sixth somite of pleon, . . . . .	4 „
„ of telson, . . . . .	9 „

*Habitat*.—Station 133, October 11, 1873; lat. 35° 41' S., long. 20° 55' W.; near Tristan da Cunha; depth, 1900 fathoms; bottom, Globigerina ooze; bottom temperature, 35°.4. One specimen. Trawled.

This species corresponds in many points with *Notostomus elegans*, A. Milne-Edwards, but it differs in having the rostrum not longer than the scaphocerite, while in *Notostomus elegans* it is stated to be twice as long, and in there being only some ten or twelve teeth on the lower surface of the rostrum instead of eighteen, those on the upper surface being continuous with those on the dorsal carina and persistent to the posterior margin of the carapace; those on the higher parts of the arch are less conspicuous, from wear, than those at the frontal and posterior regions.

*Notostomus japonicus*, n. sp. (Pl. CXXXV. fig. 1).

Carapace having the dorsal carina horizontal and but little elevated, serrate along the surface from the posterior extremity to the anterior (the rostrum is broken off just anterior to the ophthalmopoda). Each lateral surface has three carinæ; the semicarina is represented by a longitudinal groove parallel with the posterior half of the orbital carina. The inner orbital margin is not confluent with the orbital carina, and a small ridge runs from the upper margin of the rostrum and dies out above the fronto-lateral region.

The first pair of antennæ has a long and sharp stylocerite; the outer flagellum is broad and flat towards the base, and then narrows abruptly to a slender termination.

The second pair of antennæ carries an ovate scaphocerite that is armed on the outer distal margin with a long and sharp tooth.

The telson is dorsally grooved in its entire length, and is shorter than the inner lateral plate of the rhipidura.

Length, entire (male),	.	.	.	.	.	114 mm. (4.5 in.).
„ of carapace,	.	.	.	.	.	42 „
„ of rostrum,	.	.	.	.	.	? „
„ of pleon,	.	.	.	.	.	72 „
„ of third somite of pleon,	.	.	.	.	.	12 „
„ of sixth somite of pleon,	.	.	.	.	.	11 „
„ of telson,	.	.	.	.	.	22 „

*Habitat.*—Station 235, June 4, 1875; lat. 34° 7' N., long. 138° 0' E.; south of Japan; depth, 565 fathoms; bottom, green mud; bottom temperature, 38°·1. One specimen, male. Trawled.

This species is rather more compressed and less elevated dorsally than the other species; the median carina is nearly straight, and the outer antennal carina is more than usually distant from the orbital, and is nearly parallel with the inferior margin of the carapace.

The rostrum is broken off in the only specimen taken.

The surface of the animal is corrugated all over, more coarsely on the pleon and dorsal surface of the carapace than along the lateral walls. The broad ventral plate-like surface posterior to the last pair of pereopoda is shorter than in female forms; the inner branch of the first pair of pleopoda is broad, short, and submembranous, having the stylamblys reduced and closely associated with its margin, the extremity furnished with numerous cincinnuli, and the margin with short stiff spines.

The specimen may not improbably have been a wanderer from deeper water, since where it was taken the ocean rapidly deepens from the 100-fathom coast-line to 3000 fathoms; and the bottom temperature was only 0°·1 above that at 1425 fathoms at Station 195 in the Sea of Banda.

*Notostomus perlatus*, n. sp. (Pl. CXXXIV. fig. 2).

Carapace having the dorsal surface deeply carinated, arched, and produced anteriorly to a short, slender, straight rostrum, armed on the lower margin with five small denticles, and on the upper with numerous smaller ones that are constant along the dorsal carina to the posterior margin of the carapace. From the side of the rostrum a small carina starts, and uniting with the orbital carina just behind the orbit, continues prominent to the posterior margin of the carapace. A small and unimportant carina commences at the posterior margin just below the orbital carina, and runs near and subparallel to it for a short distance, and then dies out. From the second antennal tooth a carina runs slightly downwards to the posterior margin, and between this and the inferior margin of the carapace there exists the trace of a submarginal ridge. From the orbital to the outer antennal carina a vertical ridge runs slightly obliquely downwards and backwards, being formed by a sudden depression of the hepatic region. The lateral walls of the carapace in this species therefore exhibit two obscure and two well-defined carinæ on each side, or nine in all.

The carapace is smooth and the pleon corrugated; the latter has all the somites carinated, and the four posterior produced into well-defined teeth, of which that on the third somite is larger than either of the three following.

The telson is dorsally flattened and laterally compressed, and terminates in a sharp point.

Length, entire, . . . . .	111 mm. (4.3 in.).
„ of carapace, . . . . .	52 „
„ of rostrum, . . . . .	7 „
„ of pleon, . . . . .	59 „
„ of third somite of pleon, . . . . .	12 „
„ of sixth somite of pleon, . . . . .	10 „
„ of telson, . . . . .	19 „

*Habitat*.—Station 198, October 20, 1874; lat. 2° 55' N., long. 124° 53' E.; near the Philippine Islands; depth, 2150 fathoms; bottom, blue mud; bottom temperature, 38°·9. One specimen, female. Trawled.

This species in general aspect resembles *Notostomus patentissimus*, from which it may, however, be easily distinguished by its shorter rostrum, smooth carapace, the smaller number of carinæ and the larger dorsal teeth on the pleon.

On close inspection there are observable other points of variation that are worthy of consideration.

The lateral carina that starts from the infero-lateral margin of the rostrum agrees with the description of *Notostomus gibbosus* as given by A. Milne-Edwards,<sup>1</sup> in being

<sup>1</sup> *Ann. d. Sci. Nat.*, sér. 6, tom. xi. p. 7.

continuous to the posterior margin of the carapace, whereas in *Notostomus patentissimus* it terminates just behind the orbit, while the orbital carina, which commences just below it in the lower or outer margin of the orbit, proceeds independent of the rostral carina, there being a notch separating the two, to the posterior margin of the carapace. A close inspection of *Notostomus perlatus* shows that the orbital carina, although connected with the rostral carina, yet branches off into a second less important ridge to the outer canthus of the orbit; in the depression between the two carinæ the ophthalmopod is capable of being lodged when thrown backwards, and is thus protected, while at the same time a more extensive range of vision is obtained.

The outer and upper flagellum of the first pair of antennæ is not quite so broad as in the preceding species, and the stylocerite is shorter, while the flagellum of the second pair is longer, and the scaphocerite more ovate, being shorter and broader, and also narrower at the apex. The rest of the animal corresponds very closely with the generic condition.

*Notostomus brevirostris*, n. sp. (Pl. CXXXIV. fig. 3).

Carapace corrugated on the surface, dorsally arched, and laterally compressed to a carina that reaches to near the extremity of the rostrum, which is short, and armed with five small denticles below and a series above, of which only three are on the rostrum, the rest being on the dorsal carina and continuous to the posterior margin of the carapace. The lateral carinæ are as in *Notostomus perlatus*.

The pleon is dorsally carinated, and the four posterior somites are each produced posteriorly to a strong tooth.

The telson is dorsally fluted and tapers gradually to a point that reaches as far as the extremities of the outer plates of the rhipidura.

Length, entire, . . . . .	150 mm. (6.0 in.).
„ of carapace, . . . . .	60 „
„ of rostrum, . . . . .	5 „
„ of pleon, . . . . .	90 „
„ of third somite of pleon, . . . . .	13 „
„ of sixth somite of pleon, . . . . .	13 „
„ of telson, . . . . .	24 „

*Habitat*.—Station 120, September 9, 1873; lat. 8° 37' S., long. 34° 28' W.; off Pernambuco; depth, 675 fathoms; bottom, red mud. One specimen. Trawled.

This species bears a close resemblance to *Notostomus perlatus*, but the only specimen we possess has the rostrum a little shorter and less sharp; in *Notostomus perlatus* the little denticles are coarser on the rostrum and more closely implanted on the fronto-

dorsal crest, but the specimens as a whole are so closely allied that it is difficult to consider them as being more than varieties of the same species, and they both appear to differ from the description given of *Notostomus gibbosus* by A. Milne-Edwards only in the unimportant feature of the small denticles on the rostrum, more especially on the under side. It appears to me probable that the three forms belong to the same species, but, in the present condition of zoology, it is very desirable that forms found in very distant localities, though resembling each other in general aspect, should have their details and points of distinction clearly determined. This form was taken off the eastern coast of South America, near Pernambuco, in 675 fathoms; *Notostomus gibbosus* was taken off Grenada, in the West Indies, at 626 fathoms, and *Notostomus perlatus* was procured off the Island of Celebes, at 2150 fathoms, a depth of about two miles and a half.

*Notostomus longirostris*, n. sp. (Pl. CXXXV. fig. 4).

Carapace more arched posteriorly, and less over the frontal region than in *Notostomus patentissimus* or *Notostomus perlatus*; laterally marked with four long carinæ and one semi-carina. Rostrum as long as the carapace. The dorsal carina is furnished with minute denticles from the posterior margin of the carapace to the extremity of the rostrum, gradually increasing in size as they advance anteriorly; the under surface is armed with fourteen teeth, which are rather larger than those on the upper surface.

Telson equal in length to the outer plates of the rhipidura, dorsally grooved, laterally depressed, the longitudinal ridges between the depressions and the dorsal groove being furnished with three or four distant minute spinules.

Length, entire, . . . . .	64 mm. (2.5 in.).
„ of carapace, . . . . .	19 „
„ of rostrum, . . . . .	11 „
„ of pleon, . . . . .	45 „
„ of third somite of pleon, . . . . .	7 „
„ of sixth somite of pleon, . . . . .	5 „
„ of telson, . . . . .	9 „

*Habitat*.—Station 195, October 3, 1874; lat. 4° 21' S., long. 129° 7' E.; off Banda Island; depth, 1425 fathoms; bottom, blue mud; bottom temperature, 38°. One specimen, male. Trawled.

This species corresponds in many respects with A. Milne-Edwards' description of *Notostomus elegans*, and is an intermediate form between it and *Notostomus murrayi*. It has the rostrum half as long again as the scaphocerite, and has fourteen teeth on the lower surface. It has the dorsal carina more arched towards the posterior or cardiac region, and less so anteriorly, and has four lateral carinæ instead of two.

*Tropiocaris*,<sup>1</sup> n. gen.

Carapace one-fourth the length of the animal; anteriorly produced to a keel-shaped rostrum that reaches a little beyond the frontal margin.

Pleon laterally compressed and slightly carinated, with a tendency to be posteriorly produced on the dorsal surface into sharp teeth.

Telson long, narrow, and tapering.

Ophthalmopoda pyriform.

First pair of antennæ having the peduncle short and supporting two flagella.

Second pair of antennæ carrying a tapering scaphocerite, furnished with a small tooth on the external distal angle, and terminating in a long and slender flagellum.

Oral appendages not examined.

Second pair of gnathopoda long and slender.

First and second pairs of pereopoda chelate. Three following pairs terminating in a long, smooth propodos and styliform dactylos, and the fifth has the propodos long, armed with a row of short spines, which culminate towards the distal extremity, and terminate in a short dactylos.

*Observations.*—This genus in many of its parts approximates so nearly to *Acanthephyra* and *Notostomus* that it can only be considered as a separate genus for the convenience of classification. The three genera agree in the most essential points of their structure, but differ in points that readily attract notice.

In *Notostomus* the carapace is dorsally carinated and elevated, and the rostrum produced to a sharp point that reaches to a greater or less extent beyond the peduncle of the first pair of antennæ, and the lateral walls of the carapace that cover the branchial chambers are strengthened by several strongly marked carinæ.

In *Acanthephyra* the dorsal surface of the carapace is not elevated, and only carinated anteriorly. The rostrum is longer than the peduncle of the first pair of antennæ, and is generally coarsely serrate with teeth that are not continued posteriorly to the gastric region, and there are no carinæ over the branchial regions.

In *Tropiocaris* the carapace is not dorsally elevated, but strongly compressed anteriorly to a deep ridge, at the extremity of which the rostrum projects to a point, and from its base the inferior margin on each side diverges to the orbit, and forms a surface that overhangs the metope or facial wall as a sort of pent-house or hood. There is no carina on the branchial regions, and the posterior dorsal or cardiac region is smooth. The pleon, as in the two preceding genera, is dorsally carinated and posteriorly projects into tooth-like prolongations.

The branchiæ are arranged in the same manner as in *Acanthephyra*, but the

<sup>1</sup> τρέκις, a keel; καρίς, a shrimp.

mastigobranchiæ in *Tropiocaris* are rather large, and project further between the branchial plumes; their arrangement is shown in the following table:—

Pleurobranchiæ,	.	.	.	...	...	1	1	1	1	1
Arthrobranchiæ,	.	.	.	...	1	1	1	1	1	...
Podobranchiæ,	.	.	.	1	...	...	...	...	...	...
Mastigobranchiæ,	.	.	.	1	1	1	1	1	...	...
				h	i	k	l	m	n	o

*Geographical Distribution.*—Our typical species was found about twelve degrees south of Japan, and *Tropiocaris tenuipes* at the western entrance of Torres Strait.

*Tropiocaris planipes*, n. sp. (Pl. CXXXVI. fig. 1).

Dorsal surface of the carapace horizontally straight, subcarinated, produced to a laterally compressed rostrum equal with the first joint of the first pair of antennæ.

Pleon compressed, not carinated, third somite posteriorly projecting in the dorsal median line as a depressed tooth; all the other somites smooth.

Ophthalmopoda short and stout, having no tubercle on the inner surface; ophthalmus larger in diameter than the stalk, black in colour.

First antennæ having the peduncle short and deeply excavate; the outer flagellum stout and the inner slender.

Second pair of antennæ having the scaphocerite longer than the peduncle of the first pair.

Second pair of gnathopoda reaching as far as the extremity of the scaphocerite.

Pereiopoda all having the meros and ischium laterally compressed and broadly dilated.

Telson long, slender, and tapering, the sides being fringed with a row of numerous fine teeth.

Length, entire,	.	.	.	.	.	57 mm. (2.2 in.).
" of carapace,	.	.	.	.	.	15 "
" of rostrum,	.	.	.	.	.	3 "
" of pleon,	.	.	.	.	.	42 "
" of third somite of pleon,	.	.	.	.	.	8 "
" of sixth somite of pleon,	.	.	.	.	.	10 "
" of telson,	.	.	.	.	.	12 "
" of fifth pereiopod,	.	.	.	.	.	25 "
Diameter of meros of fifth pereiopod,	.	.	.	.	.	3 "

*Habitat.*—Station 230, April 5, 1875; lat. 26° 29' N., long. 137° 57' E.; depth, 2425 fathoms; bottom, red clay; bottom temperature, 35°.5. One specimen, female. Trawled.

The dorsal surface of the carapace is carinated anteriorly and horizontally produced to a laterally compressed rostrum, which is slightly elevated anteriorly, and terminates in a

sharp tooth-like point, whence the lower margin recedes obliquely in an outwardly curved line to the orbit.

The pleon is not carinated, and the third somite is posteriorly produced to a point or depressed tooth in the median line; the other somites are smooth.

The ophthalmopoda are short and robust, having a short thick tubercle on the inner surface, distinct from the ophthalmus, which is black in colour and larger in diameter than the stalk.

The first pair of antennæ has the peduncle short and the first joint deeply excavate; the outer flagellum is very large and the inner slender.

The second pair of antennæ has a scaphocerite that is longer than the peduncle of the first pair.

The first pair of gnathopoda is subpediform and has the terminal joints reflexed.

The second pair of gnathopoda is pediform and reaches beyond the distal extremity of the scaphocerite.

The first pair of pereopoda is chelate, the meros being long, broad, and transversely compressed; the second pair is longer than the first and also has the meros long and laterally compressed. The three following pairs are not much longer than the second; the third and fourth have the meros long, broad, and of great tenuity.

The first pair of pleopoda has the inner branch reduced to a rudimentary subfoliaceous petasma; all the others have the rami subequal, those of the posterior pair helping to form the rhipidura.

The telson is longer than the inner branch of the sixth pair and subequal with the outer; the dorso-lateral angle is fringed with a series of minute spinules.

*Tropiocaris tenuipes*, n. sp. (Pl. CXXXVI. fig. 2).

Rostrum anteriorly produced to a level with the distal extremity of the first joint of the first pair of antennæ, dorsal surface armed with four or five distantly placed minute denticles; first antennal tooth reduced to a minimum, second antennal tooth small.

Pleon carinated from the third to the sixth somites; third somite posteriorly produced to a dorsal tooth; the three following terminating abruptly or with a minute projection.

The appendages of the only specimen are very much damaged.

Length, entire, . . . . .	55	mm. (2.1 in.).
„ of carapace, . . . . .	20	„
„ of pleon, . . . . .	35	„
„ of third somite of pleon, . . . . .	8	„
„ of sixth somite of pleon, . . . . .	8	„
„ of telson, . . . . .	8	„
Diameter of meros of fifth pereopod, . . . . .	0.8	„

*Habitat*.—Station 184, August 29, 1874; lat. 12° 8' S., long. 145° 10' E.; depth, 1400 fathoms; bottom, Globigerina ooze; bottom temperature, 36°. One specimen, male. Trawled.

This species differs from *Hymenodora mollis* in having the dorsal crest and rostrum more compressed laterally, and anteriorly elevated to a horizontal line with the dorsum. The denticles are very minute, fewer in number, and more distantly separated from each other, and in our specimen have the appearance of being worn. The orbit exists as a well-defined notch without any tooth at the outer canthus, the tooth beyond, which is the first antennal tooth, is apparently worn and exists as a rudiment only, whereas the second antennal tooth is short and more clearly defined, and projects anteriorly outwards from the frontal margin; posteriorly the lateral margin overlies the first somite of the pleon, and is reduced to an extreme degree of tenuity.

The first two somites of the pleon are dorsally rounded and smooth, and are divided into an anterior and a posterior section; the lateral plates are of extreme tenuity and are broadly developed, that of the second overlapping the first. The third somite is dorsally slightly carinated, and posteriorly produced to a sharp tooth; the fourth, fifth, and sixth are feebly carinated and terminate abruptly, or in the most minute tooth-like projections.

The ophthalmopoda are shorter than the rostral projection, pyriform, and but little if at all compressed; the tubercle on the inner surface is reduced to a minimum, and situated close to the ophthalmus.

The first pair of antennæ has the peduncle short, but longer than the rostrum; the first joint is rather deeply excavate to permit the ophthalmopod to rest in the hollow; the second and third joints are very short and cylindrical, and support two unequal flagella of the ordinary character in the species of this genus. The stylocerite is nearly as long as the first joint and sharp-pointed.

The second pair of antennæ has the scaphocerite slightly tapering, of great tenuity, and furnished with a small denticle on the outer distal extremity, the two joints of the peduncle that succeeds the articulation of the scaphocerite are unequal in length, the distal being the longer and more robust. The flagellum is wanting.

The mandible and oral appendages have not been examined in this species, but I assume they are generic in condition.

The first pair of gnathopoda resembles the same organ in *Hymenodora duplex*, but the basephysis is wanting, which I attribute to injury, inasmuch as the muscles that move it are present; the coxa supports a mastigobranchia of extreme tenuity, and attached to it is a small podobranchial plume.

The second pair of gnathopoda is broken off at the distal extremity of the ischium.

The first two pairs of pereopoda are chelate. The first and a portion of the fifth are the only parts preserved in the solitary specimen.

The pleopoda are biramose, but those of the first pair have the inner branch developed into a large membranous petasma, of considerably tenuity, to the inner margin of which is attached a short stylamblys fringed with cincinnuli on the inner side. All the other pleopoda are subequally biramose, and carry a long and slender stylamblys tipped with cincinnuli, except the posterior pair, which is not perfect enough for description.

*Hymenodora*, G. O. Sars.

*Hymenodora*, G. O. Sars, Archiv Mathem. Nat. Christiania, vii. p. 345, 1877.

*Meningodora*, Sidney Smith, Bull. Mus. Comp. Zoöl., vol. x. p. 73, 1882.

Integument soft and membranous. Carapace dorsally elevated and anteriorly produced to an imperfectly formed rostrum that does not project beyond the distal extremity of the first joint of the first pair of antennæ, and is formed by the meeting of the frontal margin on each side with the dorsal carina in the median line, which is generally furnished with a few small spinules.

Pleon laterally compressed and more or less carinated posteriorly.

Ophthalmopoda short, the ophthalmus imperfectly developed, and carrying both an ocellus and a tubercle.

First pair of antennæ having the peduncle short, robust, terminating in two short and unequal flagella.

Second pair supporting a foliaceous scaphocerite and a long slender flagellum.

Mandible supporting a three-jointed synnhipod.

Second pair of gnathopoda pediform and carrying a long basephysis.

First two pairs of pereopoda slender, subequal, and chelate, and both supporting a basephysis. Posterior three pairs simple and terminating in a sharp-pointed dactylos, of which the posterior is the shortest.

Pleopoda biramose, the first pair in the males having the inner branch developed in the form of a petasma, and the outer branch of the rhipidura being long, and the telson tapering.

The animal is soft, and the integument very thin; the carapace is dorsally subcarinate or compressed to an angle which increases anteriorly and projects above the metope to a point that never extends beyond the first joint of the first pair of antennæ; the dorsal crest is generally surmounted by a row of minute denticles. The frontal margin slopes from the apex of the rostrum continuously to the orbit, which is clearly defined at the outer canthus, by being lobed rather than pointed. The first antennal tooth is absent or rudimentary; the second is not largely projecting but is supported by a continuous ridge more or less distinct from the hepatic region.

The pleon has the first somite rather shorter than the others and dorsally rounded, as is also the second, but the third, fourth, and fifth are carinated in the median line, the

carina being sometimes reduced to a narrow thread-like ridge, and each somite has a tendency to be developed into a more or less perfect tooth.

The telson is long, narrow, tapering, and has the sides depressed.

The ophthalmopoda are compressed more or less distinctly, and support an ophthalmus that varies somewhat in form and size in different species, and on the inner surface a distinct tubercle that is also variable in different species both in length and importance.

The first pair of antennæ has a short and stout peduncle; the first joint being excavate on the upper surface and furnished on the outer with a short pointed stylocerite; the second and third joints are cylindrical and terminally support two flagella, of which the outer is broad and compressed at the base, where it is thickly furnished with membranous cilia, whence it tapers to a fine point.

The pleopoda are short and two-branched, that of the first pair being developed in the form of a petasma; the posterior pair has the outer rami, which help to form the rhipidura,\* without a diæresis.

Unfortunately, all the specimens in the collection are more or less injured; this is the more to be regretted since the genus is one of interest, resembling in many of its characters the genus *Benthesicymus*, from which it is so widely separated in the form and character of its branchiæ.

The branchial arrangement is given in the following table:—

Pleurobranchiæ,	.	.	.	...	...	...	...	...	...	1
Arthrobranchiæ,	.	.	.	1	1	2	2	2	2	...
Podobranchiæ,	.	.	.	...	...	...	...	...	...	...
Mastigobranchiæ,	.	.	..	l	r	r	r	r	...	...
				h	i	k	l	m	n	o

This genus is undoubtedly the same as *Meningodora*, Sidney Smith, which that author distinguishes from *Hymenodora*, Sars, upon a character which at most can be only of specific value, namely, that the coxal plate of the second somite of the pleon is so broad as to overlap the anterior somite. Buchholz's figure of the species (*Pasiphaë glacialis*) that Sars has taken for the type of *Hymenodora* shows that it is not broader than the coxal plates of the other somites. Mr. Sidney Smith also states that *Meningodora* is laterally compressed, whereas *Hymenodora* is not, but this difference is one of degree only, since in all the genera of the group lateral compression is a common feature.

The ophthalmopoda vary somewhat in form in different species that in other respects nearly approach each other, even when they come from distant localities, but in their typical condition they are transversely compressed and furnished with a tubercle on the inner side, which appears to be the rudimentary representative of a larger and more important organ, such as is seen in the deep-sea genera *Benthesicymus* and *Gennadas*, belonging to the Dendrobranchiata; this tubercle is totally distinct from the ocellus

common to many genera, but absent in this one, and is more nearly associated with the ophthalmus.

The first pair of antennæ has a short and stout peduncle, the first joint being excavate on the upper surface and furnished on the outer with a short pointed stylocerite; the second and third joints are cylindrical and terminally support two flagella, one of which is slender and the other robust, to a greater degree apparently in both sexes than is common. The peduncle is short, and situated close beneath the ophthalmopoda, has the first joint excavate or hollowed for the greater freedom of its movement; on the outer side the stylocerite exists as a thickened mass, pointed somewhat obtusely at the extremity, the outer margin being a vertical wall.

The second pair of antennæ carries a scaphocerite that is broad, tapering, and membranous, of considerable tenuity, and strengthened on the outer side by a ridge that terminates in a small tooth near the distal extremity; the peduncle has two very thick joints beyond the articulation of the scaphocerite. The length of the flagellum is nearly equal to half that of the animal.

The mandibles approximate in form to those of *Notostomus* in having a large psalis-toma with a serrate margin continuous with the molar process, which is small, and carries a three-jointed synaphipod, the terminal joint of which is spatuliform.

The other oral appendages also resemble those of *Notostomus*, differing from them, apparently, only to a slight degree.

The gnathopoda also to a considerable extent resemble those of *Notostomus*. The first pair is subpediform and seven-jointed; the propodos and dactylos are broad, flat, and reflexed; the basis carries a long ephysis, and the coxa supports a mastigobranchial plate, near to which, but separated from it, is a small arthrobranchial plume.

The second pair is pediform and five-jointed, the ischium and meros, and the propodos and dactylos being probably united; the ischio-meral joint is longitudinally triangulate and curved to afford room for the oral organs; the basis probably carries a rudimentary mastigobranchia, an arthrobranchial plume and an ephysis, although I have not been able to determine it in the partially damaged specimen.

The first two pairs of pereopoda are slender and chelate, the propodos not being enlarged; they are similar in form and subequal in size, the anterior being somewhat the smaller, and have the meros compressed, and each is furnished with a basecephysis, a rudimentary mastigobranchia, and two arthrobranchial plumes. The three succeeding pairs have the meros long and transversely flattened, the carpos short and the meros long and cylindrical, and the dactylos long and styliform except in the posterior pair, which is short and has the propodos furnished posteriorly with short stiff spinules; all carry a long basecephysis.

The first pair of pleopoda has the inner ramus membranous, and almost rudimentary in some species, whereas in others, as in *Hymenodora glauca*, it is larger and leaf-like,

and carries the stylamblys in a modified form, so that the appendage is suggestive of the petasma as it exists in *Penæus*.

The telson is long, narrow and tapering, and subequal with the lateral plates of the rhipidura.

*Observations.*—Mr. Sidney Smith suggests a close affinity of this species with *Acanthephyra*, which is true so far as the resemblance of the oral appendages, and the approximation between the genera is most apparent in *Hymenodora rostrata*, where the rostrum is longer and more distinctly dentated than usual. But with these parts the resemblance seems to cease. In *Acanthephyra* the rostrum is long and dentate above and below; the eyes are furnished with an ocellus and a rudimentary tubercle on the inner side; the scaphocerite is rigid, sharply pointed, and capable of being locked in a definite position and used as a weapon of offence; the propodos in the three posterior pairs of pereopoda are not remarkably long as compared with the carpos, and the meros is not transversely compressed.

*Geographical Distribution.*—The species of this genus, like most of the family, are from deep water; only two specimens of one species being taken at a less depth than two miles.

They are mostly found in mid ocean, on a bottom of mud or ooze: in the Atlantic beneath the equator and as far south as the Island of Tristan da Cunha, and in the Indian Ocean as far south as Kerguelen Island. Buchholz's specimen<sup>1</sup> *Hymenodora (Pasiphaë) glacialis* was taken at the surface near the pack-ice in lat. 78° N., and *Hymenodora (Meningodora) mollis*, Sidney Smith, was taken off the eastern coast of the United States, whereas our specimen of the same species was taken off the eastern coast of South America, near Pernambuco. *Hymenodora duplex* was taken in the South Indian Ocean, and *Hymenodora rostrata* at the east entrance of Torres Strait, associated with *Tropiocaris tenuipes*.

In these localities the specimens which were taken are not numerous, and the depth was very considerable and varied from one and a half to two and a half miles. In the most typical forms the eyes have almost entirely lost their pigment; in some species it is reduced to a brown colour and in a few it is black, as if the degree of pigmentation was dependent upon variation in depth and degree of light.

*Hymenodora mollis*, Sidney Smith (Pl. CXXXVI. fig. 5).

*Meningodora mollis*, Sidney Smith, Bull. Mus. Comp. Zool., vol. x. p. 74, pl. xi. figs. 8-9; pl. xii. figs. 5-9.

Carapace slightly compressed anteriorly, and produced to a rostrum that is shorter than the first joint of the first antenna, and armed on the upper surface with eleven or twelve small teeth.

<sup>1</sup> Die zweite deutsche Nordpolarfahrt., Bd. ii., Crust., p. 279, 1874.

Pleon only slightly carinated, and dorsally produced to a small tooth on the third, fourth, and fifth somites.

Ophthalmopoda longer than the rostrum; ophthalmus small and round.

First and second pairs of pereopoda chelate, the second longer than the first. Three following pairs of pereopoda having meros and ischium laterally compressed, the propodos long and cylindrical, and the dactylos styliform. Posterior pair resembling the preceding excepting that the dactylos is short and almost lost amidst a brush of hairs.

Length, entire (female), . . . . .	68 mm. (2.6 in.).
„ of carapace, . . . . .	28 „
„ of pleon, . . . . .	40 „
„ of third somite of pleon, . . . . .	9 „
„ of sixth somite of pleon, . . . . .	9 „
„ of telson, . . . . .	12 „

*Habitat*.—Station 120, December 9, 1873; lat. 8° 37' S., long. 34° 28' W.; off Pernambuco; depth, 675 fathoms; bottom, red mud. One specimen, female. Trawled.

The carapace is slightly compressed on the frontal crest, and anteriorly produced to a rostrum that does not reach more than halfway to the extremity of the first joint of the peduncle of the first pair of antennæ, and has the crest armed with ten or twelve small teeth. The frontal margin supports a small tooth corresponding with the first pair of antennæ, and, further down, a second that corresponds with the second pair of antennæ; the latter is not large, but is strong and clearly defined, whence the frontal margin recedes and unites with the lateral margin without forming an angle. Posterior to the outer canthus of the orbit a slender, but stiff, ridge proceeds obliquely backwards and then divides, one branch passing along the upper margin of the branchial region, and the other and shorter branch descending to the hepatic region, where it is met by another rigid elevation that proceeds from the second antennal tooth.

The pleon is dorsally carinated, and posteriorly produced to a tooth on the third, fourth, and fifth somites.

The telson is considerably longer than the sixth somite, dorsally grooved, and has the lateral margins depressed.

The ophthalmopoda are longer than the rostrum, transversely compressed, and distally carry a small circular ophthalmus and support a small tubercle on the inner side.

The first pair of antennæ has the first joint depressed on the upper surface and carries a scaphocerite that suddenly terminates in a sharp point; the second and third joints are short, cylindrical, and terminally support two flagella, of which the outer is robust and the inner slender, both probably being a little shorter than the carapace.

The second pair of antennæ carries a broad scaphocerite of great tenuity, the outer

margin being strengthened by a narrow ridge which terminates in a small but sharp tooth somewhat short of the distal extremity of the squamous portion; the peduncle has two joints beyond the articulation of the scaphocerite, of which the distal is the longer; the flagellum is lost.

The second pair of gnathopoda is long and robust; the ultimate joint is broken, and the penultimate is narrower than the antepenultimate, which is long, reaching as far as the distal extremity of the peduncle of the first pair of antennæ, and has the inner surface for two-thirds of its length deeply excavate to leave room for the external oral appendages; the basis carries a long ephysis that reaches nearly to the distal extremity of the meros.

The first pair of pereopoda is chelate but not more robust than the second pair of gnathopoda. The second pair has the carpos and propodos longer than in the first pair. The three succeeding pairs have the ischium and meros long, broad and flattened, the carpos subcylindrical, the propodos long, and the dactylos long and styliform in the anterior two pairs and short in the posterior.

The pleopoda are biramose, the branches being flat and multiarticulate. In the first pair the inner branch is reduced to a rudimentary condition and fringed with long hairs. The posterior pair helps to form the rhipidura, and is imperfect in our only specimen.

*Observations.*—This species is almost quite smooth dorsally, having only a small narrow carina on the pleon and on the anterior portion of the carapace, the crest being reduced to a minimum ridge. The teeth on the third, fourth, and fifth somites are reduced to small points, but that on the third somite requires attentive observation to detect, although, when present, it is generally the most conspicuous.<sup>1</sup> This species is the same as that named *Meningodora mollis* by Sidney Smith, from which it appears to differ only in having more numerous denticles on the frontal crest, and in the ophthalmopoda reaching beyond the extremity of the rostrum instead of being shorter as in Smith's figure and description, but the variation is so slight that it must be considered as being specifically the same.

The specimen is laden with a number of small round ova, all of which are attached to the hairs that fringe the peduncles of the pleopoda.

*Hymenodora duplex*, n. sp. (Pl. CXXXVI. fig. 3).

Carapace anteriorly compressed to a rostral crest, that is not elevated above the line of the dorsum, or produced beyond the level of the ophthalmopoda, and armed with seven or eight small anteriorly directed denticles. Outer canthus of the orbit well defined; the first antennal tooth reduced to a minimum condition consistent with being called a tooth; second antennal tooth not large but clearly defined, projecting obliquely

<sup>1</sup> The dorsal teeth are too conspicuously represented on the plate.

outwards and forwards. Posterior portion of branchial wall of carapace more compressed than anterior portion and projecting over the coxal region of the first somite of the pleon, but underlying that of the second.

Pleon laterally compressed and dorsally carinated from the anterior margin of the second somite to the posterior margin of the fifth; carina on second somite obscure, on the third gradually increasing from the anterior margin and produced posteriorly in the form of a large laterally compressed tooth that is nearly as long as the two following somites; fourth somite dorsally carinated and terminating in a short tooth; fifth somite also carinated but less conspicuously, and terminating posteriorly in a minute tooth; sixth somite not carinated, but furnished with a minute tooth at the posterior extremity in the median line.

The telson is broken in our only specimen, but from the portion preserved it appears to be dorsally flattened, laterally compressed, long, narrow, and tapering.

Ophthalmopoda horizontally compressed and furnished with a small tubercle on the inner surface; ophthalmus larger than the stalk on which it stands.

First pair of antennæ having the first joint deeply excavate, laterally extended, and furnished with a short, obtusely pointed stylocerite; second and third joints cylindrical, and terminally carrying two flagella.

Second pair of antennæ having two joints to the peduncle beyond the attachment of the scaphocerite, which is broad and foliaceous; the flagellum is broken off.

Gnathopoda apparently of generic value only; the second pair is broken off.

First two pairs of pereopoda slender and chelate, the second pair being longer and rather more slender than the first. Three succeeding pairs long and slender; the basis carrying an ephysis; ischium and meros transversely compressed; propodos very long, cylindrical, and supporting a styliform dactylos that is long in the anterior two pairs and short in the posterior.

Pleopoda biramose.

The rhipidura is injured, so that the length of the several parts cannot with certainty be determined.

Length, entire, . . . . .	73 mm. (3 in.).
„ of carapace, . . . . .	27 „
„ of pleon, . . . . .	46 „
„ of third somite of pleon, . . . . .	21 „
„ of sixth somite of pleon, . . . . .	10 „
„ of telson, . . . . .	13 „

*Habitat*.—Station 147, December 30, 1873; lat. 46° 16' S., long. 48° 27' E.; off Marion Island; depth, 1600 fathoms; bottom, Diatom ooze; bottom temperature, 34°·2. One specimen, female. Trawled.

This species is remarkable for the exceptional development of the tooth-like structure on the posterior margin of the third somite of the pleon, which is developed in a carina-like form and overhangs the two succeeding somites, while that on the fourth is shorter and almost covered by it, giving the appearance of two projections from one somite. It is not only the carina that projects but the dorsal surface of the somite is suddenly produced on each side, halfway between the median line and the angle formed by the coxal scale, at a right angle to the lateral margin, above which lies the laterally narrow carina that increases in height as it projects posteriorly, whereas on each of the somites anteriorly and posteriorly the carina is reduced in character, dying out on the first and last somites, the terminal tooth of the somites gradually getting reduced in size posteriorly.

The ophthalmopoda are moderately long, slightly compressed transversely, and furnished on the inner side with a small tubercle near the ophthalmus, which is hemispherical; it is lodged in a small notch-like orbit that is clearly defined by a rounded outer canthus.

The first pair of antennæ has the peduncle very robust and short; the first joint extends beyond the extremity of the rostrum, and is deeply excavate for the reception of the ophthalmopod; on the outer side there is a short stout stylocerite, the external surface of which is vertical or nearly so, and terminates in a small sharp tooth that reaches to about half the length of the joint. The cilia that form the blepharis so common in most species is altogether absent, and this is apparently not the result of accident, but indicates the permanent condition.

The second and third joints are very short, cylindrical, and together are about half the length of the first, and are very thick, the second more so than the third. The flagella are very unequal, the upper and outer being much more stout than the inner and lower; the lower surface of the upper is flattened and occupied by a series of membranous cilia. The lower flagellum is slender almost to the base, which is slightly enlarged and conformable with the under surface of the upper; both are obscurely multiarticulate and free from hairs; the length cannot be determined in this specimen, as the organs are broken off short.

The second pair of antennæ has the peduncle very stout and carries an apparently large scaphocerite, the length of which cannot be determined, but it appears to be more rigid than the other organ, for which purpose it is strengthened by two long, narrow, rod-like ridges, one on the outer margin within and parallel with it; beyond the articulation of the scaphocerite there are two well-developed and robust joints, of which the distal is the longer and stouter. The flagellum is wanting.

The mandibles and the oral appendages correspond closely with those of *Notostomus*, scarcely exhibiting even a specific variation.

The first pair of gnathopoda is seven-jointed and subpediform, and resembles that of

*Notostomus*, excepting in the relative lengths of the several joints and in having the mastigobranchial plates larger in proportion.

The second pair of gnathopoda is broken off near the mero-carpal articulation, but the joints remaining are compressed and curved.

The pereiopoda so far as preserved resemble those of *Hymenodora mollis*, and are remarkable for the great length of the propodos, which is cylindrical, and for the flattened or compressed condition of the ischium and meros. The first two pairs are chelate and slender, the second being more slender than the first and having the carpos longer than the propodos, and all are furnished with a well-developed basephysis.

The first pair of pleopoda has the inner ramus reduced to a rudimentary condition; all the others have the two branches subequal, the inner of the anterior pair carrying a long, slender, and cylindrical stylamblys, the extremity of which is furnished with a bundle of small cincinnuli. The posterior pair is too much damaged to be described, but what remains appears to be of generic character.

*Hymenodora rostrata*, n. sp. (Pl. CXXXVI. fig. 4).

Dorsal surface of the carapace laterally compressed and anteriorly produced in a depressed line to a sharply pointed rostrum, that reaches as far as the distal extremity of the first joint of the first pair of antennæ, and furnished on the upper surface with eight small denticles; inferior margin smooth and receding obliquely to the orbit, which is clearly defined but furnished with no tooth at the outer canthus. First and second antennal teeth small; the second is strengthened by a long carina-like ridge that proceeds posteriorly from it.

Pleon slightly carinated and produced to a small tooth on the fourth and fifth somites; on the third and sixth the carina terminates abruptly.

Length, entire, . . . . .	40 mm. (1.5 in.).
„ of carapace, . . . . .	15 „
„ of rostrum, . . . . .	3 „
„ of pleon, . . . . .	25 „
„ of third somite of pleon, . . . . .	5 „
„ of sixth somite of pleon, . . . . .	65 „
„ of telson, . . . . .	9 „

*Habitat*.—Station 184, August 29, 1874; lat. 12° 8' S., long. 145° 10' E.; near Torres Strait; depth, 1400 fathoms; bottom, Globigerina ooze; bottom temperature, 36°. One specimen, male. Trawled.

Station 205, November 13, 1874; lat. 16° 42' N.; long. 119° 22' S.; Philippine Islands; depth, 1050 fathoms; bottom, blue mud; bottom temperature, 37°. One specimen, male. Trawled.

Station 245, June 30, 1875; lat.  $36^{\circ} 23' N.$ , long.  $174^{\circ} 31' E.$ ; North Pacific; depth, 2775 fathoms. Taken in a tow-net sent down to over 1700 fathoms.

This species shows the development of the rostrum more after the manner of the normal Phyllobranchiata than do the other described species, and exhibits the direction in which generic relationship exists. This species differs little in structural character from *Acanthephyra*, except in the soft and membranous condition of the dermal tissues, the shortness of the rostrum, which in this genus never reaches beyond the first joint of the first pair of antennæ, the absence of the ocellus, and the length of the propodos of the posterior pair of pereopoda.

The ophthalmopoda in this species are short and broad, being nearly as broad as long, scarcely compressed, and the ophthalmus is brown in colour.

The first pair of antennæ has the first joint of the peduncle deeply excavate, more so than is usual in this genus; the distal outer angle is produced to a process, and the stylocerite is stout, sharply pointed, and about half the length of the joint.

Most of the appendages are broken off and lost, but the chelate pereopoda and the posterior pair are present and exhibit the features common to the genus.

The first pair of pleopoda has the inner ramus developed as a small foliaceous plate, and the others carry a long and slender stylamblys.

*Hymenodora glauca*, n. sp. (Pl. CXXXVII. fig. 1).

Dermal structure soft, flexible and smooth, carapace slightly compressed over the frontal region to a median ridge, which is furnished with three or four minute denticles; anteriorly the carapace projects as far as the extremities of the ophthalmopoda in a rounded margin, the central point of which is furnished with a small sharp denticle, beneath which is a second of nearly equal importance.

The pleon is smooth and laterally compressed, the sixth somite being about twice the length of the preceding and subequal with the telson, which is long, narrow and tapering, having the lateral margins depressed, and the dorsal surface flattened.

The ophthalmopoda are short, horizontally flattened, broader at the base than at the distal extremity, near which on the inner side, in close proximity to the ophthalmus, is a small but conspicuous tubercle.

The first pair of antennæ has the peduncle about one-third the length of the carapace; it is stout and has the first joint slightly depressed to receive the ophthalmopoda, and the stylocerite exists as a bluntly pointed vertical wall on the outer side; the second and third joints are short and cylindrical, and support two flagella, of which the outer is the more robust and is enlarged at the base, on the under surface of which is a thick brush of membranous cilia, the inner flagellum is slender and filiform throughout, and both are subequal with the length of the carapace.

The first pair of gnathopoda is subpediform and seven-jointed; the coxal joint supports a mastigobranchia and an arthrobranchial plume, and the basis an ephysis; the two terminal joints are reflexed against the preceding.

The second pair of gnathopoda is pediform and five-jointed, the last two joints articulating with the preceding at the inferior angle of the distal extremity; the coxa carries a small mastigobranchia and an arthrobranchial plume; the basis supports a slender and moderately long ephysis; the next two joints coalesce and are long and curved, and the terminal two are straight and fringed with long hairs.

The first two pairs of pereopoda are slender, short, and subequally chelate; the next three pairs are slender and simple.

The pleopoda are biramose, the first pair having the inner branch in the form of a petasma.

The telson is damaged in the typical specimen, but appears to be long, slender, and tapering, having the sides depressed.

Length, entire, . . . . .	55 mm. (2.1 in.).
„ of carapace, . . . . .	20 „
„ of rostrum, . . . . .	2 „
„ of pleon, . . . . .	35 „
„ of third somite of pleon, . . . . .	6 „
„ of sixth somite of pleon, . . . . .	8 „
„ of telson, . . . . .	1 „

*Habitat*.—Station 159, March 10, 1874; lat. 47° 25' S., long. 130° 22' E.; south of Australia; depth, 2150 fathoms; bottom, Globigerina ooze; bottom temperature, 34°·5. One specimen, male. Trawled.

Station 215, February 12, 1875; lat. 4° 19' N., long. 130° 15' E.; south of the Philippines; depth, 2550 fathoms; bottom, red clay; bottom temperature, 35°·4. One specimen, damaged. Trawled.

*Hymenodora mollicutis*, n. sp. (Pl. CXXXVII. fig. 2).

Carapace smooth and slightly compressed anteriorly, a small carina traverses the frontal region in the median line, and projects anteriorly as a rostrum in the form of a small tooth. The dorsal surface of the pleon is smooth, without any sign of a carina or dental projection.

The ophthalmopoda are stout and flat and carry the tubercular protuberance distally on the inner side, near the ophthalmus, which is of a fawn or pale yellow colour.

The first pair of antennæ has the peduncle stout and deeply excavate at the base, and terminates in two flagella, of which the upper is much stouter than the lower.

The second pair of gnathopoda is robust and styliform.

The two anterior pairs of pereopoda are chelate and subequal. The two following have the meros subcylindrical and terminate in a styliform dactylos, that of the posterior pair being short and stunted.

	Female.	Male.
Length, entire, . . . . .	50 mm. (2 in.).	60 mm. (2.3 in.).
" of carapace, . . . . .	19 "	21 "
" of rostrum, . . . . .	5 "	5 "
" of pleon, . . . . .	31 "	39 "
" of third somite of pleon, . . . . .	5 "	7 "
" of sixth somite of pleon, . . . . .	8 "	9 "
" of telson, . . . . .	(?) "	12 "

*Habitat.*—Station 104, March 23, 1873; lat. 2° 25' N., long. 20° 1' W.; Atlantic; depth, 2500 fathoms; bottom, Globigerina ooze; bottom temperature, 36°.6. One specimen, female with ova. Trawled. Length, 50 mm.

Station 87, July 21, 1873; lat. 25° 49' N., long. 20° 55' W.; near the Canary Islands; depth, 1675 fathoms; bottom, rock. One specimen, male. Dredged. Length, 62 mm.

Station 133, October 11, 1873; lat. 35° 41' S., long. 20° 55' W.; near Tristan da Cunha; depth, 1900 fathoms; bottom, Globigerina ooze; bottom temperature, 35°.4. Two specimens; one male (damaged), one female. Trawled.

Station 156, February 26, 1874; lat. 62° 26' S., long. 95° 44' S.; depth, 1975 fathoms; bottom, Diatom ooze. One specimen, male. Trawled. Length, 25 mm.

Station 157, March 3, 1874; lat. 53° 55' S., long. 108° 35' S.; depth, 1950 fathoms; bottom, Diatom ooze; bottom temperature, 32°.1. Two specimens, males. Trawled. Length, 70 mm.

Station 318, February 11, 1876; lat. 42° 32' S., long. 56° 29' W.; depth, 2040 fathoms; bottom, blue mud; bottom temperature, 33°.7. One specimen, female. Trawled. Length, 50 mm.

The carapace is slightly depressed between the gastric and cardiac regions, slightly arcuate over the gastric region, and in the median line compressed to a ridge that is adorned with four small denticles, posterior to the rostral point, which does not reach as far as the distal extremity of the ophthalmopoda; from the extremity at the base of the small rostral projection, the frontal surface abruptly descends and unites with the metope, and does not carry a small tooth as in *Hymenodora glauca*, being smooth throughout.

This species differs from *Hymenodora glauca* most conspicuously by having no denticle on the metope beneath the rostral tooth, and by the last two joints of the second pair of gnathopoda articulating with the preceding joint at the extremity, instead of on the under surface.

*Observations.*—It appears to be very commonly distributed, since it has been taken

in the Atlantic and South Indian Oceans at an approximate depth of about 2000 fathoms.

The specimen taken at Station 104 carried from thirty to forty eggs of an ovate form and large size, in which the embryo is present, sufficiently advanced to demonstrate the character of the brephalos to be that of the *Megalopa* stage.

The specimen from Station 87 has the dorsal crest almost smooth, the small denticles being either in a rudimentary condition or broken off by friction. In this specimen the outer plates of the rhipidura are preserved, and close inspection, even after the application of a reagent, failed to show the presence of a diæresis, and the small tooth on the outer margin that demonstrates its position when present is wanting, although a small notch shows its position. This is also the condition in the two specimens taken at Station 157. In one of these the animal was not far from the point of moulting. The form of the plate is rounded at the extremity, and almost smooth, or where more highly magnified shows small indentations from which hairs have been removed, and a small denticle is present at the outer angle. Within the cuticle the new dermal structure is in an advanced condition, and exhibits the presence of long slender hairs along the distal margin, and the outer angle bears, not a minute denticle, but a long hair and a strong spine, beyond which the outer margin is smooth, although in some specimens a series of small dots are regularly placed, suggesting the presence of a number of minute hairs on the under side within the margin.

In one of the two specimens from Station 133 the telson is tolerably preserved, which is not the case in the type specimen. It is longer than the lateral plates of the rhipidura, and nearly twice the length of the sixth somite, and probably terminates in a few hairs of greater or less length, but which are broken off.

#### Family STYLODACTYLIDÆ.

This family is established to receive those forms, of which only one genus is known, in which the first pair of gnathopoda terminates in two branches, subequal in size and importance, and the propodos of the two chelate pereopoda has the palm short and the pollex and dactylos long, slender, and feeble.

#### *Stylodactylus*, A. Milne-Edwards.

*Stylodactylus*, A. Milne-Edwards, Ann. d. Sci. Nat., sér. 6, tom. xi. p. 11, 1884; Recueil de Fig. Crust. nouv., 1883.

Carapace one-third of the length of the body, dorsally rounded, anteriorly compressed to a slight carina, and produced to a long, slender, and laterally compressed rostrum,

armed on the upper and lower margins with long stout articulated spines. Frontal margin having the orbit defined by an inner and an outer canthus. First and second antennal teeth strong and well developed. Fronto-lateral angle rounded.

Pleon dorsally smooth and round; sixth somite scarcely longer than the fifth.

Telson longer than the sixth somite, dorsally flattened, and laterally armed with minute spinules; posterior extremity produced to a sharp point furnished on each side with movable spines or hairs.

Ophthalmopoda pyriform, uniarticulate, and near together.

First pair of antennæ having a strong stylocerite, and terminating in two long and slender flagella.

Second pair of antennæ furnished with a pointed scaphocerite and carrying a long and robust flagellum.

First pair of gnathopoda terminating in a duplex joint.

Second pair of gnathopoda six-jointed, long, slender, and pediform.

First two pairs of pereopoda long, slender, and chelate; the carpos long, the palm of the propodos short, and the pollex and dactylos long, slender, and styliform. Posterior three pairs robust, having a sharp carpos, a long propodos, and a short dactylos.

Pleopoda biramose, the first pair having the inner branch short and the posterior pair broad and subequal in length with the telson.

*Geographical Distribution.*—The first specimens were taken on the 15th of July 1874, near the Kermadec Islands in the Pacific, another was taken near the Admiralty Islands, and the third, being the type on which A. Milne-Edwards founded the genus, was taken by Professor Agassiz off St. Domingo. The average range of depth is between 400 and 500 fathoms.

*Stylodactylus discissipes*, n. sp. (Pl. CXXXVIII. fig. 1).

Carapace quite one-third of the length of the animal; posterior dorsal surface smooth and round; frontal region compressed to a carina that is not elevated above the carapace, and produced anteriorly to a laterally compressed rostrum that is slightly elevated at the extremity, and armed on the upper surface with thirty strong and robust spines that articulate with the rostrum, the posterior standing on the gastric region, and the anterior near the apex. First and second antennal teeth well developed.

Pleon having the third somite not arcuate and not longer than the preceding; sixth somite subequal with the fifth.

Telson shorter than the two preceding somites, and corresponding in length with the inner plates of the rhipidura, dorsally flattened, and armed at the dorso-lateral angles with five spinules, and terminating in a short central point and seven spines.

Ophthalmopoda short and pyriform; ophthalmus brown in colour.

First pair of antennæ having the flagella slender, the outer branch a little more robust than the inner, and both about half as long again as the rostrum; the first joint of the peduncle carries a sharp stylocerite that reaches as far as the second joint.

Second pair of antennæ carrying a scaphocerite that reaches a little beyond the peduncle of the first pair and terminates in a sharp point; the flagellum is longer than the animal.

First pair of gnathopoda subpediform and terminating in two branches implanted side by side on the extremity of the preceding joint.

Second pair of gnathopoda pediform, long and slender, having the penultimate joint armed with fine stiff spines on the anterior and outer margins, as also on the preceding joint.

First two pairs of pereopoda similar in form and terminating in two long and slender fingers, equal in size and similar in form, and fringed with ciliated hairs; the carpos carries a few long spines on the anterior margin and hairs on the posterior. Posterior three pairs fringed with strong teeth on the posterior margin, and terminating in a short, sharp, curved, smooth dactylos.

Rhipidura broadly expanded; peduncle armed with a strong tooth; outer plate having a diæresis defined by a strong tooth and long spine.

Length, entire, . . . . .	28 mm. (1.1 in.).
„ of carapace, . . . . .	8 „
„ of rostrum, . . . . .	10 „
„ of pleon, . . . . .	20 „
„ of third somite of pleon, . . . . .	3 „
„ of sixth somite of pleon, . . . . .	3.5 „
„ of telson, . . . . .	4 „

*Habitat*.—Station 171, July 15, 1874; lat. 28° 33' S., long. 177° 50' W.; north of the Kermadec Islands; depth, 600 fathoms; bottom, hard ground; bottom temperature, 39°·5. Two specimens; one male, one female (?). Trawled. Associated with *Stylo-dactylus orientalis*, *Benthesicymus*, and *Hemipenæus*.

The two specimens correspond so closely in general form and in most of the details, that it is difficult to believe that they are not one and the same species, but the differences between them are the same in kind as those which distinguish them from the specimen obtained by Agassiz in the West Indies, namely, the relative length of the rostrum and the general armature of the animal.

In the specimen from which our figure and description are taken, the rostrum is longer than the carapace in the proportion of 10 mm. to 8 mm., measuring from the orbit, and the number of spinules on the upper margin is twenty-seven, and on the lower fourteen. In the larger specimen taken at the same station the relative lengths are

13 and 12 mm., while the spinules on the upper margin of the rostrum are thirty, and on the lower fifteen. In *Stylodactylus serratus* A. Milne-Edwards says that there are forty spines on the upper margin, and more than twenty on the lower, and that the proportion of the rostrum to the carapace is 24 mm. to 20 mm.; but *Stylodactylus serratus* is nearly double the size of any of the Oriental specimens. The comparative lengths of the three specimens are as follows:—

	Rostrum.	Carapace.	Entire length.	Rostral spines.
<i>Stylodactylus serratus</i> , A. M.-E.,	24 mm.	20 mm.	65 mm.	{ $\frac{40}{20}$
<i>Stylodactylus discissipes</i> , . . .	10 „	8 „	28 „	{ $\frac{27}{14}$
<i>Stylodactylus orientalis</i> , . . .	13 „	13 „	38 „	{ $\frac{30}{15}$

The length of the carapace to that of the entire animal is relatively the same in each, being little less than one-third of the animal, measuring from the orbital margin to the extremity of the telson. The rostrum varies in relative length, and the armature varies still more, especially as exhibited on the upper margin. All the spines articulate with the base on which they stand.'

In *Stylodactylus discissipes* the dorsal crest is slightly elevated, and a depression exists on the dorsum corresponding with the cervical fossa, anterior to which the rostral carina ends. The pleon is dorsally rounded, and all the somites are subequal in length, the second being rather the longest.

The first pair of antennæ has the flagella unequal, the inner pair reaching but little beyond the extremity of the rostrum.

The second pair of antennæ has the scaphocerite sharply pointed at the outer distal extremity, and reaches a little beyond the peduncle of the first pair. A long and conspicuous tooth stands on the outer and distal angle of the second joint of the peduncle at the base of the scaphocerite. The ultimate joint is very stout, and supports a flagellum that is a little longer than the animal, and tolerably strong and not readily detached.

The oral appendages have not been examined in this the most perfect specimen; they are described in *Stylodactylus orientalis*.

The first pair of gnathopoda are, so far as my experience goes, unique in structure; they are subpediform; the basis carries a long, slender, and rather stiff ephysis, the two succeeding joints are long and robust, and support at the extremity two broad, flat, spatuliform plates that articulate side by side; they are blunt or rounded at the extremity, and fringed with long hairs.

The second pair of gnathopoda is pediform, and has six joints; the meros and carpos are very long, and armed with short spinules and long hairs, the dactylos being either wanting or fused with the propodos.

The first two pairs of pereiopoda are nominally chelate, the meros and carpos being long and fringed with short spines on the anterior margin, and hairs on the posterior. The carpos is long and slender, the propodos has an extremely short palm, and supports a long and feeble pollex, and articulates with a dactylos which lies parallel with it and corresponds in its entire length. They are fringed with ciliated hairs posteriorly, and are smooth anteriorly. The posterior three pairs are robust and not long; the meros is sparsely armed with spines on the anterior surface, of which the last is produced from the distal or carpal angle, and posteriorly with strong teeth that increase in length towards the carpal joint. The carpos is armed with spines on the posterior margin, but is smooth on the anterior, the distal extremity of which overlaps the carpal extremity of the propodos, which is about three times as long as the carpos; it is smooth on the anterior margin, and fringed with spines on the posterior. At the carpal extremity of the anterior surface is a depression into which the distal process of the carpos falls, and supports the leg in its extended direction; the dactylos is short, curved, and sharply pointed.

The pleopoda are all equally biramose, excepting the first pair, and that has the inner branch reduced to a small membranous plate. The posterior pair is articulated laterally, and carries a large tooth at the outer angle of the basal joint. The inner branch is about the same length as the telson, lanceolate in form, and fringed on both sides with hairs, the outer branch is not longer than the inner, it is very broad, and is furnished with a diæresis that is armed on the outer extremity with a short tooth and a strong spine.

*Stylodactylus orientalis*, n. sp. (Pl. CXXXVIII. fig. 2).

Rostrum as long as the carapace, armed on the upper surface with thirty spines, and on the lower with fifteen. Inferior margin of the carapace strengthened by a calcified ridge.

The general armature of the specimen is stronger, and the dermal tissue more rigid than in *Stylodactylus discissipes*, but with this exception and the proportional length of the rostrum, the closest inspection does not enable me to distinguish any character of specific value.

Length, entire, . . . . .	38	mm. (1.5 in.).
" of carapace, . . . . .	11	"
" of rostrum, . . . . .	14	"
" of pleon, . . . . .	27	"
" of third somite of pleon, . . . . .	4	"
" of sixth somite of pleon, . . . . .	4.5	"
" of telson, . . . . .	5.5	"

*Habitat*.—Station 171, July 15, 1874; lat. 28° 33' S., long. 177° 50' W., north of the Kermadec Islands; depth, 600 fathoms; bottom, hard ground; bottom temperature, 39°.5. One specimen, female. Trawled.

The description given of the preceding species agrees with the present form, except that the general structure is stronger and more pronounced in this specimen, which would have been selected as the type had not certain important parts, more especially the peculiar chelate appendages, been wanting.

In this species I had the opportunity of examining the oral appendages, which I was not able to do in *Stylodactylus discissipes*.

The mandibles (fig. 2*d*) have a broad psalistoma connected with the molar prominence, furnished with a few strong dental processes, and carry a biarticulate synhipod fringed with hairs, of which the longest are attached to the first joint.

The first pair of siagnopoda (fig. 2*e*) consists of three short branches; the inner is short, flat, curved, and distally fringed with a few hairs; the second or median is bat-shaped, being narrow at the base, and distally broad, flat, the distal margin being rounded and fringed with small cilia; the outer branch is short, cylindrical, and bifid at the extremity.

The second pair of siagnopoda (fig. 2*f*) consists of a cylindrical and two broad but small plates on the inner side, the margins of which are fringed with hairs; the first has the margins parallel, the second is bat-shaped, and the third is short, cylindrical, and tipped with hairs; on the outer side is a large, broad, flat, squamous plate, fringed with hairs, of which those on the posterior extremity are sufficiently long to reach to the posterior extremity of the branchial chamber.

The third pair of siagnopoda (fig. 2*g*) consists of one large and one small squamous plate, beyond which, fringed with hairs, is a narrow subcylindrical median plate tipped with hairs, and on the outer side a broad squamous plate of great tenuity, from the inner margin of which arises a slender cylindrical branch that tapers to the extremity and is tipped with hairs; at the base of the plate stands two membranous plates.

The second pair of gnathopoda, as well as all the pereopoda except the last pair, carry attached to the coxa a short, broad, flat, mobile plate, fringed on the upper surface with hairs, which is the rudiment of the mastigobranchial appendage.

All the other parts bear a close resemblance to those described in other species, and from which I am not able to determine any specific distinction besides those mentioned.

*Observations.*—This species was found associated with *Stylodactylus discissipes*, from which it differs chiefly in the length of the rostrum and the number of teeth that ornament it, as also from *Stylodactylus serratus* of the West Indies, from which it may also be determined by the presence of small spines on the anterior margins of the carpal joints of the second pair of gnathopoda and the first two pairs of pereopoda.

*Stylodactylus bimaxillaris*, n. sp. (Pl. CXXXVIII. fig. 3).

Carapace less than one-third of the length of the animal; rostrum about once and a half the length of the carapace, and armed on the upper margin with thirty-six fine

spines, commencing over the gastric region and on the lower margin with seven or eight long ones. Antennal teeth on the frontal margin small.

Pleon dorsally smooth; third somite considerably longer than the others, and dorsally arcuate, slightly compressed, and posteriorly projecting in the median line; sixth somite slightly longer than the fifth.

Telson as long as the two preceding somites, dorsally flattened, and having the dorso-lateral angles armed with several small spinules arranged in a longitudinal row.

Ophthalmopoda pyriform.

First pair of antennæ having the flagella short, scarcely reaching beyond the rostrum.

Second pair of antennæ having the scaphocerite long and slender, two-thirds the length of the rostrum.

Pereiopoda smooth and generally free from spines on the anterior margin, and posteriorly fringed with long hairs.

Length, entire, . . . . .	26 mm. (1 in.).
„ of carapace, . . . . .	8 „
„ of rostrum, . . . . .	9 „
„ of pleon, . . . . .	18 „
„ of third somite of pleon, . . . . .	5 „
„ of sixth somite of pleon, . . . . .	3 „
„ of telson, . . . . .	5 „

*Habitat*.—Station 219, March 10, 1875; lat.  $1^{\circ} 54' 0''$  S., long.  $146^{\circ} 39' 40''$  E.; off the Admiralty Islands; depth, 150 fathoms; bottom, coral mud. One specimen, female, laden with ova. Trawled.

The specimen from which this description is taken is a distinct and fixed species, and may readily be distinguished from the others by the greater length and by the form of the third somite of the pleon, and by the general armature being less pronounced. In the other species the spines on the upper margin of the rostrum are larger than those on the lower, but in this species they are finer and less conspicuous, and more regularly placed than those on the lower, and the antennal teeth on the frontal margin are not so well developed.

The ophthalmopoda are less stout and carry a black ophthalmus that is furnished with a small circular ocellus.

The first pair of antennæ does not reach beyond the extremity of the rostrum, the outer flagellum being thick nearly to the apex, where it is suddenly reduced to a thread-like extremity of a diameter similar to that of the inner flagellum; the first joint is long and depressed on the upper surface, and carries a sharply pointed stylocerite that is about half the length of the joint.

The second pair of antennæ carries a very long scaphocerite that has the outer margin curved outwards, the apex sharply pointed and rigid, and the inner foliaceous division reduced to a longitudinal narrow margin, fringed with long hairs. The basal joint carries a small tooth on the upper surface near the articulation of the scaphocerite.

The oral appendages have not been examined in this specimen.

The first pair of gnathopoda lies curved up against the mouth, and is seven-jointed; the terminal joint is double, and the coxa carries a small branchial plume, but I have not detected a mastigobranchial plate; the basis carries a long and slender ecpysis; the ischium is long, subcylindrical, and fringed on the inner surface with numerous much ciliated strong stiff hairs; the next joint, which is analogous to the carpos, curves abruptly round, so that the more distal joints are flexed against the ischium; the next joint, which represents the propodos, is subcylindrical and increases in diameter distally, at which extremity the terminal branches stand side by side, one longer than the other, and both are flat, long-ovate, and copiously fringed with stiff, curved, and ciliated hairs; some longer hairs stand on the outer angle of the preceding joint and fringe the inner margin, all possessing stout and strong cilia, giving to the organ a powerful brush-like character, so that it has the power of sweeping an area round the mouth and collecting material for food.

The second pair of gnathopoda has been broken at the carpal-joint of the meros, but so far as preserved it generally resembles that of the preceding species.

The first two pairs of pereopoda are free from teeth on the anterior margin and fringed with hairs on the posterior; the palm is very short, and the fingers long, straight, and parallel. The posterior three pairs are strong and smooth, being free from the dentation or the spinous condition of the preceding species.

The pleopoda are biramose; the first pair has the inner branch short and bud-like, and the others have the two branches subequal. The terminal pair helps to form the rhipidura, and is subequal in length with the telson; the outer branch is the longer, has an oblique diæresis, and is armed at the outer margin with a small tooth and spine.

#### Family PASIPHÆIDÆ.

This family has not been well defined. Milne-Edwards<sup>1</sup> says that the genus *Pasiphæa* establishes in many respects a passage between *Penæus* and *Sergestes*, but this view, I think, cannot be accepted, seeing that *Pasiphæa* belongs to the Phyllobranchiata and *Penæus* and *Sergestes* belong to the Dendrobranchiata, the different form of the branchiæ in the two divisions precluding these genera from belonging to one and the same division.

The remarkable features in the Pasiphæidæ appear to exist in the imperfect develop-

<sup>1</sup> Hist. Nat. Crust., tom. ii. p. 424.

ment of some of the pereiopoda, while others are well formed; for instance in the genus *Pasiphæa* the first two pairs of pereiopoda are well developed, whereas the three posterior pairs are diminutive in size and imperfectly formed.

The genus *Leptocheila* has also the first two pairs of pereiopoda well developed, while the three posterior pairs are slender and feeble. In *Pasiphæa* there is no synnhipod attached to the mandibles, and in *Leptocheila* the same appendage is only single-jointed. In *Orphania* the chelate pereiopoda are well developed, and the three posterior slender and feeble.

These three genera I propose to unite in this one family, and there are probably others which may be found possessing features that may bring them within its range.

### *Leptocheila*, Stimpson.

*Leptocheila*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 111, 1860.

Carapace smooth, scarcely crested; lateral walls and margin destitute of spines. Rostrum very short, spiniform.

First pair of antennæ biflagellate.

Mandibles inflexed, broad, and compressed; synnhipod short, ovate, and uniarticulate.

First pair of gnathopoda not pediform, having the last joint armed with long spines.

Second pair of gnathopoda furnished with an ephysis.

Pereiopoda carrying a basephysis. First and second pairs compressed, chelate, slender, with long parallel dactyli; three posterior pairs short.

Pleon having the antepenultimate somite more or less abruptly curved.

Pleopoda biramose, rhipidura well developed.

Telson long, narrow, and tapering.

The above definition corresponds closely with Dr. Stimpson's description of the genus, which he considers to bear a close affinity to *Pasiphæa*, differing only in having the mandibles with a synnhipod, and in the first pair of gnathopoda not being pediform.

The description coincides with the characters of the specimen in the Challenger collection, except that what Dr. Simpson calls "long spines" on the terminal joint of the first pair of gnathopoda I should have called hairs.

The arrangement of the branchiæ, as observed in *Leptocheila robusta*, is shown in the following table:—

Pleurobranchiæ,	.	.	.	...	...	1	1	1	1	1
Arthrobranchiæ,	.	.	.	...	...	1	1	1	1	...
Podobranchiæ,	.	.	.	...	...	...	...	...	...	...
Mastigobranchiæ,	.	.	.	r	r	...	...	...	...	...
				h	i	k	l	m	n	o

*Geographical Distribution.*—Dr. Stimpson obtained some specimens of *Leptocheila gracilis* from deep water in the Gulf of Kagosima, and *Leptocheila robusta*, at a depth

of 20 fathoms, in the China Sea, and also near the Island of Loochoo. Of the Challenger specimens of this genus, *Leptochela serratorbita* was taken off St. Thomas Island, West Indies, and *Leptochela robusta* in Bass Strait, while *Leptochela gracilis* was captured near the southern coast of Japan.

*Leptochela serratorbita*, n. sp. (Pl. CXXXIX. fig. 1).

Orbital margin fringed with a series of small teeth. Dorsal surface of the fifth and sixth somites of the pleon smooth.

Second pair of gnathopoda furnished with a large and pointed tooth.

Length, entire, . . . . .	13 mm. (0.5 in.).
" of carapace, . . . . .	3 "
" of rostrum, . . . . .	0.7 "
" of pleon, . . . . .	10 "
" of third somite of pleon, . . . . .	2 "
" of sixth somite of pleon, . . . . .	1.5 "
" of telson, . . . . .	2.5 "

*Habitat*.—St. Thomas, West Indies ; shallow water. One specimen, associated with *Platybema rugosum*.

The carapace is smooth and anteriorly produced to a sharp horizontal rostrum. The orbit extends to the first antennal tooth, and has the margin serrate ; the second antennal tooth is reduced to a point ; the lateral plates of the first somite of the pleon overlap the posterior margin of the carapace, and the dorsal surface of the posterior somites is unarmed and smooth.

The telson is as long as the lateral plates of the rhipidura.

The ophthalmopoda are shorter than the rostrum, robust, and have the ophthalmus orbicular, and but little larger in diameter than the stalk.

The first pair of antennæ is subequal and short.

The second pair of antennæ has the scaphocerite longer than the peduncle of the first pair, and the flagellum slender (broken).

The mandibles are broad, flat, and serrate at the margin, with sharply cut teeth that are largest towards the front, and furnished with a short ovate single-jointed synnaphipod, tipped with six ciliated hairs.

The first pair of siagnopoda is three-branched ; the inner branch is small and the middle broad and foliaceous, both being tipped with hairs ; the third, which appears to represent the basephysis, is narrow and two-jointed, the terminal joint being small and bud-like.

The second pair of siagnopoda consists of four plates ; two on the inner surface which

are foliaceous and tipped with a thick fringe of hairs, a third that is sharply pointed and single, and a fourth that is broad and foliaceous, extending forwards beyond the apex of the previous one and posteriorly into the branchial chamber, and has the margin furnished with radiating cilia.

The first pair of gnathopoda is short and subpediform, consisting of six joints, of which the terminal is small and tipped with five or six spine-like hairs, similar to others that fringe the outer margin of the second joint; it carries no branch attached to the basal joint, and only the rudiment of a mastigobranchial plate.

The second pair of gnathopoda is long, slender, and pediform, and carries a long basephysis and a rudimentary mastigobranchial plate.

The first pair of pereopoda is slender and not very long, the chela is scarcely wider than the carpos, and the fingers are long, slender, and parallel, the inner margins being fringed with long and slender teeth, every third and fourth being longer than the others; the outer margin of the pollex is smooth, while that of the dactylos is armed with four or five equidistant solitary spines. The second pair resembles the first and corresponds in size. The three posterior pairs are shorter than the two first; they are slender and feeble, and carry a short basephysis fringed with hairs that are jointed and ciliated; the ischium is armed on the posterior under surface with a strong tooth nearly as long as the joint; the meros is slightly lobed on the inner side, and is furnished with two strong spines and five or six ciliated hairs; the carpos is nearly as long as the meros and lobed on the inner side anteriorly, the lobe being furnished with one small spine and several long and ciliated hairs; the propodos is shorter than the carpos, lobed on the inner side anteriorly, but less so than the carpos, the lobe being fringed with four or five ciliated hairs, but no spines; the dactylos is longer than the propodos, the margins are subparallel, increasing rather than decreasing in width until near the apex, where they approach and terminate in a slightly unguiculate point, the under margin being fringed with a few hairs.

The pleon is somewhat more slender than the carapace, and the sixth joint is abruptly narrower than the preceding, and possesses the indication of a lobe on the anterior dorsal extremity.

The telson is long, slender, tapering, and armed with three strong spines on each side, each spine being solitary and distant from the others.

*Leptochela gracilis*, Stimpson (Pl. CXXXIX. fig. 2).

*Leptochela gracilis*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 111, 1860.

Carapace cylindrical. Rostrum subequal with the ophthalmopod.

Pleon smooth; fifth somite posteriorly produced to a horizontal tooth; sixth somite furnished with a tubercle near the anterior dorsal extremity.

Length, entire, . . . . .	18 mm. (0·7 in.).
„ of carapace, . . . . .	6 „
„ of rostrum, . . . . .	3 „
„ of pleon, . . . . .	12 „
„ of third somite of pleon, . . . . .	3 „
„ of sixth somite of pleon, . . . . .	4 „
„ of telson, . . . . .	4 „

*Habitat*.—Station 233A, May 19, 1875; lat. 34° 38' N., long. 135° 1' E.; off Japan; depth, 50 fathoms; bottom, sand. Two specimens; one male. Dredged.

The carapace is smooth, slightly carinated on the anterior portion, and produced to a pointed rostrum, which is depressed anteriorly. The dorsal surface is smooth. The pleon is slightly carinated to the posterior extremity of the fifth somite, which is produced to a sharp point in the median line. The sixth somite is considerably narrower, and is armed with a small tooth on the dorsal surface near the anterior extremity, and with a small and slender spine-like tooth near the posterior extremity of the infra-lateral margin.

The telson is long, slender, tapering, armed laterally with three strong, solitary, equidistant spines, and terminating in two long spines; the dorsal surface is channelled in the median line.

The ophthalmopoda are more slender than in the previous species; the ophthalmus is orbicular.

The first pair of antennæ has the peduncle longer than the rostrum, and has the first joint excavate to receive the eye; the flagella are unequal, one being nearly half the length of the animal, and the other scarcely half the length of the carapace.

The second pair of antennæ has the scaphocerite longer than the peduncle of the first pair, and carries a flagellum that is broken off in our three specimens, but which Stimpson says is scarcely longer than that of the first pair.

The pereopoda correspond closely with those of *Leptochela serratorbita*.

*Observations*.—This species, the specimens of which were procured off the southern coast of Japan, corresponds with the description of those taken by Stimpson in the Gulf of Kagosima. The only points that do not correspond with it are the presence of a small tooth or tubercle on the anterior portion of the sixth somite of the pleon, and the small slender tooth on the infra-lateral margin near the posterior extremity. In the female the form of these is frequently reduced to a small point.

It may be that Stimpson's description was taken from a female, but if so, the specific name does not correspond, and it is less slender and graceful than the male. In the female the anterior somites of the pleon have the lateral or coxal walls deeper than in the male.

The ova are oval, very numerous and small, being less than 0·5 mm. in diameter.

Stimpson's specimens were taken at a depth of more than 40 fathoms.

*Leptochela robusta*, Stimpson (Pl. CXXXIX. figs. 3, 4).

*Leptochela robusta*, Stimpson, *loc. cit.*, p. 112.

"Animal robust, slightly compressed. Carapace carinated. Rostrum slender, shorter than the ophthalmopoda.

"First pair of antennæ scarcely longer than the carapace, having the peduncle robust.

"Second pair of antennæ having the scaphocerite broad but acutely triangular.

"Mandibles having the psalistoma undivided.

"Pereiopoda broad.

"Pleon having the antepenultimate (fifth) somite neither carinated nor armed with a spine. Generally resembles *Leptochela gracilis*, but is much more robust.

"Length one inch" (Stimpson).

The preceding is a translation of Dr. Stimpson's diagnosis of the species. The specimens in the Challenger collection are not as a rule so large, although some of them are laden with ova.

Length, entire (female), . . . . .	25 mm. (1 in.).
" of carapace, . . . . .	7 "
" of rostrum, . . . . .	1 "
" of pleon, . . . . .	18 "
" of third somite of pleon, . . . . .	3 "
" of sixth somite of pleon, . . . . .	4 "
" of telson, . . . . .	4 "

*Habitat*.—Station 162, April 2, 1874; lat. 39° 10' 30" S., long. 146° 37' 0" E.; off East Moncœur Island, Bass Strait; depth, 38 fathoms; bottom, sand and shells. Sixteen specimens; males, and two females with ova.

In June 1874 a single specimen was taken, probably a little south of Sydney, and near the surface, since it was preserved in the same bottle with the *Zoëæ* and young of other species.

Dr. Stimpson obtained his specimens at the depth of 20 fathoms in the China Sea, and also near the Loo Choo Islands.

This species corresponds with *Leptochela gracilis* very closely in all important structural characters, excepting that the fifth somite is not produced posteriorly to a point.

The sixth somite is rather shorter, and has a very small tubercle on the anterior dorsal surface.

There is a close resemblance in the form of the appendages to those of the two previous species.

It differs from the description given by Stimpson, with which it coincides in many points, in having the rostrum as large as the ophthalmopoda, the longer flagellum of the

first pair of antennæ longer than the carapace, and in having the posterior portion of the fifth somite *carinated in the dorsal median line*.

The telson is long, tapering, dorsally grooved, laterally armed with three distant spines, and terminates in two short median, and four long outer spines.

In all the specimens taken the posterior two pairs of pereopoda are reversed, that is, they have the dactylos pointed anteriorly instead of posteriorly as it usually is.

### *Pasiphæa*, Savigny.

*Pasiphæa*, Savigny, Mem. sur les animaux sans vert., p. 50.

Animal laterally compressed. Carapace short, not produced to a rostrum but furnished with a large tooth on the dorsal crest. Mandible without a synnhipod. First and second pairs of gnathopoda chelate, posterior three pairs feeble and imperfectly developed and furnished with basephyses. Pleon long. Rhipidura well developed. Telson short.

Carapace less than one-third of the length of the body of the animal, laterally compressed, and not so deep anteriorly as posteriorly. Frontal margin having the orbit slightly excavate and imperfectly defined. The first antennal tooth represented as an angle of the frontal margin projecting between the antennæ; the second antennal tooth forms a well-defined tooth standing slightly within the frontal margin, and directed obliquely forwards, thence the frontal margin recedes and meets the corresponding margin of the lateral wall at a more or less obtuse angle.

The pleon is laterally compressed, and the sides are deep; the somites are longitudinally subequal, the sixth being the longest.

The telson is laterally compressed, dorsally flat, and tapers towards the extremity. The ophthalmopoda are short, robust, and carry no ocellus.

The first pair of antennæ is biramose, and has the first joint of the peduncle excavate on the upper surface and furnished with a stylocerite.

The second pair of antennæ has a long flagellum and carries a scaphocerite that is distally armed with a tooth.

The mandibles are shell-shaped (conchiform), without molar process or synnhipod, and consist of a serrate psalistoma.

The first pair of siagnopoda is small and three-branched.

The second pair of siagnopoda consists of a narrow ovate plate, projecting anteriorly and posteriorly, and fringed with ciliated hairs that radiate towards the anterior distal extremity; on the inner side is a narrow cylindrical process tipped with a few hairs.

The third pair of siagnopoda consists of a long, narrow, membranous plate, tapering from the base to the distal extremity. The outer angle of the base is stouter, more membranous, and is imperfectly articulated with the rest; from the articulation the

outer margin proceeds in a straight line to the distal extremity, the inner margin tapers towards the outer, and the distal extremity is semiarticulated with the rest by an imperfect division, which gives a leaf-like appearance to the part, both margins of which are fringed with hairs, while the inner margin is armed with a small tooth-like projection.

The first pair of gnathopoda is seven-jointed and subpediform, the three terminal joints being reflexed and curved backwards, and carries neither ecephysis nor mastigobranchial appendage.

The second pair of gnathopoda is pediform and four-jointed, the basis and ischium being probably united, and the terminal joint long, narrow, and without a dactylos; the coxa carries no appendage, but the basis supports a robust ecephysis that is generally attached by a small pedicle.

The first two pairs of pereopoda are subequal in form, both are chelate, long, and slender, the hand is narrow, and the fingers long; both pairs carry a stout basecephysis. The third pair is about half the length of the preceding, it is seven-jointed, carries a basecephysis, is extremely slender, and terminates in a long and styliiform joint. The fourth pair is considerably shorter than the third; it is equally slender, seven-jointed, and carries a basecephysis, the terminal joint being short, compressed, and distally furnished with a brush of hair. The fifth pair is longer than the preceding and more robust; it is seven-jointed, carries a basecephysis, and terminates in a short and broad dactylos, tipped with a brush of hair.

The first pair of pleopoda has one branch long and multiarticulate, and the other short and membranous. The second and following pairs are subequally biramose, the inner branch being furnished with a long and slender stylamblys, tipped with a bundle of cincinnuli.

The posterior pair assists in the formation of the rhipidura; it is biramose, long, foliaceous, and the outer branch is furnished with a diæresis.

The branchial arrangement consists of eight plumes, of which the anterior five are the largest. The first two are attached to the membranous articulation of the first pair of pereopoda, the third and fourth belong to the articulation of the second pair of pereopoda, and the fifth and sixth to that of the third pair; the seventh and eighth are not attached to the membranous articulation, but to the interstitial process of the somites of the pereion. The branchial arrangement is represented in the following table:—

Pleurobranchiæ,	.	.	.	...	...	...	...	...	1	1
Arthrobranchiæ,	.	.	.	...	...	2	2	2	...	...
Podobranchiæ,	.	.	.	...	...	...	...	...	...	...
Mastigobranchiæ,	.	.	.	...	...	...	...	...	...	...
				h	i	k	l	m	n	o

*Observations.*—This genus was established by Savigny and placed by him in close relation to the genera *Penæus* and *Sergestes*, to the latter of which it possesses a general

resemblance, particularly in the feeble condition of the posterior pair of legs, but it differs in the character of the branchiæ, the form of the third pair of pereopoda, and in the manner of carrying the ova.

I have not examined the plan of the nervous system nor the development of the embryo, but anticipate that they will be found to be more in accordance with those of the Phyllobranchiata than with those of the Dendrobranchiata.

*Geographical Distribution.*—The species of this genus at present known are not numerous, and the specimens scarcely more so. *Pasiphæa sivado*, Risso, is found in the Mediterranean and in the Scandinavian seas, where it was taken at the depth of 100 fathoms.<sup>1</sup> *Pasiphæa tarda*, Krøyer, has also been found in the Norwegian waters, as also *Pasiphæa norvegica*, Sars. *Pasiphæa cristata* was taken with the trawl near the Fiji Islands, and *Pasiphæa amplidens* is found near Japan, *Pasiphæa acutifrons* in the Strait of Magellan, and its near ally *Orphanina tenuimana* off the eastern coast of North America. These species, together with *Pasiphæa savignyi*, Leach, and *Pasiphæa brevirostris*, Milne-Edwards, from unknown localities, are evidence of the rarity of the species and the paucity of the individuals. They appear to be very extensively distributed in depth, ranging from a few fathoms to over a mile and a half. A scarcity of specimens may be due to our want of knowledge of the habits of the animal and the localities which it most frequents.

*Pasiphæa cristata*, n. sp. (Pl. CXL.; Pl. CXLI. fig. 1).

Laterally compressed. Carapace one-fourth the length of the animal, measured from the frontal margin to the extremity of the telson; dorsal surface rounded, not carinated; frontal margin not advanced to a rostrum between the ophthalmopoda, frontal region in the median line elevated, with a laterally compressed triangular crest. Orbits imperfectly excavate and defined by an outer obtusely pointed canthus, beneath which, but less advanced, is the rounded projection that represents the first antennal tooth, and still more retiring is a distinct and well-formed tooth that corresponds with the second pair of antennæ, beneath which the frontal margin still recedes and unites with the lateral margin, forming an obtuse angle, from which posteriorly the sides of the carapace gradually deepen.

Pleon dorsally smooth, rounded, and laterally compressed; first somite shorter than the succeeding, second and three following subequal, and sixth much longer than the preceding. Telson about half the length of the sixth somite.

Ophthalmopoda moderately broad.

First pair of antennæ having a stylocerite that is sharply pointed, and nearly as long

<sup>1</sup> Mr. John Murray has recently (1887) dredged large numbers of *Pasiphæa sivado*, of all sizes, in Loch Fyne, Loch Etive, Loch Aber, and Loch Carron, in the west of Scotland, in depths of from 50 to 100 fathoms, on a muddy bottom. Their stomachs contained fine mud.

as the first joint of the peduncle, second and third joints cylindrical and subequal in length, being about half the length of the first joint, flagella subequal in length, upper stout at the base.

Second pair of antennæ having a scaphocerite that is half as long again as the peduncle of the first pair, narrow and lanceolate; flagellum long and slender.

Anterior two pairs of pereopoda having the chelæ long and narrow, the second pair having the fingers longer than those of the first; in both they cross each other when closed. Following three pairs small, feeble, carrying a strong stiff basecephysis.

Pleopoda stout, except the terminal pair, which is longer than the telson.

Length, entire, . . . . .	68 mm. (2.6 in.).
„ of carapace, . . . . .	16 „
„ of pleon, . . . . .	52 „
„ of third somite of pleon, . . . . .	9 „
„ of sixth somite of pleon, . . . . .	12 „
„ of telson, . . . . .	7 „

*Habitat.*—Station 173, July 24, 1874; lat. 19° 9' 35" S., long. 179° 41' 50" E.; off Matuku, Fiji Islands; depth, 315 fathoms; bottom, coral mud. One specimen, female. Dredged.

The appearance of this species is that of an animal that has been subjected to constant lateral pressure, the whole animal being so evenly flattened. The dorsal surface is not carinated, nor compressed to a ridge, but is smooth and rounded; the depth of the carapace increases posteriorly in a line that is continuous with the lower margin of the coxal plates of the pleon until the sixth somite, which is less deep, being much longer than the preceding, and twice the length of the telson.

The ophthalmopoda are short and stout, and support an ophthalmus that is quite black and somewhat greater in diameter than the stalk, the whole being supported on a pedicle that is abruptly and considerably smaller.

The first pair of antennæ is about half the length of the animal, having the peduncle nearly half the length of the dorsal surface of the carapace; the first joint is fully equal to the two next, and carries on the outer side a sharply pointed stylocerite of great tenuity, which has the distal extremity twisted to a right angle with the basal portion, and is nearly as long as the joint, the inner side is deep, straight, and flat, being compressed against the corresponding margin of the other appendage. The upper and lower surfaces are hollowed, the former to receive the ophthalmopod, and the latter to make way for the second pair of antennæ, leaving the inner surface as a wall standing both above and below the extremely thin structure of the joint, and free from hairs or cilia. The two succeeding joints are cylindrical, the second is shorter than the third, and

together they do not quite equal the first in length. The outer and upper flagellum is swollen at the base for a short distance, and then gradually narrows to a diameter which corresponds with that of the lower flagellum, and the under surface of the enlarged portion is flat or hollowed, and carries a mat of membranous cilia.

The second pair of antennæ carries a scaphocerite that is long, narrow, and has the two margins correspondingly curved to meet at the extremity, where the outer is produced to a small tooth; the outer margin is smooth and rigid, and the inner thickened by a fringe of strong hairs; the ultimate joint of the peduncle is half the length of the scaphocerite, and much stouter than the flagellum, which is about half the length of the animal.

Behind these latter appendages in the median line the epistoma projects in the form of a laterally compressed, anteriorly directed, lobe-like beak, between which and the metastoma the mandibles are enclosed.

The mandibles (Pl. CXXI. fig. 1*d*) are short, broad, and shell-shaped, and consist of the psalidoma only, the molar process and synhipod being absent.

The first pair of siagnopoda (fig. 1*e*) is small and three-branched; the outer branch is subcylindrical, unarmed, except for two hairs, one short and simple and the other extremely long and minutely serrate; the middle branch is broad and armed with long, strong, curved spines, and the inner branch is short, and armed with short, straight spines.

The second pair of siagnopoda (fig. 1*f*) consists of a broad, foliaceous plate of considerable tenuity, surrounded with hairs that radiate as from a common centre, all bending towards the anterior apex; on the inner end, attached to the plate as part of the same structure, is a short, subcylindrical branch, tipped with three or four minutely serrate hairs.

The third pair of siagnopoda (fig. 1*g*) consists of a long, foliaceous plate of considerable tenuity; the basal part has the outer portion separated by a broad, imperfect articulation, from which the structure gradually narrows towards the extremity, forming a long acute triangle, the distal portion of which forms the apex, and is divided from the rest by an obscure articulation, at the base of which on the inner side is a tooth-like prominence; the margin is distally fringed with long hairs that increase in length towards the extremity.

The first pair of gnathopoda (fig. 1*h*) is six-jointed, subpediform, short, narrow, and cylindrical; the coxa is short and stout, the basis is longer, and the ischium is long and narrow, and slightly flattened; the meros resembles the ischium, and the carpos is short, triangular, and articulates with the meros at a right angle. The propodos is long, cylindrical, and reflexed; the dactylos is broad, distally attached to the propodos, and directed posteriorly, and is fringed with short, stout spinules on the outer margin, and apically with one long and straight. This appendage is so closely associated with the preceding, that to all appearance the two are connected as represented in the Plate. Even when

treated with a reagent, it is difficult to determine their separation from each other, but the absence otherwise of the third pair of siagnopoda convinces me as to the homological relation of the two appendages.

The second pair of gnathopoda is long, slender, and five-jointed; the coxa is short, the basis but a little longer, and supports a broad, multiarticulate ecephysis that reaches as far as the distal extremity of the next succeeding joint, which probably consists of the ischium and meros fused together; it is longitudinally depressed on the upper surface, and slightly curved on the inferior to allow of free passage over the oral appendages; the next joint, which I take to represent the carpos, is cylindrical, and about half the length of the preceding; the terminal joint, which therefore represents the propodos, is half as long again as the carpos, and of the same diameter, it is cylindrical at the carpal extremity, and flattened and somewhat spatuliform at the rounded distal end, which is thickly tipped on the inferior margin with serrate hairs, and on the superior margin with equidistant, solitary, curved hairs.

The first pair of pereiopoda (Pl. CXL. *k*) is long and slender, reaching beyond the distal extremity of the scaphocerite; the coxa is short, and carries an ecephysis supported on a small pedicle, the base suddenly enlarging from the pedicle, it is cylindrical, and terminates in a multiarticulate extremity, which reaches beyond the ischium, which is long, slender, and laterally compressed on the outer side for the reception of the robust ecephysis; the meros is long, slender, and slightly compressed laterally, it is twice the length of the ischium, and small throughout; the carpos is short and slightly larger at the propodal than at the carpal extremity; the propodos is long, narrow, and chelate; the palm is twice the length of the carpos, and subequal in length with the pollex and dactylos, which correspond with each other in form, being long, slender, and curved; the points where the chela is closed overlap each other considerably, and the inner margin is deeply serrate (*k'*).

The second pair of pereiopoda resembles the first in form and appearance, but is a little longer, a circumstance that is due to a variation in the length of different parts; the coxa and basis are similarly formed to those of the first pair, and the latter supports a closely similar ecephysis, but the ischium is shorter, while the meros is much longer, being six or eight times as long as the ischium, and is armed with a small sharp tooth on the inferior margin, about one-third of its length from the ischial articulation; the carpos and palm are nearly the same length, but the fingers are longer than in the first pair, and are more strongly serrate. This serrature is peculiar, consisting of a series of processes that are flattened and pointed and stand on a long base in the case of the dactylos, and in the case of the pollex are rounded at the apex, slightly curved, and stand on a short base; in both pollex and dactylos they are directed obliquely forwards and possess a spiral structure.

The third pair of pereiopoda (*m*) is short and slender, and carries a short basecephysis

that is attached by a small pedicular articulation ; the ischium is short and about half the length of the ephysis ; the meros is long and slender, the carpos short and narrow, and the propodos long, slender, and tapering, the extremity being broken off in our specimen ; the dactylos, which is probably minute, is missing. The fourth pair of pereopoda (*n*) is much shorter than the third, and differs from it in having the propodos cylindrical and not tapering, being as broad at the distal as at the meral extremity ; the dactylos is short, broad, and flat, and tipped with hairs.

The fifth or posterior pair of pereopoda (*o*) is considerably longer than the fourth and stouter than the third ; it is formed as in the preceding, but differs in the shape of the dactylos, which is flattened and increases in diameter distally, where it terminates in a rounded extremity ; the distal and inner margin being fringed with long and short hairs respectively.

The branchiæ (Pl. CXL. fig. 2) of this species are peculiar, but from the small number and size of the specimens I have not had the opportunity to determine if the condition be generic or not. There are none corresponding with the gnathopoda, while those that belong to the first two pairs of pereopoda are attached to the membranous portion of the coxal articulation, and are of equal size and importance ; those of the third pair are unequal, and those of the posterior two pairs are attached to the interstitial portion of the somites of the pereion and therefore are pleurobranchiæ, while the former are arthrobranchiæ as shown in the table given under the genus.

The pleopoda are biramose and multiarticulate. The first pair (*p*) has the outer ramus long, slender, and fringed with ciliated hairs ; the inner ramus is short, flat, and membranous, of great tenuity, and fringed with short, strong, ciliated hairs on the posterior and distal surfaces respectively, and on the anterior margin there is a pointed process that I take to be the rudiment of a stylamblys. The second (*q*) and all the following pairs have the branches subequal in length, the inner, which carries a long, cylindrical, narrow stylamblys, tipped with cincinnuli, being narrower than the outer. The terminal pair, which helps to form the rhipidura, has the outer branch much longer than the inner, and is traversed by a diæresis (*v*) that is imperfectly defined on the outer margin, and does not reach the inner, which like both margins of the inner branches is fringed with strong and ciliated hairs.

In our specimen, which I consider to be a female, there is a mass of parasitic cell-growth (fig. 3) strung together in a bead-like arrangement and suspended from a common centre. On casual inspection the appearance as seen through the thin structure of the integument is that of a mass of ova peculiarly arranged, but closer and more careful examination demonstrates the parasitical nature of the growth.

The specimen was associated with one of *Sergestes*, so much like it in general appearance, although smaller, that it might easily have been taken for a younger specimen.

*Pasiphæa amplidens*, n. sp. (Pl. CXLI. fig. 2).

Carapace dorsally straight, rounded, smooth, without a carina; frontal margin without a rostrum; frontal region dorsally crested in the form of a sharply pointed, obliquely elevated, and laterally compressed tooth; it is broad at the base longitudinally, and anteriorly directed. The orbits are but sparingly excavate and imperfectly defined by a small projection. The first antennal tooth is reduced to a prominence, but the second is developed to a large tooth, whence the margin recedes backwards and then at right angles downwards, then rounds off to form the lateral margin of the carapace, which gradually descends posteriorly to near the base of the second pair of pereopoda, when it is gradually directed upwards.

The ophthalmopoda are short, standing on distinct pedicles, and distant from each other; the ophthalmus is globular, of larger diameter than the peduncle, and possesses no ocellus.

The first pair of antennæ has the first joint deeply excavate and furnished with a stylocerite, which is sharply pointed and twisted anteriorly so as to become vertical; the inner margin is expanded, and flattened by compression against its fellow. The second and third joints are short and cylindrical and carry two flagella, of which the upper is the more robust.

The second pair of antennæ carries a scaphocerite that reaches beyond the distal extremity of the peduncle of the first pair, and is about half the length of the carapace, the inner and outer margin corresponding, each being curved towards the apex, the outer angle of which is furnished with a tooth, and the inner margin is fringed with hairs.

The mandibles are similar to those of *Pasiphæa cristata*, but have a larger number of teeth (thirteen) on the incisive margin, and the tooth that forms the lower angle is rather large and somewhat thickened, as if it were the rudiment of the molar tubercle.

The siagnopoda also closely resemble those of *Pasiphæa cristata*, but there is an interesting variation in the third pair in the more definite distinction of the distal extremity of the appendage from the basal portion, and in the semiarticulated portion of the outer basal division being more acutely produced.

The first pair of gnathopoda is associated with the third pair of siagnopoda, and in form and appearance closely resembles those of *Pasiphæa cristata*.

The second pair of gnathopoda is long, slender, and pediform; it carries a stout basephysis and terminates in a long narrow joint with parallel margins, flattened towards the distal extremity and fringed with short hairs and spinules.

The first two pairs of pereopoda are chelate. The first pair is long, slender, and smooth; the second pair has the posterior margin of the meros strongly serrate, and

both have the chela long, fringed, with their margins serrate, but the system of dentation is somewhat different; the teeth are sharper, more resembling each other on the pollex and dactylos, and fall more obliquely forward.

*Habitat*.—Station 236, June 5, 1875; lat.  $34^{\circ} 58' N.$ , long.  $139^{\circ} 29' E.$ ; depth, 775 fathoms; bottom, green mud; bottom temperature,  $37^{\circ}.6$ . One specimen, fragmentary. Trawled.

Our only specimen is imperfect, the pleon with its appendages and all the pereion and its appendage posterior to the second pair of pereopoda are wanting; but what remains is sufficient to identify it as a distinct species from any other known to me.

The length of the carapace is about 19 mm., and assuming that it is about one-third of the length of the animal, or a little less, we may consider the entire length of the perfect animal to be from about 75 to 80 mm., or about three inches.

*Pasiphæa acutifrons*, n. sp. (Pl. CXLI. fig. 3).

Carapace one-third of the length of the animal, laterally compressed, dorsally carinated, and anteriorly armed with a strong sharp tooth abruptly elevated over the frontal region; anterior margin in front of the tooth not carinated, slightly advanced between the ophthalmopoda, but not enough to form a rostrum. Orbits imperfectly excavate; first antennal tooth feeble; second antennal tooth small but well defined, thence the frontal margin recedes until it meets the lateral margin of the carapace, which gradually recedes obliquely to the posterior margin.

Pleon slightly carinated on the second and following somites.

Telson (fig. 3z) laterally compressed, dorsally grooved, posteriorly forked, and nearly as long as the sixth somite of the pleon.

The ophthalmopoda short, stout, and standing on a small pedicle.

The first pair of antennæ having the first joint of the peduncle excavate on the upper surface, and armed with a stylocerite that is sharply pointed and as long as the joint; the two succeeding joints are short, subequal and cylindrical, and carry two flagella that are very slender and about half the length of the animal.

The second pair of antennæ has a scaphocerite that reaches beyond the distal extremity of the peduncle of the first pair, and gradually tapers to a point, which is armed on the outer angle with a strong tooth.

The gnathopoda correspond with those of the preceding species.

The first two pairs of pereopoda also agree, excepting that both pairs have the posterior margin of the meros armed with teeth, but these are few in number, and fewer on the first than on the second. The three following pairs are short, slight, and correspond with the generic type.

The pleopoda are subequal in length and correspond in form with those of *Pasiphaea cristata*.

The telson is shorter than the plates of the rhipidura.

Length, entire,	. . . . .	47 mm. (1.9 in.).
„ of carapace,	. . . . .	15 „
„ of rostrum,	. . . . .	...
„ of pleon,	. . . . .	32 „
„ of third somite of pleon,	. . . . .	5 „
„ of sixth somite of pleon,	. . . . .	9 „
„ of telson,	. . . . .	7 „

*Habitat*.—Station 311, January 11, 1876; lat. 52° 45' 30" S., long. 73° 46' 0" W.; off Port Churruca, Patagonia; depth, 245 fathoms; bottom, blue mud; bottom temperature, 46° 0. One specimen. Trawled.

Station 236, June 5, 1875; lat. 34° 58' N., long. 139° 29' E.; south of Japan; depth, 775 fathoms; bottom, green mud; bottom temperature, 37° 6. One specimen. Trawled.

### *Orphanina*,<sup>1</sup> n. gen.

Carapace more than one-third the length of the animal, anteriorly produced to a rostral point. Frontal crest not adorned with a strong tooth.

Ophthalmopoda well developed.

First pair of antennæ biflagellate.

Second pair of antennæ supporting a foliaceous scaphocerite.

Second pair of gnathopoda pediform.

First two pairs of pereopoda slender and chelate. Second pair longer than the first. Three succeeding pairs feeble.

Five anterior somites of pleon subequal; sixth longer than the preceding.

Telson tapering to a point.

### *Orphanina tenuimana*, n. sp. (Pl. CXLI, fig. 4).

Carapace about one-third of the entire length of the animal, dorsally subcarinated, anteriorly produced to a small point. Orbit well defined.

Pleon dorsally rounded; anterior five somites subequal, sixth subequal with the two preceding.

Telson long, slender, and tapering to a sharp point, armed with a small tooth on each side.

<sup>1</sup> ὄρφνη, the condition of an orphan.

Ophthalmopoda short and cylindrical.

First pair of antennæ biflagellate, and scarcely as long as the carapace.

Second pair of antennæ having a broad scaphocerite, armed with a tooth on the outer distal extremity, and carrying a slender flagellum.

Second pair of gnathopoda pediform.

First pair of pereiopoda narrow, chelate; second pair chelate and longer than the first; third pair about half the length of the second; fourth pair about half the length of the third, and feeble and slender; fifth pair a little stouter and slightly longer than the fourth, but not so long as the third; all the pairs carry a broad and stout basecephysis.

Pleopoda moderate in size and biramose, excepting the first pair, which has the inner branch resembling a small bud-like process; all are attached to the lateral margin of the coxal plates. Sixth pair long, narrow, and reaching beyond the extremity of the telson; inner branch lanceolate and fringed with hairs; outer rounded, the external margin being furnished with a strong tooth, and the inner fringed with hairs; no evidence of a diæresis.

Length, entire, . . . . .	20 mm. (0·8 in.).
„ of carapace, . . . . .	7 „
„ of rostrum, . . . . .	0·5 „
„ of pleon, . . . . .	13 „
„ of third somite of pleon, . . . . .	2 „
„ of sixth somite of pleon, . . . . .	3 „
„ of telson, . . . . .	3 „

*Habitat.*—Station 45, May 3, 1873; lat. 38° 34' N., long. 72° 10' W.; south-east of New York; depth, 1240 fathoms; bottom, blue mud; bottom temperature, 37°·2. One specimen. Dredged.

This species corresponds much in general form with *Pasiphæa tarda*, Kröyer,<sup>1</sup> but differs in the length of the flagella of the first pair of antennæ, and in the more important character of the development of the coxal plates of the somites of the pereion; it also has the propodos of the second pair of pereiopoda proportionately longer than Kröyer's species.

The carapace is less laterally compressed than in the more typical species of *Pasiphæa*, and is distinguished by an elevated line that runs from the antennal tooth to the posterior portion of the branchial wall, but does not reach the posterior margin. The frontal margin projects to a small rostral point between the ophthalmopoda, it carries no dorsal crest, but a very slight carina traverses the anterior portion in the median line.

The somites of the pleon differ somewhat in length; the first is the shortest and is

<sup>1</sup> Voy. en Scandinavie, Atlas, pl. vi. fig. 1a, 1846.

laterally produced to a narrow point, from the extremity of which the first pair of pleopoda proceeds; the second, third, and fourth somites are of similar length, and have the coxal plates developed in a slightly squamous form, and carry the pleopoda attached to the inner wall of the margin. The fourth somite is slightly longer than the preceding, and has the coxal plate not developed in a squamous form, but as a process near the posterior extremity, to which the pleopod is attached. The fifth somite is slightly shorter than the fourth but resembles it in form. The sixth is nearly as long as the preceding two, is considerably compressed laterally, and carries the sixth pair of pleopoda at its posterior margin, which combine with the telson to form the rhipidura.

The ophthalmopoda are stout and cylindrical; the ophthalmus is not of larger diameter than the stalk, and in this respect it differs from Kröyer's figure of *Pasiphæa tarda*, in which the ophthalmus is larger than the peduncle.

The first pair of antennæ appears to be rather shorter than the carapace, but the extreme ends of the flagella are broken off; the first joint is concave on the upper surface for the reception of the ophthalmopod.

The second pair of antennæ also has the flagellum broken, and carries a scaphocerite that is broad at the distal extremity, armed with a small tooth on the outer distal angle, and bears hairs upon the outer margin.

The oral appendages have not been examined, as the specimen is unique and not very perfect.

The second pair of gnathopoda is pediform, but terminates in an obtuse extremity, which reaches nearly as far as the distal extremity of the scaphocerite.

The first pair of pereopoda is shorter and more robust than the second, it has the propodos but little longer than the carpos and slightly stouter; the fingers are stout at the base, slightly curved, and pass each other at their apices. The second pair is much longer than the first, each joint being slightly longer relatively than the corresponding joint of the first pair; the propodos is much longer and terminates in a pollex and dactylos that are longer, more slender, sharper, and slightly curved. The three posterior pairs are short and slender, the last two being subequal and shorter than the third pair.

The pleopoda are connected with the respective somites at the lateral margins, and are not remarkably long.

The telson is a little shorter than the lateral branches of the rhipidura.

#### Family OODEOPIDÆ.

Carapace short, anteriorly produced to a long horizontal rostrum. Pleon long, generally armed with teeth. Ophthalmus long, ovate. First pair of antennæ biflagellate. Second pair furnished with a scaphocerite and a slender flagellum. Mandible without a

synnhipod. Second pair of gnathopoda long, slender, and pediform. First pair of pereopoda chelate or subchelate and larger than the second, which is simple like the others posterior to it.

*Oodeopus*, n. gen.

Carapace about one-fourth the length of the animal. Rostrum long and slender.

Pereion narrow and subcylindrical.

Five anterior somites of pleon subequal, the sixth longer than the preceding.

Telson long, narrow, the terminal extremity fringed with hairs.

Ophthalmopoda short; ophthalmus large, ovate.

First pair of antennæ biflagellate.

Second pair of antennæ furnished with an obtusely-pointed scaphocerite.

Mandibles without synnhipod.

The second pair of gnathopoda long, slender, pediform and six-jointed, and carrying a basephysis.

First pair of pereopoda large and chelate. Second pair robust, but more slender than the first and simple. All the pereopoda carry a basephysis.

Pleopoda biramose, posterior pair not longer than the telson.

*Observations.*—The description of this genus is drawn from an immature animal, but the one that is in the most advanced stage of development in the collection, and which shows a tendency to develop the first pair of pereopoda into a chela in the adult stage. All the other specimens exhibit them in the simple form, which I take to be a still more immature condition.

It bears comparison with a young animal which Dana has figured under the name of *Rachitia spinalis*,<sup>1</sup> which he captured in the Atlantic, off the harbour of Rio Janeiro, on January 7, 1838. It, however, differs from this genus in having the rostrum short, in the first pair of antennæ having only a single flagellum, and in the form of the telson. It must, however, be the young of some closely allied genus, of which the one taken as the type in this collection is in the most advanced condition, and exhibits evidence of the relation it bears to an older form.

*Geographical Distribution.*—Most of those found were taken in the Eastern Seas. Four different forms that appear to represent separate species were procured off Cape York, one off Cape Jackson, one off the New Hebrides, and one off Cape Verde in the Atlantic. Dana took his specimen of *Rachitia* off the coast of Brazil.

<sup>1</sup> U.S. Explor. Exped., Crust., p. 667, pl. xlv. figs. 8a-b.

*Oodeopus geminidentatus*, n. sp. (Pl. CXLII. fig. 1).

Carapace smooth; anteriorly produced to a long rostrum, serrate at the lateral margins. Fronto-lateral angle produced to a long, style-like tooth.

Pleon long and narrow; five anterior somites subequal. First somite dorsally smooth, second armed with two teeth at the posterior margin, one on each side of the median line; third, fourth, and fifth somites similarly armed with two teeth; sixth somite about the length of the two preceding, and posteriorly armed on the dorsal surface with one long, spine-like tooth.

Telson a little shorter than the sixth somite.

Length, entire,	.	.	.	.	.	8	mm. (0.3 in.).
„ of carapace,	.	.	.	.	.	2	„
„ of rostrum,	.	.	.	.	.	3	„
„ of pleon,	.	.	.	.	.	6	„
„ of third somite of pleon,	.	.	.	.	.	0.5	„
„ of sixth somite of pleon,	.	.	.	.	.	1.6	„
„ of telson,	.	.	.	.	.	1.5	„

*Habitat*.—Cape York, September 8, 1874.

The carapace is about one-fourth the length of the animal, slightly elevated to a small protuberance on the dorsal crest over the frontal region, and anteriorly produced to a rostrum that is one-third longer than the carapace, dorsally depressed, and laterally widened and tapering to the apex, the margin long, serrate with a number of small teeth; the median line on the lower surface of the rostrum is depressed below the lateral margins. The orbital excavation is slight, and extends nearly to the fronto-lateral angle of the carapace, which is produced to a long, narrow, and spine-like tooth, reaching as far as the extremity of the peduncle of the second pair of antennæ; posteriorly to this tooth the lateral margin of the carapace is finely serrate for a short distance, whence it is smooth to the posterior extremity.

The pleon is about three times as long as the carapace, the first somite is dorsally smooth, but all the others are armed; the four succeeding somites have each two teeth at the posterior margin, while the lower marginal angles are slightly produced to a small obtuse point; the sixth somite is dorsally armed at the posterior margin with a long, slender tooth, and on each side at the infero-distal angle with a sharp tooth.

The telson (fig. 1z) is nearly as long as the sixth somite; the lateral margins are nearly parallel, and terminally slope to a point in the median line, where it is armed with a long, robust spine, on each side of which there are eight spines, four smaller and three succeeding larger ones, and a distant one still smaller on the outer margin.

The ophthalmopoda are short, and terminate in a large, oval-shaped ophthalmus, the larger diameter of which is near the posterior extremity.

The first pair of antennæ has the peduncle reaching to about half the length of the rostrum, and terminates in two short, immature flagella.

The second pair of antennæ has the peduncle reaching nearly as far as the distal extremity of the eye, and has the second joint armed with a long, spine-like tooth on the outer distant angle, and on the inner with a long and slender foliaceous scaphocerite, fringed on the inner margins with long hairs. The flagellum is in an immature condition, and does not reach to the extremity of the scaphocerite.

The mandibles have no synhipod.

The second pair of gnathopoda is six-jointed, and carries a basephysis that reaches to nearly the extremity of the meros; the succeeding joints are subequal, the terminal one being more slender than the preceding, somewhat shorter, and tipped with hairs.

The first pair of pereopoda is slender at the base, and carries a two-jointed basephysis, tipped with long hairs. It gradually increases in diameter until it reaches the broadest part at the distal extremity of the carpos, whence to the distal extremity of the palm of the propodos the width gradually lessens, and the inferior angle projects to a small point which represents the pollex, against which the longer dactylos impinges. The second pair of pereopoda, although tolerably robust, is much more slender than the first pair, and terminates in a simple dactylos; like the preceding it is furnished with a biarticulate basephysis. The following three pairs of pereopoda are more slender than the second, and terminate in a sharply pointed, simple dactylos; each pair is furnished with a biarticulate basephysis, that is slightly longer than the preceding.

The pleopoda are still in an immature condition, and are all biramose, except the first pair, which appears to be wanting. The posterior pair, which forms part of the rhipidura, has the two branches subequal but neither as long as the telson.

*Observation.*—It is almost impossible as yet to determine what may be the adult characters of the specimens of which this and the following species are the undeveloped forms.

*Oodeopus serratus*, n. sp. (Pl. CXLII. figs. 2, 3).

Carapace smooth, dorsally depressed in the gastric region, anteriorly produced to a horizontally directed rostrum that is slightly waved and serrate on the lateral margins. The orbit is excavate to the infero-lateral angle, which is produced to a small but acute point, whence the lateral margin is serrate to the posterior margin of the carapace.

The pleon is three times the length of the carapace; the first somite is dorsally smooth, the second is armed with a large laterally compressed tooth, the carina of which commences at the anterior margin and terminates at the posterior, and reaches as far as

the posterior extremity of the fourth somite, each two succeeding somite is shorter than the preceding, and is serrate along the dorsal margin and posteriorly produced to a small tooth; the fifth somite is nearly as long as the two preceding, it is dorsally serrate and posteriorly projects to a strong tooth, but not more than half as long as the tooth on the second somite; the sixth somite is subequal with the length of the fifth, cylindrical, dorsally smooth, and posteriorly produced at the posterior extremity to a small tooth; the lower lateral angle is truncate.

The telson (fig. 22) is little more than half the length of the preceding somite, slightly enlarging posteriorly, the posterior margin being armed in the median line with a long and straight tooth, and at the lateral angles with a slightly curved spine, the intermediate space on each side being fringed with small and finely ciliated hairs.

The ophthalmus is long, ovate, and tapers to a narrow, anteriorly projecting point, the peduncle being invisible.

The first pair of antennæ is about half the length of the rostrum, and supports two rudimentary flagella.

The second pair of antennæ carries a broad and foliaceous scaphocerite that is scarcely half the length of the rostrum and terminally fringed with long hairs, as also is the inner margin; the flagellum as yet is only rudimentary.

The oral appendages have not been examined, and the gnathopoda and pereopoda are as yet in the biramose condition common to an early and immature state of the *Macrura*.

The pleopoda are in an incipient condition, except the sixth pair, which is about two-thirds the length of the telson, the two branches are subequal in length, the outer being armed on the outer distal angle with a long sharp tooth; the inner branch, as well as the inner margin of the outer branch, is very thickly fringed with fine ciliated hairs.

Length, entire, . . . . .	6 mm. (0.2 in.).
„ of carapace, . . . . .	1.5 „
„ of rostrum, . . . . .	2.3 „
„ of pleon, . . . . .	4.5 „
„ of large tooth, . . . . .	0.8 „
„ of sixth somite of pleon, . . . . .	1 „
„ of telson, . . . . .	0.7 „

*Habitat*.—New Hebrides, August 23, 1874; Sibago, Philippines, and Cape Howe, Australia.

A slight variety of this species (fig. 3) was taken off Cape York, in which the serrature behind the fronto-lateral angle of the carapace is continuous only for a short distance, and there is no serrature on the dorsal surface of the rostrum; the pereopoda are in a more advanced but still biramose condition.

This specimen was taken in the same locality as *Oodeopus geminidentatus* and has the following measurements :—

Length, entire, . . . . .	8 mm. (0·3 in.).
„ of carapace, . . . . .	3 „
„ of rostrum, . . . . .	3·3 „
„ of pleon, . . . . .	5 „
„ of large tooth, . . . . .	1 „
„ of sixth somite of pleon, . . . . .	1·4 „
„ of telson, . . . . .	1 „

*Observations.*—These specimens appear to me to belong to the same genus as the preceding, but they are in a less advanced condition. That they are the young of a larger species is probable, inasmuch as one is as large in size, although in a younger stage.

*Oodeopus armatus*, n. sp. (Pl. CXLII. fig. 4).

Carapace dorsally smooth and anteriorly produced to a rostrum that is a little longer than the carapace.

Pleon three times as long as the carapace and armed dorsally on all the somites, excepting the first, with large teeth, the anterior of which is the largest, the others decreasing in size gradually to the last ; the sixth somite is subequal to the three preceding in length, and the telson is subequal with the sixth somite.

The ophthalmus is ovate, but less pointed anteriorly than in *Oodeopus serratus*.

The antennæ and pereionic appendages are still in an immature condition, and the terminal pleopoda, which appear to be the only pair developed, do not as yet reach the length of the telson.

Length, entire, . . . . .	7 mm. (0·3 in.).
„ of carapace, . . . . .	2 „
„ of rostrum, . . . . .	2·4 „
„ of pleon, . . . . .	5 „
„ of sixth somite of pleon, . . . . .	1·5 „
„ of telson, . . . . .	1·5 „

*Habitat.*—The New Hebrides, August 18 ; Cape York, September 6, 1874 ; surface.

*Oodeopus intermedius*, n. sp. (Pl. CXLIII. fig. 1).

Carapace about one-fifth the length of the animal, dorsally smooth, and anteriorly produced to a rostrum that is about three times the length of the carapace, and has the lateral margins serrate ; the fronto-lateral angle is short and the lateral margin slightly serrate near the anterior extremity.

The pleon is four times as long as the carapace, and has the first somite short and smooth, the second is dorsally armed with a tooth originating from the posterior margin,

and about half the length of the third somite, which is also armed with a shorter tooth at the posterior margin, as are also the fourth and fifth somites; the sixth is nearly as long as the two preceding, and posteriorly projects to a sharp tooth on the dorsal surface as well as at the postero-inferior angle.

The telson (fig. 1z) is nearly as long as the sixth somite, it is posteriorly produced to a long and slender tooth, and armed with several spines on either side.

The ophthalmus is long-ovate, and equals in length about a third of the carapace.

The first pair of antennæ is scarcely half the length of the rostrum, and the second has the flagellum still less developed.

The pereionic appendages are in the biramose condition.

The pleopoda are still undeveloped, excepting the posterior pair (*v.v.*), which is unequally biramose, and but little shorter than the telson.

Length, entire,	.	.	.	.	.	7	mm. (0.3 in.).
„ of carapace,	.	.	.	.	.	1	„
„ of rostrum,	.	.	.	.	.	4	„
„ of pleon,	.	.	.	.	.	6	„
„ of sixth somite of pleon,	.	.	.	.	.	1.3	„
„ of telson,	.	.	.	.	.	1.4	„

*Habitat.*—Cape York, September 6, 1874; surface.

*Oodeopus duplex*, n. sp. (Pl. CXLIII. fig. 2).

Carapace about one-fifth the length of the animal, dorsally smooth, anteriorly projecting to a long rostrum that is about half the length of the animal, and is armed along the lateral margins with a series of small teeth. The orbit is defined at the outer canthus by a small point and the fronto-lateral angle by another, neither being strongly pronounced; behind the fronto-lateral angle the margin is armed with a series of small teeth.

The pleon is four times as long as the carapace, and has the first somite dorsally smooth, the second armed with a long tooth, the third with a tooth subequal with it, and the fourth and fifth with shorter teeth; the sixth somite is equal in length to the three preceding, and is posteriorly produced to a sharp tooth.

The telson is as long as the sixth somite, has the margin posteriorly tapering, and armed on the dorsal surface and in the median line at the extremity with three spinules and a terminal tooth.

The ophthalmopoda are more than half the length of the carapace, and support a long-ovate ophthalmus.

The first pair of antennæ is about half the length of the rostrum and terminates in two short, incipient flagella.

The second pair of antennæ is furnished at the distal extremity of the second

joint on the outer side with a long and slender tooth, and on the inner with a scaphocerite.

The appendages belonging to the pereion are in the biramose condition, and those of the pleon are as yet undeveloped, except the sixth pair, which is subequally biramose, but does not reach as far as the extremity of the telson.

Length, entire, . . . . .	7 mm. (0.3 in.).
„ of carapace, . . . . .	1.5 „
„ of rostrum, . . . . .	2.5 „
„ of pleon, . . . . .	5.5 „
„ of dorsal tooth, . . . . .	0.5 „
„ of sixth somite of pleon, . . . . .	1.5 „
„ of telson, . . . . .	1.5 „

*Habitat.*—New Hebrides, August 19, 1874; Cape York; Fiji Islands.

*Oodeopus longispinus*, n. sp. (Pl. CXLII. fig. 5).

Carapace one-fifth the length of the animal, dorsally smooth, and anteriorly produced to a long, horizontally straight rostrum, that has the lateral margins serrate. The orbit is not clearly defined; the fronto-lateral angle is short and the lateral margin is serrate to near the postero-lateral angle, where it becomes smooth.

The pleon has the first somite smooth, the second armed with a very long tooth, the front of which commences at the anterior margin of the somite, and the posterior margin coincides with that of the somite; the third somite terminates in a small dorsal tooth which is serrate on the upper surface; the fourth somite is also serrate towards the posterior extremity, and is produced to a small tooth; the fifth somite is serrate throughout its length and produced posteriorly to a long tooth that lies parallel with the dorsal surface of the sixth somite. The sixth somite is narrower and equal in length to the preceding two, it is dorsally smooth and posteriorly armed with a sharp, strong tooth, and on the under surface the posterior angle is also produced to a sharp tooth.

The telson (fig. 5z) is almost as long as the sixth somite, slightly increasing in width posteriorly, and has the terminal margin fringed with long spines, of which those at the lateral angles are the longer and are fringed with fine spinules.

The ophthalmus is long and somewhat reniform, and about one-fourth the length of the rostrum.

The first pair of antennæ is about half the length of the rostrum.

The second pair of antennæ is furnished with a scaphocerite that is armed with a long tooth at the outer distal extremity, and is subequal in length to the first pair of antennæ.

The appendages of the pereion are in the biramose condition.

The pleopoda are undeveloped, excepting the sixth pair, which is unequally biramose, the outer branch being a little shorter than the telson and the inner half its length.

Length, entire, . . . . .	6.5 mm. (0.2 in.).
„ of carapace, . . . . .	1.5 „
„ of rostrum, . . . . .	2.5 „
„ of pleon, . . . . .	5 „
„ of dorsal tooth, . . . . .	5 „
„ of sixth somite of pleon, . . . . .	1.3 „
„ of telson, . . . . .	1.2 „

*Habitat*.—Celebes Sea, October 1874.

*Oodeopus gibbosus*, n. sp. (Pl. CXLIII. figs. 3, 4).

Carapace about one-third the length of the animal, anteriorly produced to a rostrum that is half the length of the animal, smooth at the margins. Orbit defined by a small point; fronto-lateral angle stoutly pointed, lateral margin smooth, posteriorly descending beyond the ventral surface of the pereion.

Pleon having the first somite smooth and flat, the second elevated to a decided hump, the third smooth and rounded, the fourth dorsally smooth, and laterally produced at the posterior angles to a long and sharp tooth on each side; the sixth somite is narrow and smooth, increasing in diameter at each extremity.

Telson (fig. 3z) nearly as long as the sixth somite, having the margins subparallel, slightly wider at each extremity, the posterior being excavate in the median line and fringed with hairs, of which the smallest is towards the middle on each side of a small median tooth and a larger tooth at the angles, and two small hairs on the lateral margin near the base of the teeth at the angles. The hairs are all fringed with small points, but the teeth are smooth.

The ophthalmus is ovate, and projected on a narrow peduncle.

The first pair of antennæ is about half the length of the rostrum.

The second pair of antennæ supports a scaphocerite that reaches as far as the distal extremity of the peduncle of the first pair, and a flagellum that is about two-thirds the length of the scaphocerite.

The appendages of the pereion are biramose so far as they are developed, but the posterior two pairs are still in a state of gemmation.

The pleopoda are as yet undeveloped, with the exception of the sixth pair (fig. v. v.) which is unequally biramose, the outer branch reaching as far as the distal extremity of the telson; it, as well as the inner branch, is fringed with hairs on the inner and distal margins, but is not armed with a tooth on the outer margin.

Length, entire, . . . . .	7 mm. (0·3 in.).
„ of carapace, . . . . .	2 „
Depth of carapace, . . . . .	1·25 „
Length of rostrum, . . . . .	3·5 „
„ of pleon, . . . . .	5 „
„ of sixth somite of pleon, . . . . .	1·25 „
„ of telson, . . . . .	1·75 „

*Habitat*.—Cape Verde, April 26, 1876.

### Tribe Haplopodea.

This tribe is established to receive all those genera in which the pereiopoda are simple and resemble each other, none of them being chelate or having the carpos multi-articulate.

The tribe may be divided into separate families according to the structure and development.

#### Family HECTARTHROPIDÆ.

This family is established to receive those *Macrura* that have all the pereiopoda similar in structure to each other, consist of six joints only, and in which every limb except the last supports a basephysis.

#### *Proctetes*,<sup>1</sup> n. gen.

Animal rigid. Carapace about one-third the length of the animal, anteriorly produced to a long rostrum, which is serrate on the upper and lower margins. The frontal margin is armed with a supraorbital and a small orbital tooth, another tooth corresponding with the second antennæ, and one at the fronto-lateral angle.

The pleon is dorsally carinated and armed with teeth; the sixth somite is subequal with the fifth and the telson, which is tapering.

The first pair of antennæ is biramose.

The second pair of antennæ has a scaphocerite that has the outer margin rigid and distally armed with a tooth.

The gnathopoda and pereiopoda are six-jointed, pediform, not chelate, and furnished with a basephysis, except the posterior pair.

The sixth pair of pleopoda has the rami subequal and foliaceous.

*Geographical Distribution*.—Only two species of the genus have been observed. The first was taken by the late Sir Walter Elliot at Waltair, on the coast of Coromandel,

<sup>1</sup> προκλητης, "Challenger."

and that in this collection was dredged in the shallow Sea of Banda, off the south-western coast of New Guinea.

*Proclestes biangulatus*, n. sp. (Pl. CXXVII. fig. 4).

Carapace armed on the dorsal surface with a tooth at the posterior extremity, and others on the frontal crest, continued regularly on the upper margin of the rostrum to its apex. The rostrum reaches to twice the length of the carapace, and has the lower margin armed with teeth corresponding to those on the upper surface. On the lateral walls of the carapace are three carinæ, and the frontal margin is furnished with a large supraorbital tooth and a large antennal tooth.

The pleon has the dorsal surface armed with teeth, the third somite having two, an anterior and a posterior.

The telson is long and tapering, laterally armed with two or three small spinules.

Length, entire, . . . . .	16 mm. (0.6 in.).
„ of carapace, . . . . .	5 „
„ of rostrum, . . . . .	10 „
„ of pleon, . . . . .	11 „
„ of dorsal tooth, . . . . .	3 „
„ of sixth somite of pleon, . . . . .	2 „

*Habitat*.—Station 191, September 23, 1874; lat. 5° 41' 0" S., long. 134° 4' 30" E., off the Arrou Islands; depth, 800 fathoms; bottom, green mud; bottom temperature, 39°.5. One specimen. Trawled.

The carapace has the dorsal surface broad and angular; the median line is carinated from the posterior margin to the rostrum, which is laterally compressed from the base to the apex. The dorsal surface is armed near the posterior margin with a strong, anteriorly directed tooth, whence the edge is smooth to the gastric region, where a series of small regularly planted teeth commences and continues along the upper margin of the rostrum to the distal extremity, as well as on the lower margin, from just beyond the extremity of the ophthalmopod, posterior to which the margin is smooth. The frontal margin has the orbit defined by a small orbital tooth, below which a large, obliquely directed tooth, corresponding with the second antenna, forms the anterior extremity of a small but conspicuous ridge; beneath this tooth there exists a small fronto-lateral angle. Viewed dorsally the fronto-orbital region is flattened out and bounded by a ridge that commences posteriorly at the pyloric region, and anteriorly terminates in a long, spine-like, supraorbital tooth, that reaches nearly to the ophthalmus, and is midway armed with a small tooth. Commencing at the posterior margin a lateral carina runs obliquely

to the hepatic region, where it meets another that also commences at the posterior margin of the carapace, and horizontally traverses the lateral walls; the two unite and continue for a short distance as a single ridge, which dies out just below the one that corresponds with the antennal tooth.

The pleon has the somites subequal in length, increasing a little posteriorly; the first is dorsally smooth and a little elevated in the centre; the second is armed with a small, anteriorly directed tooth situated nearer the anterior margin, but not on it; the third is dorsally carinated, and produced to a tooth both at the anterior and posterior extremity, the anterior tooth being directed forwards and obliquely upwards, and the posterior, which is the longer, directed backwards, reaching as far as the middle of the fourth somite, which also is posteriorly produced to a sharp-pointed tooth, as is likewise the fifth, but the sixth has none.

The telson is long and gradually narrows to the apex, which is armed with two or three small hairs, and on the lateral walls with two or three small distal spinules.

The ophthalmopoda are large, pyriform, and quite equal in length to half the carapace; the ophthalmus is large, being fully equal to half the length of the ophthalmopoda in diameter.

The first pair of antennæ reaches to about half the length of the rostrum, and terminates in two flagella which are subequal in length with the peduncle, the inner being the more robust.

The second pair of antennæ is a little longer than the rostrum, and carries a scaphocerite that is foliaceous, long and narrow, slightly narrowing to the distal extremity, fringed on the inner margin with fine hairs, and strengthened on the outer margin with a strong, smooth edge, that terminates at the distal extremity in a long and slender tooth.

The mandibles have not been examined, as I did not wish to injure the specimen.

The second pair of gnathopoda is pediform and six-jointed; the second joint supports a leaf-like ephysis, and it terminates in a short, sharp-pointed dactylos.

The first pair of pereopoda and all the other pairs correspond in form, but gradually increase in length posteriorly; they all carry a leaf-like basephysis except the posterior pair, which is the longer, and does not carry an ephysis.

The pleopoda are short and biramose. The sixth pair has the branches subequal, and about the same length as the telson.

*Observations.*—This species is of much interest, and it is to be regretted that there is only a single specimen in the collection. Some years since the late Sir Walter Elliot, F.R.S., took off Waltair, on the coast of Coromandel, a specimen of which I have a carefully drawn figure before me. It differs only specifically from that which I have just described, and I wish to record it under the name of *Proclates ellioti*, in honour of its original discoverer. It resembles *Proclates biangulatus*, but differs from it in having

the lateral walls of the carapace free from carinæ, the supraorbital teeth not so long, the flagellum of the second pair of antennæ shorter than the rostrum, and the telson longer than the sixth pair of pleopoda.

*Icotopus*,<sup>1</sup> n. gen.

Carapace dorsally smooth, anteriorly crested, produced to a long rostrum, serrate on the upper and lower margins. Frontal margin furnished with a supraorbital tooth, and with a large fronto-lateral tooth.

Pleon having the somites subequal; sixth somite a little longer than the fifth.

Telson long, tapering, and sharp pointed.

Ophthalmopoda long, pyriform.

First pair of antennæ biflagellate.

Second pair of antennæ long and slender, and supporting a foliaceous scaphocerite armed with a tooth at the distal extremity.

Gnathopoda and pereopoda formed on the same type, all being simply pediform or not chelate.

Branchiæ as in the following table:—

Pleurobranchiæ,	.	.	.	...	...	1	1	1	1	1
Arthrobranchiæ,	.	.	.	...	...	...	...	...	...	...
Podobranchiæ,	.	.	.	...	...	...	...	...	...	...
Mastigobranchiæ,	.	.	.	1	1	...	...	...	...	...
				h	i	k	l	m	n	o

*Geographical Distribution.*—The only species yet known belongs to the Australian seas.

*Icotopus arcurostris*, n. sp. (Pl. CXLIV. fig. 1).

Carapace smooth, anteriorly crested, and produced to a long rostrum that is slightly arched, and armed on the upper surface with a series of teeth, and on the lower margin with a few at the distal extremity; lateral margin fringed with a few teeth posterior to the fronto-lateral angle.

Pleon dorsally smooth; telson longer than the sixth somite.

Ophthalmopoda pyriform, half the length of the rostrum.

First pair of antennæ shorter than the rostrum.

Second pair of antennæ as long as the animal.

Appendages of the pereion gradually increasing in length posteriorly until the posterior pair, which is not quite so long as the preceding.

<sup>1</sup> *σκάς*, like; *ποῦς*, foot.

Posterior pair of pleopoda shorter than the telson.

Length, entire, . . . . .	10 mm. (0.4 in.).
„ of carapace, . . . . .	3 „
„ of rostrum, . . . . .	3.5 „
„ of pleon, . . . . .	7 „
„ of sixth somite of pleon, . . . . .	1.5 „

*Habitat.*—April 3, 1874; off Cape Howe, Australia. Two specimens were taken at the surface at night.

The carapace is dorsally smooth, but slightly depressed over the gastric region, anterior to which, on the frontal region, the crest is elevated and anteriorly produced to a rostrum that is a little longer than the carapace; it is serrate on the upper margin with thirteen teeth, of which the posterior two are postorbital and supported by a small tubercle, and the anterior is distant from the apex of the rostrum; the under margin is smooth and arcuate towards the base for one-half the length of the rostrum, beyond which it is armed with six teeth, the most distal of which is distant from the apex, but beyond the distal tooth on the upper margin. The frontal margin is armed with a long and slender supraorbital tooth (*fig. 1c*), which stands at the upper margin of the orbit, and is continuous with a ridge that strikes the dorsal median line near the pyloric region; the outer canthus of the orbit is rounded, and beyond it there stands a small first antennal tooth, whence the marginal line descends slightly posteriorly to the fronto-lateral angle, which is produced to a long and slender tooth, posterior to which on the lateral margin are four strong teeth that gradually decrease in size, and behind them the lateral margin is smooth to the posterior margin of the carapace.

The pleon is dorsally smooth and all the somites are subequal in length until the sixth, which is a little longer than the preceding, and is also narrower and less deep.

The telson is longer than the sixth somite.

The ophthalmopoda are long in the stalk and pyriform, and reach to half the length of the rostrum.

The first pair of antennæ is excavate on the upper surface of the first joint, which is subequal in length with the ophthalmopoda, and is armed on the outer margin with a short stylocerite. The second and third joints are short, cylindrical, and continuous with the first; there are scarcely definite articulations separating the joints which support the flagella, the outer of which is the more robust and strongly multiarticulate, the inner being more slender and obscurely multiarticulate.

The second pair of antennæ is broken off in the typical specimen at a point about equal to half the length of the animal, but from its diameter I should judge that when perfect it is at least twice as long. The peduncle is short and supports a scaphocerite that is longer than the ophthalmopod, subfoliaceous, having the margins parallel

and the extremity rounded and like the inner margins fringed with ciliate hairs, and armed on the outer distal extremity with a strong tooth; the second joint of the peduncle is furnished at the outer angle with a sharp tooth.

The mandibles (fig. 1*d*) are short, robust, and have neither synnaphipod nor molar process; the psalidoma is prominent and sharp; behind it on the margin are several minute teeth or spinules.

The first pair of siagnopoda is three-branched; the two basal branches are broad and foliaceous, and the distal narrow; all supporting a few spine-like hairs.

The second pair of siagnopoda (fig. 1*f*) is four-lobed; the two basal on the inner side are bilobed, and tipped with long simple hairs, the distal is narrow and furnished with hairs on the inner side and at the tip, the outer side being smooth; the fourth or outer lobe is broad, projects anteriorly and posteriorly beyond the others, and is fringed with hairs, of which a few at the posterior margin are extremely long and directed backwards, the others fringe the margin from the posterior extremity to the anterior, gradually increase in size, and are directed forwards.

The third pair of siagnopoda (fig. 1*g*) or maxillipedes consists of two foliaceous plates on the inner surface fringed with hairs, of which the distal is narrow and the basal broad, and on the outer side a long and slender ramus distally tipped with a few hairs.

The first pair of gnathopoda is short and pediform; the ischial and meral joints are broad, concavo-convex, and fringed with hairs; the basal joint carries an ephysis that is double the length of the leg, and the coxa supports a divided mastigobranchia.

The second pair of gnathopoda is longer and more robust than the first, it terminates in a sharply pointed dactylos, and is furnished with a very long and slender multiarticulate basecephysis, and the coxa carries an undivided mastigobranchia.

The first pair of pereopoda is long, cylindrical, and pediform; the coxa and basis are long, the latter carrying an ephysis that is subequal in length with the leg; the meros is long, the carpos short, the propodos longer, and the dactylos tapering, and terminating in a styliform unguis. The other pereopoda correspond in form but gradually increase in length until the posterior pair, which is slightly shorter.

The pleopoda are biramose and smooth, as if not yet fully developed. The posterior pair is more advanced, is subequally biramose, fringed with hairs, and the outer margin near the distal extremity is armed with a strong tooth.

The branchiæ consist of five pairs, one to each pair of pereopoda; these represent as many pleurobranchiæ, all of which are comparatively large and well developed.

One of the specimens showed the nerve-ganglia very distinctly through the dermal structure, and it appeared as if the several somites of the pereion were connected by one large neural mass, while those of the pleon consisted of large globular ganglia, situated near the posterior extremity of each successive somite, connected together by a fine cord.

*Observations.*—The specimens taken were of different sizes, that described being

the largest. The degree of development shows that as yet the animal is not fully matured, but the parts described are such as are not likely to vary much in form but only in relative proportions. The ecpysis may fall off at a later stage, and the pleopoda increase in size and become ciliated, but the simple condition of the pereiopoda is not likely to alter, nor the form of the gnathopoda to become changed.

I know of no recognised adult Crustacean that corresponds so nearly with the preceding genus as *Procletes*, from which it chiefly differs in the number of teeth on the frontal region.

*Hectarthropus*, n. gen.

Carapace short, anteriorly produced to a horizontally smooth straight rostrum. Dorsal crest armed with a single tooth in the median line, orbit not well defined, frontal surface furnished with a supraorbital and two antennal teeth and one at the fronto-lateral angle.

Pleon long and slender.

Ophthalmopoda pyriform.

First pair of antennæ biflagellate.

Second pair of antennæ furnished with a long scaphocerite.

Mandible without a synnhipod.

Second pair of gnathopoda pediform.

Pereiopoda simple, six-jointed, the second joint being long, slender, and furnished with a basecpysis.

*Hectarthropus exilis*, n. sp. (Pl. CXLIV. fig. 2).

Carapace about one-eighth the length of the animal, produced anteriorly to a smooth, short rostrum; dorsal crest armed with one small tooth. Orbital region having a long supraorbital tooth; outer antennal region with a long antennal tooth; fronto-lateral angle produced to a small tooth, behind which the lateral margin is fringed with small teeth for a short distance.

Pleon long and slender; five anterior somites subequal; sixth as long as the two preceding.

Telson longer than the sixth somite.

Length, entire,	.	.	.	.	.	9	mm. (0.3 in.).
„ of carapace,	.	.	.	.	.	1.4	„
„ of rostrum,	.	.	.	.	.	1	„
„ of pleon,	.	.	.	.	.	7	„
„ of sixth somite of pleon,	.	.	.	.	.	1.5	„
„ of telson,	.	.	.	.	.	1.8	„

*Habitat*.—October 23, 1874; off Basilan Strait, Philippine Islands; taken at the surface.

The carapace is short, being scarcely one-eighth the length of the animal, it is dorsally armed with a small tooth on the cardiac region and another over the frontal crest, and anteriorly produced to a sharply pointed smooth rostrum, on each side of which the frontal region is extended to a long and slender supraorbital tooth, whence the walls descend more abruptly to the lateral margin, the anterior extremity of which is serrate to the fronto-lateral angle, above which and just within the margin stands a long and slender antennal tooth.

The pleon is long; the three anterior somites are subequal in length and dorsally unarmed, the succeeding two are shorter, the fourth being dorsally smooth, but the fifth, while smooth in the median line, is armed with a sharp tooth on each side on the dorsal surface. The sixth somite is longer than the preceding two, it is dorsally smooth and laterally compressed to a greater extent than the others, and is armed on each side at the posterior margin with a long sharp tooth, and ventrally in the median line with a strong tooth.

The telson is long and slender.

The ophthalmopoda are thick, clavate, and one-fourth longer than the rostrum; the ophthalmus is broader than the peduncle, which gradually narrows to the base, which is projected on a short stalk.

The first pair of antennæ has the peduncle very long, longer than the carapace; the first joint is nearly twice the length of the ophthalmopod, the upper margin is excavate and gives the joint an inferiorly arcuate appearance, the distal extremity is thickened to support the short second and third cylindrical joints, which carry two short flagella, the longest of which is not half the length of the peduncle.

The second pair of antennæ has the flagellum not reaching to the extremity of the first pair, and carries a scaphocerite that is long and narrow, rigid on the outer margin, and distally armed with a tooth that reaches subequally with the first joint of the first pair.

The oral appendages have not been examined.

The first pair of gnathopoda is subpediform, and carries a long basephysis.

The second pair of gnathopoda is pediform, six-jointed, carries a basephysis that is nearly as long as itself, and terminates in a short, sharp, unguiculate dactylos.

The first pair of pereopoda is a little longer than the second pair of gnathopoda, carries a similar basephysis, and terminates in a long and slender unguiculate dactylos, each articulation being supported by one or two simple hairs. The second pair of pereopoda is rather more robust than the preceding, is furnished with a similar basephysis, and terminates in a sharp unguiculate dactylos; the inferior angle of the propodos is armed with a long stiff serrate spine. The third pair of pereopoda is sub-

equal in length with the preceding, but more slender, and terminates in a long, sharp, straight, unguiculate dactylos; the basephysis is broken off, but the process on which it stands is large and prominent, and suggestive of supporting a large appendage. The two succeeding pairs of pereopoda are broken off at the distal extremity of the basal joints, which are long and robust, the penultimate being bilobed like that of the third pair.

The first pair of pleopoda is single-branched, the others are biramose. The sixth pair is subequal in length with the telson; the outer branch is furnished with a small denticle on the outer distal angle, and is fringed with hairs on the inner margin, as are also both margins of the inner ramus.

*Hectarthropus compressus*, n. sp. (Pl. CXLIV. fig. 3).

Carapace about one-fifth the length of the animal, anteriorly produced to a straight slender rostrum that is nearly half the dorsal length of the former; armed on the frontal crest with a strong tooth in the median line, and another small anteriorly directed tooth on the post-cardiac region, with a long supraorbital tooth on each side of the base of the rostrum, and one post-marginal corresponding with the second pair of antennæ. The fronto-lateral margin is slightly serrate.

The fifth somite of the pleon is posteriorly bidentate, a small tooth standing on the posterior margin, one on each side of the median line. The sixth somite is longer than the carapace, and much compressed laterally.

The telson is about two-thirds the length of the carapace.

Length, entire,	.	.	.	.	.	11 mm. (0.4 in.).
„ of carapace,	.	.	.	.	.	2 „
Depth of carapace,	.	.	.	.	.	1.5 „
Length of rostrum,	.	.	.	.	.	0.8 „
„ of pleon,	.	.	.	.	.	9 „
„ of sixth somite of pleon,	.	.	.	.	.	3 „
„ of telson,	.	.	.	.	.	2 „

*Habitat*.—Pacific; between Api and Cape York; surface. One specimen. Associated with *Sergestes* and *Oodeopus*.

This specimen corresponds with *Hectarthropus exilis*, which was taken at the Philippines, and I should have considered them as being one species but for important variations in the measurement of certain parts. The animals are of about the same length, being 9 mm. and 11 mm. respectively, but the difference may be even less, since *Hectarthropus compressus* is much more stretched, the pleon being considerably curved. A reference to the tables of measurements will show the relative differences in the lengths of corresponding parts.

The ophthalmopoda in *Hectarthropus compressus* reach to the extremity of the rostrum, whereas in *Hectarthropus exilis* they are nearly half longer; the frontal extremity of the lateral margin of the carapace is strongly serrate in *Hectarthropus exilis*, whereas in *Hectarthropus compressus*, though the serrature is present, the tothing is but feebly marked, while the tooth on the post-cardiac region of the carapace is more strongly pronounced, and those on each side of the posterior margin of the fifth somite are less so.

*Observations.*—These measurements are important distinctions, but still they may be dependent on the variability of growth; but until that is determined, it is desirable that the form should be noticed in its relation to other specimens.

*Hectarthropus expansus*, n. sp. (Pl. CXLIV. figs. 4, 5).

Carapace dorsally as broad as long, anteriorly produced to a sharp, smooth rostrum, and armed on the frontal crest with a short tooth; supraorbital tooth large, and projecting anteriorly; second antennal tooth large.

Pleon dorsally smooth in the median line; second somite armed with a tooth on the anterior margin of the coxal plate; fifth somite armed with a tooth at the posterior margin on each side of the dorsal surface.

Telson as long as the sixth somite.

Length, entire, . . . . .	7	mm. (0.25 in.).
„ of carapace, . . . . .	2	„
„ of pleon, . . . . .	5	„
„ of third somite of pleon, . . . . .	0.5	„
„ of sixth somite of pleon, . . . . .	1	„
„ of telson, . . . . .	1	„

*Habitat.*—October 23, 1874; off Basilan Strait, Philippine Islands; at the surface. Associated with the preceding species.

The carapace is expanded dorsally, and not laterally compressed as in the preceding species. It is anteriorly produced to a smooth, straight rostrum, that is about one-third the length of the carapace, and is dorsally armed on the frontal crest with a short stout tooth. From the base of the rostrum the frontal margin obliquely recedes to the supra-orbital tooth, which projects above the orbit, the outer portion of which is seen as an excavation between the preceding and the orbital tooth that forms the outer canthus. The second antennal tooth stands as a large, oblique, anteriorly directed tooth, whence the frontal margin descends, projecting anteriorly to the fronto-lateral angle, posterior to which the lateral margin is serrate, with a series of four or five teeth; behind this serration the margin is smooth to the posterior extremity.

The pleon has the first somite divided, as in the preceding species, into an anterior and posterior section, but instead of the lateral walls being compressed, the antero-lateral margin of the coxal plate is expanded outwards to an obtuse point. The second somite is likewise divided into two portions, and the coxal plate projects both anteriorly and posteriorly over the adjoining somites, the anterior margin of the former being armed with a large, strong, sharp tooth that is directed obliquely forwards. The third and fourth somites are subequal in length, dorsally smooth, and laterally compressed, the compression increasing posteriorly. The fifth somite is shorter and laterally more compressed than the preceding; it is smooth in the median line, and on each side it is dorsally armed on the posterior margin with a strong tooth. The sixth somite is cylindrical, and twice the length of the preceding somite.

The telson is subequal in length with the sixth somite, and slightly narrows posteriorly, where it terminates in a straight line fringed with short hairs.

The ophthalmopoda are pyriform, and are projected on a short stalk, the ophthalmus being of slightly greater diameter than the peduncle.

The first pair of antennæ is enlarged at the base, and gradually narrows to a cylindrical shaft that reaches beyond the rostrum, where it carries two short subequal joints; the terminal joint supports two short (broken) flagella.

The second pair of antennæ has a short flagellum that does not reach beyond the apex of the rostrum (but this is probably due to the incomplete growth of the animal), and carries a large and broad scaphocerite with parallel margins that is subequal with the length of the peduncle of the first antennæ; and is rigid on the outer margin, and distally armed with a small tooth; the inner is fringed with a series of hairs.

The pereopoda are all broken off at the extremity of the basal joints, and the ephysis are also wanting.

The pleopoda are short and in an incipient stage.

The sixth pair is subequal in length with the telson, broad and foliaceous, and except on the external margin of the outer plate fringed with hairs.

*Hectarthropus tenuis*, n. sp. (Pl. CXLIV. fig. 6).

Long and slender, carapace one-fourth of the length of the animal, anteriorly produced to a rostrum that is smooth on the lower margin, and dorsally armed with three teeth at the base.

Pleon having the fifth somite smooth; sixth somite subequal with the three preceding somites.

Telson half the length of the sixth somite.

Length, entire, . . . . .	10 mm. (0.4 in.).
„ of carapace, . . . . .	2.5 „
„ of rostrum, . . . . .	1.2 „
„ of pleon, . . . . .	7.5 „
„ of third somite of pleon, . . . . .	2 „
„ of sixth somite of pleon, . . . . .	3 „
„ of telson, . . . . .	1.5 „

*Habitat*.—April 1876, North Atlantic, surface; probably near the Cape Verde Islands.

This species resembles *Hectarthropus exilis*, but may easily be determined by the form of the rostrum and the absence of the dorsal teeth on the posterior margin of the fifth somite of the pleon.

The carapace is armed on the dorsal crest with three teeth, whence the rostrum, produced to about half the length of the carapace, is slightly depressed and smooth on the upper and lower margins. The orbit is furnished with a supraorbital tooth of moderate size. The frontal margin is anteriorly produced, but is not armed with an antennal tooth as in other species, and the infero-lateral angle is produced to a strong tooth, from which point the margin is smooth.

The second somite of the pleon is longer than the first, and the third is longer than any except the sixth, which is equal in length to the three preceding.

The telson is about half the length of the sixth somite and gradually tapers to a sharp point.

The ophthalmopoda are clavate, and slightly longer than the rostrum.

The first pair of antennæ are biramose, but are not perfect.

The second pair is also broken, and the scaphocerite is not perfect.

The oral appendages have not been examined, and all the pereopoda are broken off at the ischial joint, and all the ephyses also, excepting those of the second gnathopoda and first pair of pereipoda, these are long and slender.

The pleopoda are short, biramose, and without cilia.

The posterior pair is slightly longer than the telson and furnished with a tooth on the outer margin.

#### *Eretmocarid*,<sup>1</sup> n. gen.

Carapace about one-fourth the length of the animal, anteriorly produced to a rostrum.

Pleon having the somites subequal; sixth a little longer than the fifth.

Telson subequal with the sixth somite.

Ophthalmopoda very long and supported on a long slender pedicle.

First pair of antennæ biflagellate.

<sup>1</sup> ἑρμῶς, an oar; καρίς, a shrimp.

Second pair of antennæ carrying a long scaphocerite ; flagellum slender and subequal with the length of the animal.

Pereiopoda pediform, slender, simple ; the third, fourth, and probably the fifth pairs are long and remiform, each carrying a long basecephysis. The fifth pair in all the specimens has been broken at the basal joint, which is remarkable for its very large diameter.

The pleopoda biramosc.

*Observations.*—The first three pairs of appendages in this genus, the eyes, and two pairs of antennæ, are attached to a portion of the cephalon projected in front of the carapace, which still retains the embryonic ocellus.

*Geographical Distribution.*—Of the species of this genus one was taken in the Pacific, south of Japan, and three near the Cape Verde Islands in the Atlantic.

*Eretmocaris remipes*, n. sp. (Pl. CXLV. fig. 1).

Carapace anteriorly produced to a slender rostrum that is about half the length of the carapace, and armed with two teeth on the rostrum, the anterior being the smaller, and with one on the gastric region. Orbit not well defined, but a small tooth corresponds with the first antennal tooth, and a supraorbital tooth stands just above it ; the fronto-lateral angle defined by a strong tooth, thence the lateral margin is smooth.

First pair of gnathopoda short and robust, terminating in an obtuse extremity, and carrying a long basecephysis.

Second pair of gnathopoda long, slender, and six-jointed, as are all the pereiopoda, each of which carries a long and slender basecephysis ; the third and fourth pairs have the propodos enlarged and flattened near the middle and narrowing towards each extremity, and the dactylos is long and styliform ; the fifth pair has the coxa and basis extremely large and robust ; the rest of the appendage is lost.

Pleopoda, excepting the first pair, biramosc, the posterior pair longer than the telson.

		Subm's measurements.
Length, entire, . . . . .	12 mm. (0·4 in.).	12·5 mm.
" of carapace, . . . . .	3 "	3 "
" of pereion, . . . . .	...	4·5 "
" of rostrum, . . . . .	1 "	1·5 "
" of ophthalmopoda, . . . . .	3 "	3 "
" of first antenna, . . . . .	9 "	...
" of scaphocerite, . . . . .	4 "	...
" of pleon, . . . . .	9 "	8 "
" of third somite of pleon, . . . . .	1·5 "	...
" of sixth somite of pleon, . . . . .	2 "	...
" of telson, . . . . .	2·3 "	...

*Habitat.*—North-west Pacific, south of Japan.

The carapace is about one-fourth the length of the entire animal, it is dorsally smooth except for a large tooth that surmounts the gastric region in the median line, and another that stands near the margin above the orbital angle. The rostrum is slender, smooth on the lower margin, and armed with two unequal teeth on the upper surface, of which the larger is the posterior, and situated about one-third from the base. The outer orbital angle is rounded, and tipped with a small tooth that I take to be the first antennal tooth, and the fronto-lateral angle is produced to a sharp point, whence the lateral margin is smooth to the posterior margin of the carapace.

The pleon is smooth; the five anterior somites are subequal in length, the sixth is longer and narrower, and the telson is longer than the sixth somite.

The ophthalmopoda are pyriform and projected on a long and slender cylindrical stalk; they are 4 mm. long, or about one-third the length of the animal; the ophthalmus is rounded. In front, beneath the base of the rostrum, a large globular lobe projects between the ophthalmopoda, on which exists a small ocellus.

The first pair of antennæ has the peduncle reaching nearly to the extremity of the ophthalmopoda; the first joint is long and armed at the outer side at the base with a sharp-pointed stylocerite, and is but imperfectly defined by a small prominence from the second joint; the third joint is short and cylindrical, and supports two long slender flagella, of which the upper is rather the more robust.

The second pair of antennæ is furnished with a scaphocerite that reaches beyond the distal extremity of the peduncle of the first pair, it is rigid on the outer side and is distally armed with a sharp tooth, and foliaceous on the inner side, the margin of which is fringed with hairs.

The oral appendages have not been examined.

The first pair of gnathopoda have not been carefully examined, but appear to be short, robust, and subpediform, with the distal joints reflexed.

The second pair of gnathopoda is long, slender, and pediform; it is six-jointed, and terminates in a sharp-pointed dactylos, and carries a slender subequally long basecephysis that has the margins parallel and the extremity blunt.

The first pair of pereopoda is scarcely as long as the second gnathopoda, it resembles it in form and carries a similar basecephysis. The second pair resembles the first, but is a little longer and perhaps also more slender. The third pair is much longer than the second; the meros is extremely long, the carpos shorter, and the propodos, which is flattened and long, gradually increases and as gradually diminishes in diameter towards the dactylos, which terminates in a straight sharp-pointed dactylos. The fourth pair resembles the third, but is a little longer and terminates in a long, slender, styliiform dactylos, and, like the preceding, carries a long, narrow basecephysis. The fifth pair is

wanting, being unfortunately broken off on both sides beyond the basal joint, but the enormous size of the latter indicates that it supported a large appendage, which probably corresponds in form more or less closely with the preceding pair, but is without an ephysis. The internal muscles are very strong and also support this conclusion.

The first pair of pleopoda is a powerful but single-branched appendage; the following pairs are all biramose, the terminal pair having the branches subequal and longer than the telson, the outer being armed with a tooth near the distal extremity, which shows no trace of a diæresis.

*Eretmocarid longicaulis*, n. sp. (Pl. CXLV. fig. 2).

Carapace less than one-fourth the length of the animal, dorsally smooth, except for a small tooth on the frontal crest, and anteriorly produced to a small rostrum.

Pleon dorsally smooth, having the somites subequal in length.

Telson as long as the sixth somite.

Ophthalmopoda projected on a pedicle that is longer than the animal.

First pair of antennæ nearly as long as the animal.

Second pair of antennæ having a scaphocerite equal in length with the first joint of the peduncle of the first pair.

Length, entire, . . . . .	6 mm. (0.2 in.).
„ of carapace, . . . . .	1.5 „
„ of pleon, . . . . .	4.5 „
„ of ophthalmopod, . . . . .	6.6 „
„ of first antenna, . . . . .	5 „
„ of scaphocerite, . . . . .	2 „
„ of sixth somite of pleon, . . . . .	0.8 „
„ of telson, . . . . .	1 „

*Habitat*.—Station 227, March 27, 1875; lat. 17° 29' N., long. 141° 21' E.; south of Japan. The specimen was taken at the surface. It is labelled "Amphionid, 27 March 1875, W. Pacific."

The carapace, which is one-fourth of the length of the animal, is furnished on the gastric region with a small tooth and anteriorly produced to a small, sharply pointed rostrum. The frontal margin is not furnished with teeth, except the fronto-lateral angle which forms a small one.

The pleon is smooth and the somites subequal in length; the telson is rather longer than the sixth somite, and terminates in a sharp point.

The ophthalmopoda surpass in length that of the entire animal; the pedicle forms a long, slender, cylindrical stalk, which carries a pear-shaped organ at its extremity, which is furnished with a faceted ophthalmus.