

hairs; the coxa is short, smooth, and carries a short and sharp-pointed rudiment of a mastigobranchial plate; the basis is short, furnished on the inner side with three fasciculi of ciliated hairs, and supports a long, slender ephysis; the third joint, which probably is the ischium and meros combined, is long and slender and fringed with simple hairs on the inner side only, excepting for a short distance on the outer side at the base, and bears at the distal extremity a single plumose hair; the third joint, which probably represents the carpos, is curved at the base to enable it to be flexed against the inner margin of the preceding joints, it is fringed both on the inner and outer side with a series of fasciculi of simple hairs; the fourth or terminal joint, representing the propodos, is long, cylindrical, and tapering at the point, and is fringed on both the inner and outer margins with a series of long hairs, having a fasciculus of short ones at the base of each.

The first pair of pereopoda (fig. 1*k*) is six-jointed and chelate; the coxa is short and stout; the basis is short and furnished with long simple hairs on the inner margin, and a rudimentary ephysis of membranous character on the outer; the ischium is long, cylindrical, and fringed with long and simple hairs on the inner margin; the meros is a little longer than the ischium, and fringed on both the inner and outer margins with a series of long and short hairs, distally placed in fasciculi; the carpos is long and narrow, narrower on the inner side near the base to enable it to be flexed more perfectly against the preceding joints, and fringed on both inner and outer margins with long, simple hairs; the terminal joint or propodos is not more than half the length of the carpos, fringed on both sides with slender bundles of simple hairs, and terminates in a sharp unguiculate point. The second pair of pereopoda is slender, chelate, and has the carpos biarticulate. There is but one of the appendages of this pair preserved, so that I cannot say if it be unequal or not. The propodos is long, and the pollex and dactylos short. The three following pairs of pereopoda are slender, having the meros and ischium posteriorly fringed with short teeth, and terminate in a fringed propodos, and a long and styliform dactylos. Each of the pereopoda excepting the posterior pair is furnished with a rudimentary mastigobranchia.

The pleopoda are short and biramose; those of the sixth pair are subequal with the telson in length, and are fringed with hairs.

The branchiæ (fig. 2) consist of a series of five small arthrobranchiæ and six large pleurobranchiæ, but no podobranchiæ and only rudimentary mastigobranchiæ, as shown in the accompanying table:—

Pleurobranchiæ,	.	.	.	.	...	1	1	1	1	1	1
Arthrobranchiæ,	.	.	.	.	...	1	1	1	1	1	...
Podobranchiæ,	.	.	.	.	...	...	...	...	...	...	...
Mastigobranchiæ,	.	.	.	.	1	1	1	1	1	1	...
						<b>h</b>	<b>i</b>	<b>k</b>	<b>l</b>	<b>m</b>	<b>n</b>
										<b>o</b>	

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

Carapace smooth, laterally compressed and dorsally carinated, anteriorly produced to a rostrum armed with a series of teeth above and below.

Pleon smooth but slightly compressed laterally; third somite posteriorly produced on the dorsal surface; fourth and fifth somites laterally cleft at the posterior margin between the somite and coxal plates.

Telson long and narrow.

Ophthalmopod small and uniarticulate.

First pair of antennæ twice the length of the carapace, and furnished with a sharp-pointed stylocerite.

Second pair of gnathopoda pediform, and furnished with a long basephysis.

First pair of pereiopoda simple. Second pair chelate; having a long, slender and flexible, multiarticulate carpos. Three posterior pairs of pereiopoda tolerably robust, having the meros and ischium armed with small spines; carpos not so long as the propodos; dactylos styliform.

Pleopoda biramose and subfoliaceous; the anterior branch carrying a single stylamblys. Outer branch of the rhipidura furnished with a distinct diæresis.

All the pereiopoda except the posterior pair carry a rudimentary mastigobranchia tipped with a little hook. The branchial arrangement differs from that of *Pandalus*, in having two arthrobranchial plumes attached to the second pair of gnathopoda, as shown in the annexed table:—

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

*Observation.*—This genus very closely resembles *Chlorotocus*, A. Milne-Edwards, but differs chiefly in the character of the second pair of pereiopoda, which has the carpos multiarticulate in *Dorodotes* and biarticulate in *Chlorotocus*.

*Geographical Distribution.*—I only know of one species of this genus, and this has been taken twice, in the Sea of Banda and near Manila, on the northern shores of the Philippine Islands, where the largest specimen was trawled.

<sup>1</sup> δωροδότης, a bestower.

*Dorodotes reflexus*, n. sp. (Pl. CXVI. fig. 3).

Carapace smooth. Carinated dorsally over the gastric and frontal regions, and produced to a laterally compressed rostrum that is about one-half the length of the carapace, serrate on the upper and lower margins with closely pressed, anteriorly directed sharp teeth.

Pleon smooth and but slightly compressed laterally in the three posterior somites; third somite dorsally produced posteriorly in the median line but neither compressed nor dentated; fourth and fifth laterally cleft posteriorly between the somite and the coxal plates, the postero-lateral angle of which is rounded in the fourth and produced to a sharp point in the fifth, while in the sixth it culminates in a strong tooth.

Telson narrow, dorsally flat and laterally compressed, the angles armed with long spines.

Ophthalmopoda short, ophthalmus small and round.

First pair of antennæ about twice the length of the carapace, carrying a strong sharply pointed stylocerite.

Second pair of gnathopoda long and robust, more so than the first pair of pereiopoda, which is slender and terminates in a small dactylos.

Length, entire (male),	.	.	.	.	.	78 mm. (3 in.).
„ of carapace,	.	.	.	.	.	28 „
„ of rostrum,	.	.	.	.	.	12 „
„ of pleon,	.	.	.	.	.	50 „
„ of third somite of pleon,	.	.	.	.	.	12 „
„ of sixth somite of pleon,	.	.	.	.	.	7 „
„ of telson,	.	.	.	.	.	13 „

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

Station 205, November 13, 1874; lat. 16° 42' N., long. 119° 22' E.; Philippine Islands; depth 1050 fathoms; bottom, blue mud; bottom temperature, 37°. Two specimens, male and female. Trawled.

The rostrum is slightly elevated anteriorly and is broadest at the base, whence it gradually tapers to the apex, there being no excavation on the under surface for the reception of the eye-stalks. It is about one-third the length of the carapace, armed on the lower margin with four or five sharp teeth, and on the upper with fourteen or fifteen, the posterior gradually becoming smaller and placed closer together towards the termination of the carina on which they stand, and which dies out just over the cardiac region,

behind which, in advance of the posterior margin, there is in the median line a small circumscribed tubercle. The frontal margin of the carapace has the outer canthus of the orbit defined by an obtuse point within the first antennal tooth, which is small, as is also that of the second.

The ophthalmus is small and round, being smaller in diameter than the ophthalmopod on which it stands (fig. 3*a*).

The first pair of antennæ has the peduncle subequal in length with the rostrum; the first joint, which equals the length of the other two, is depressed to a greater extent than is necessary to receive the eye and has no blepharos or fringe of reversely directed cilia on the anterior upper surface, but carries a long stylocerite, sharp at the apex but horizontally dilated within the extremity. The flagella are slender and about twice the length of the carapace, the outer and upper in the male being a little more robust than the inner.

The second pair of antennæ carries a long and narrow scaphocerite that reaches considerably beyond the rostrum, and the flagellum is longer than the animal.

The branch attached to the basal joint of the first pair of gnathopoda is long, and that attached to the second is slender, single-jointed and flexile.

The first pair of pereopoda is less robust and shorter than the second pair of gnathopoda, and terminates in a lanceolate dactylos. The second pair carries a tolerably robust chela and the articulations of the carpos are rather distant. The three posterior pairs have the posterior margin of the ischium and meros sparsely armed with strong spine-like teeth. The coxal joint of the last three, as shown most distinctly in the posterior pair, has a broad and flat posterior plate that checks the backward movement of the legs. This joint in all the pereopoda except the posterior carries a small rudimentary mastigobranchia, which terminates in a small hook. The mastigobranchia belonging to the second pair of gnathopoda exhibits a peculiarity that exists in most of its congeners, but is very pronounced in this species. Instead of springing directly from the coxa as in all the pereopoda it arises vertically from the centre of a rigid and scarcely articulating basal plate which springs perpendicularly from the coxa and penetrates between the branchial plumes, separating that of the first pair of gnathopoda from those of the second.

The pleopoda are biramose and subfoliaceous; the anterior branch carries on the inner side a long stylamblys, subapically furnished with a corona of cincinnuli, except in the first pair, which has the inner and anterior branch shorter and more membranous, and terminates in a point which carries the stylamblys, the margins being furnished with thickly set plumose cilia. The outer branch of the posterior pair, which helps to form the rhipidura, has two longitudinal ribs: the outer runs diagonally from the base to the outer angle of the diæresis and terminates in two small teeth, the second is central and contains the muscles that act upon the terminal plate.

The telson is dorsally flat, with the sides depressed and the longitudinal line between the two strengthened by a ridge and armed with four long sharp spines, the posterior being situated at the terminal angles. These spines are evidently under the will and control of the animal, and are capable of being erected so as to be perpendicular to their base, and of being used as offensive weapons. This appears still more evident from the fact that the animal has the power of becoming dorsally flexed considerably beyond a horizontal line, the extent of which is shown in the shortness of the dorsal length of the first two somites, which are transversely bisected by a narrow groove.

*Observations.*—This species presents several points of extreme interest, which I do not think can be considered as generic. One is the extreme length of the two posterior pleurobranchiæ; in the largest specimen they are so long that their apical extremities are reflexed and folded back against the upper surface of the branchial chamber. Another feature of interest is the deep cleft that exists, more particularly in the fifth somite, between it and the coxal plate which belongs to it. Again in several congeneric forms in this small group, the dorsal crest is armed with teeth, in others with spines, and in some with both teeth and spines. In this genus the rostrum is armed entirely, both above and below, with sharp teeth that in this species are anteriorly directed almost parallel with the general line of the animal, but it is worthy of notice that several of the posterior teeth show a depression or groove at the anterior basal portion, apparently indicating a tendency for the conversion of the rigid teeth into movable spines.

*Dorodotes levicarina*, n. sp. (Pl. CXII. fig. 5).

Carapace smooth, lateral carinæ subdued; median dorsal line slightly carinated and armed with eleven teeth, the posterior standing on the pyloric region and the anterior near the apex of the rostrum, which is half the length of the carapace, and on the lower side with six small teeth.

Pleon slightly compressed, dorsally carinated, the carina on the third, fourth and fifth somites terminating posteriorly in a small tooth.

Telson tapering, not longer than the outer rami of the rhipidura.

First pair of antennæ scarcely longer than the rostrum.

Second about half the length of the animal.

Outer rami of the rhipidura broad and furnished with a diæresis, the outer angle of which is near the distal extremity.

Length, entire (male), . . . . .	39 mm. (1.5 in.).
" of carapace, . . . . .	12 "
" of rostrum, . . . . .	9 "
" of pleon, . . . . .	27 "
" of third somite of pleon, . . . . .	5.5 "
" of sixth somite of pleon, . . . . .	3 "
" of telson, . . . . .	6 "

*Habitat*.—Station 188, September 10, 1874; lat. 9° 59' S., long. 139° 42' E.; Arafura Sea, south of Papua; depth, 28 fathoms; bottom, green mud. Two specimens; males. Trawl and dredge both used.

This species is remarkable for its smoothness, but when it is in a dry condition the lines of the lateral carinæ on the carapace are appreciable, appearing as very slight elevations. One carina corresponds with the orbital tooth, and the other commences at the posterior margin, runs forward and unites with the first on the hepatic region. The dorsal carina is likewise less conspicuous than in the typical forms of the genus and is not elevated into a prominent crest.

On the pleon the carina is indicated on all the somites, but more especially on the third, fourth, and fifth, where it culminates on each posteriorly in a small sharp tooth.

The ophthalmopoda are pear-shaped and the ophthalmus hemispherical.

The first pair of antennæ carries a stylocerite that is sharply pointed and reaches beyond the distal extremity of the first joint, and a flagellum that is scarcely longer than the rostrum; the outer flagellum in the male is much more robust than the inner. The second pair supports a scaphocerite that tapers to the extremity and terminates in an external tooth.

The pereopoda are rather short; the three last pairs are serrate on the posterior margin, and each terminates in a long dactylos.

*Observations*.—Two specimens of this intermediate form were taken in the shallow sea south of New Guinea. They are interesting as showing the value in classification of the lateral carina and the passage of one form into another.

The species bears a near resemblance to *Chlorotocus gracilipes*, A. Milne-Edwards, from the West Indies, and it would, indeed, have been classified in the same genus had not A. Milne-Edwards figured the carpos of the second pair of pereopoda as being unarticulate, a character which approximates it to *Thalassocaris* of Stimpson (*Regulus* of Dana), whereas *Dorodotes* is structurally nearer *Pandalus*.

### Tribe Monocarpidea.

The genera in this tribe consist of those forms that differ from the Polycarpidea in having the carpos of the second pair of pereopoda formed of a single joint, and generally the chela of this pair larger than that of the first. As in the preceding tribe the genera may conveniently be divided into those which have the first pair of pereopoda monodactyle and those in which they are didactyle, or chelate, and to this tribe may also be added a third division, comprising those in which all the pereopoda are monodactyle.

#### Family THALASSOCARIDÆ.

Carapace dorsally smooth, anteriorly produced to a laterally compressed rostrum. Pleon narrow, laterally compressed and tapering to a pointed telson truncated at the tip. First antennæ having a stylocerite and terminating in two flagella. Second antennæ furnished with a scaphocerite that is rigid on the outer margin and armed with a tooth. First pair of pereopoda simple; second chelate. Pleopoda foliaceous and biramose. Rhipidura well developed.

#### *Thalassocaris*, Stimpson.

*Thalassocaris*, Stimpson, Proc. Acad. Nat. Sci. Philad., p. 42, January 1860.

*Regulus*, Dana, U.S. Explor. Exped., Crust., vol. xiii. p. 597 (*nom. præocc.*).

Animal slightly compressed; carapace more than one-third its length. Rostrum elongate and dentate. Frontal margin produced to a tooth corresponding with the first pair of antennæ, but without a second antennal or fronto-lateral tooth.

Pleon more compressed than the carapace; somites subequal and laterally produced to a point; sixth somite longer than the preceding. Telson nearly as long as the sixth somite.

First pair of antennæ biflagellate.

Second pair of antennæ long, slender, and furnished with a sharp pointed scaphocerite.

First pair of pereopoda long, slender, and styliform. Second pair more robust than the first pair and chelate. Three following pairs simple.

Pleopoda two-branched, terminal pair well developed, foliaceous, rounded at the extremity and subequal with the length of the telson.

Dana states as one of the characters of the genus that the third somite of the pleon is dorsally produced to a spine. It was so produced in the two species known to him, and such is also the case with those in the Challenger collection, but there is a closely allied specimen that is dorsally nearly smooth, and I hesitate to consider this character as

generic, seeing how variably the dorsal teeth on the pleon are distributed among the species of the same genus.

*Geographical Distribution.*—One of Dana's species was taken at the Ladrone Islands and the other in the Sulu Sea. Of those in the Challenger collection, one was taken off the Fiji Islands and the other off Japan and the Philippine Islands. Stimpson records *Thalassocaris fucida*, Dana, from the Pacific Ocean.

*Observation.*—The species of this genus appear to connect those of the family Pandalidæ with those of the family Palæmonidæ.

*Thalassocaris danæ*, n. sp. (Pl. CXVII. fig. 1).

Carapace dorsally smooth, anteriorly slightly compressed, and produced to a rostrum which is rather longer than the carapace and serrate superiorly from the frontal crest to the apex with a series of small teeth. Frontal margin furnished with an antennal tooth.

Pleon having the somites subequal; third somite posteriorly produced to a large dorsal tooth; lateral margins of the coxal plates produced to a sharp point which is longest in the first and second and gradually lessens posteriorly; sixth somite more slender and narrower than the preceding. Telson rather longer than the sixth somite and gradually tapering to a point.

Ophthalmopoda robust and large rather than long.

First pair of antennæ not reaching beyond the apex of the rostrum.

Second pair of antennæ about as long as the animal. Scaphocerite sharply pointed and armed with teeth on the outer margin.

First pair of pereiopoda slender and styliform. Second pair short and robust. Three following pairs longer than the second and terminating in a simple dactylos.

Pleopoda biramose, terminal pair not longer than the telson.

Length, entire, . . . . .	9	mm. (0.3 in.).
„ of carapace, . . . . .	3	„
„ of rostrum, . . . . .	4	„
„ of pleon, . . . . .	6	„
„ of dorsal tooth on third somite, . . . . .	1	„
„ of sixth somite of pleon, . . . . .	1	„
„ of telson, . . . . .	1.5	„

*Habitat.*—Fiji Islands; at the surface. One specimen.

The carapace is rounded posteriorly and a little compressed anteriorly, slightly crested and produced to a rostrum that is slightly longer than the carapace, and armed on the upper surface with a regular series of small teeth commencing on the frontal crest and continued to the distal extremity, which is slightly curved upwards. The under margin

is smooth and free from teeth, excepting two or three small points near the apex. The frontal margin is furnished with a tooth at the outer angle of the orbit corresponding with the position of the first antennal tooth, beyond which there appears to be no other tooth.

The pleon has the somites subequal, the sixth being cylindrical, a little longer and narrower than, but not so deep as, the fifth and preceding somites. The third somite carries a tooth at the posterior extremity of the dorsal surface that is as long as the sixth somite or as the telson, which tapers to a sharp point.

The ophthalmopoda are about one-fourth the length of the rostrum, slightly pear-shaped and about half as thick as long.

The first pair of antennæ (fig. 1*b*) has the first joint a little longer than the ophthalmopoda, the second and third very short, cylindrical, and supporting two slender flagella that reach nearly to the extremity of the rostrum.

The second pair of antennæ (fig. 1*c*) has the second joint of the peduncle produced to a sharp tooth at the inner distal extremity, and carries a long and trigonal scaphocerite, the distal extremity of which runs to a sharp point, the outer margin being armed near the middle with three strong sharp teeth, and the inner fringed with recurved teeth and fine ciliated hairs. The third joint is obliquely articulated on the inner side of the second; it is cylindrical, and articulates at its extremity with the fourth joint, which carries at its extremity a long and slender flagellum, the basal articuli of which are fused together for a distance equal to about half the length of the scaphocerite.

The oral appendages have not been examined, as the specimen is a solitary one and the species of the genus that are known are not numerous.

The first pair of pereopoda is slender and styliform, and carries a basephysis. The second pair is scarcely as long as the first, more robust, and terminates in a well-developed chela of which the propodos is thick and the fingers shorter than the palm; this pair also appears to be furnished with a basephysis. The third and fourth pairs are slender, longer than the preceding, terminate in a rather long and slender dactylos, and carry a rudimentary basephysis. The fifth pair shows no evidence of a basephysis and terminates in a dactylos that is shorter than those of the preceding pairs.

The pleopoda are biramose; those of the sixth pair are subequal in length and do not reach beyond the distal extremity of the telson.

*Thalassocaris stimpsoni*, n. sp. (Pl. CXVII. fig. 2).

Carapace dorsally smooth, anteriorly produced to a rostrum that is straight, laterally compressed, and about half the length of the carapace.

Pleon smooth except for a tooth on the posterior margin of the third somite. The sixth somite is a little longer and narrower than the fifth.

Telson long and tapering slightly to the extremity, which is armed at each angle with a strong spine and with six smaller spinules between them.

Ophthalmopoda pyriform.

Second pair of pereopoda imperfectly chelate, the pollex being shorter than the dactylos, and the propodos not of greater diameter than the carpos.

	Japanese specimen.	Fiji specimen.
Length, entire, . . . . .	10 mm. (0.4 in.).	7 mm. (0.3 in.).
„ of carapace, . . . . .	3.5 „	3.3 „
„ of rostrum, . . . . .	2.5 „	2 „
„ of pleon, . . . . .	6.5 „	4 „
„ of dorsal tooth, . . . . .	0.5 „	0.5 „
„ of sixth somite of pleon, . . . . .	1.5 „	1.5 „
„ of telson, . . . . .	1.5 „	1.5 „

*Habitat.*—Japan, near Yokohama, June 17, 1875; surface. One specimen.

Fiji Islands, August 11, 1874; surface. Two specimens.

The carapace is about one-third the length of the animal, measured from the orbital margin to the extremity of the telson. It is dorsally smooth and carries a straight, smooth, and sharply pointed rostrum, which is about one-third shorter than the carapace.

The pleon, including the telson, is about twice the length of the carapace, and the sixth somite is of the same length as the telson. The dorsal surface is smooth except for a tooth in the median line on the posterior margin of the third somite.

The telson gradually narrows posteriorly, the terminal extremity being truncated and armed with a long spine at each angle and six small spines between them.

The ophthalmopoda are pear-shaped, about half the length of the rostrum and projected on a slender stalk.

The first pair of antennæ has the peduncle about two-thirds the length of the rostrum, the first joint is slightly concave, wide at the base, and armed on the outer margin with a short sharp stylocerite. The second and third joints are short and cylindrical, and terminate in two flagella that are subequal in length with the peduncle, and reach beyond the rostrum to a distance equal to half its length; the inner flagellum is slender and thread-like and the outer robust.

The second pair of antennæ is a little more than half the length of the animal, and carries a scaphocerite that is subequal in length with the rostrum. The outer margin is smooth, straight, rigid, and terminates in a sharp and slender point, the inner is convex, membranous, and fringed with ciliated hairs; it is widest near the base and gradually tapers to the distal point.

The oral appendages have not been examined.

The gnathopoda are pediform, the second pair being much longer than the first, both being furnished with basecephyses.

The first pair of pereiopoda is long, slender and simple. The second terminates in an imperfect chela, the pollex being about half the length of the dactylos, but this inequality may be due to the imperfectly developed character of the specimen. The third and fourth pairs are slender, simple, and longer than the preceding, and like them carry a basal appendage of considerable length. The fifth pair is shorter than the preceding and does not carry an appendage, nor is the basal joint quite as important as in the four preceding pairs, which are remarkable for their length and robust appearance.

The pleopoda are biramose. The first pair has the branches unequal, the inner being small and rudimentary. The succeeding pairs have the branches subequal, the inner carrying a single stylamblys. The sixth pair has the rami subequal, and about the same length as the telson; the outer plate is armed with a feeble tooth at the outer distal angle, and the inner and outer margins as well as the rounded extremity are fringed with slender ciliated hairs.

The hairs everywhere on the animal appear to be ciliated, on the legs as well as on the other parts.

*Observations.*—There were two specimens taken off the Fiji Islands that correspond much with the one described, and which I consider to belong to the same species. The chief distinctions between them exist in the length of the ophthalmopoda, their projection upon long and slender stalks, and the greater length of the scaphocerite as compared with the rostrum, which nearly corresponds in length with that in the specimen from Japan, but differs in having three minute teeth on the upper margin. These however are visible only in a lateral view and with increased magnifying power.

In the Fiji specimens the hairs on the legs instead of being ciliated are smooth.

The second pair of pereiopoda in both specimens has the chela broken off, and the pleon has the third somite armed with a stronger tooth than in the Japanese specimen.

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

Animal slender. Carapace not more than one-third the length of the animal, anteriorly produced to a horizontal rostrum.

Pleon smooth; somites subequal.

Telson tapering, slender.

Ophthalmopoda robust.

First pair of antennæ biflagellate.

Second pair furnished with a foliaceous scaphocerite; flagellum long and slender (?).

Mandible without a synnhipod.

First pair of pereiopoda slender and terminating in a straight styliform dactylos. Second pair robust, chelate. Third and fourth pairs short, simple, and terminating in a

<sup>1</sup> διάφορος, different; πούς, foot.

biunguiculate dactylos. Fifth pair very long, slender, and terminating in a biunguiculate dactylos.

Pleopoda biramose, ultimate pair subequal in length with the telson.

*Geographical Distribution.*—Species of this genus have been captured in the Australian seas and in the Atlantic off the Cape Verde Islands.

*Observation.*—This genus is evidently the immature condition of some undetermined form.

*Diaphoropus versipellis*, n. sp. (Pl. CXVII. fig. 3).

Carapace long, cylindrical, anteriorly produced to a rostrum that is twice the length of the ophthalmopod, which is short and stout.

Peduncle of first antennæ subequal with the rostrum. Scaphocerite subequal with the peduncle of the first pair of antennæ, flagellum (probably) long and slender.

First pair of pereopoda terminating in a straight and style-like unguis. Second pair robust, long and chelate; fingers about half the length of the palm, carpos short. Two succeeding pairs terminating in a biunguiculate dactylos. The fifth pair reaches beyond the ophthalmopoda and terminates in a biunguiculate dactylos.

Length, entire,	.	.	.	.	.	9 mm. (0.3 in.).
„ of carapace,	.	.	.	.	.	3 „
„ of pleon,	.	.	.	.	.	6 „

*Habitat.*—Off Cape Howe, Australia, April 3, 1874. Surface, at night.

The carapace is one-third the length of the animal and rather deeper than the walls of the pleon, and has the surface smooth except for a small tubercle on the gastric region; it is anteriorly produced to a sharp rostrum lying in the plane of the dorsal surface, and about half the length of the carapace. The frontal margin is excavate to form orbits, the outer angles of which correspond with the first antennal tooth, whence the margin recedes and unites immediately with the lateral margin, which continues in a line subparallel with the dorsal surface to the posterior extremity of the carapace, the lateral angles of which are rounded and increased in depth.

The first somite of the pleon is long and divided into an anterior and a posterior section. The second is still longer, being subequal with the third, fourth and fifth, all of which are smooth and free from any dorsal depression. The sixth is subequal in length with the preceding and with the telson.

The ophthalmopoda are short and stout, not exceeding half the length of the rostrum and about a third less broad than long.

The first pair of antennæ has the first joint of the peduncle longer than the

ophthalmopod, and the third joint, which is subequal with the second, reaches to the extremity of the rostrum and terminates in two short flagella.

The second pair of antennæ carries a long flagellum, but it is broken off a little behind the distal extremity of the scaphocerite, which reaches to the length of the peduncle of the first pair, is rounded at the extremity and fringed with hairs, the outer angle being furnished with a strong tooth.

The mandibles are without a synhipod.

The first pair of pereopoda (fig. 3*k*) is long and slender; the meros is long, the carpos and propodos gradually enlarge and then as gradually decrease in thickness anteriorly to that of the dactylos, which terminates in a long straight unguis, the base of which bears a hair or two. The second pair (fig. 3*l*) is short, robust, and chelate; the carpos and propodos continuously enlarge at first and as gradually decrease to the extremity of the dactylos and form a long ovate chela, the fingers of which are about half the length of the palm of the propodos. The third (fig. 3*m*) and fourth pairs resemble each other; they are short, and terminate in a biunguiculate dactylos that is about one-third the length of the palm of the propodos. The fifth pair (fig. 3*o*) is very long and slender, reaching anteriorly as far as the extremity of the ophthalmopoda. It is remarkable for the large size of the coxal joint, which is broad at the base but rapidly narrows to the diameter of the basis, and generally lies directed forwards.

The pleopoda are all biramose, the posterior pair not being longer than the telson.

*Observations.*—This specimen is one of interest from the remarkable state of transition which it exhibits. It is evidently a young animal that is passing from one stage to another, the change almost corresponding in degree to a metamorphosis. The antennæ and other appendages are seen in a higher state of development within the older skin that is about to be shed, but the fifth pair of pereopoda, which in the adult state terminates in a biunguiculate dactylos, is inclosed within an older case that is produced to a long and slender point, more than four times its length, and fringed at the extremity on the concave side with a series of small reversed teeth.

*Diaphoropus longidorsalis*, n. sp. (Pl. CXVII. fig. 4).

Carapace long, cylindrical, carrying a short, pointed rostrum. Frontal margin without an antennal tooth; fronto-lateral angle produced to a small tooth.

Pleon having the five anterior somites subequally long; sixth somite as long as the two immediately preceding.

Telson nearly as long as the sixth somite.

Ophthalmopoda short and thick, but twice the length of the rostrum.

First antennæ twice the length of the ophthalmopod.

Second antennæ possessing a scaphocerite that reaches as far as the distal extremity of the peduncle of the first pair.

The oral appendages have not been examined.

The appendages of the pereion are uniform, excepting the posterior pair of pereiopoda, which is long, slender, and reaches to the distal extremity of the first antenna.

The pleopoda are short and biramose; the sixth pair is subequal in length with the telson.

Length, entire,	.	.	.	.	.	9 mm. (0.3 in.).
„ of carapace,	.	.	.	.	.	3.5 „
„ of rostrum,	.	.	.	.	.	0.5 „
„ of pleon,	.	.	.	.	.	5.5 „

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

This species resembles *Aneboecaris quadroculus* (Pl. CXXIII. fig. 1), in which the anterior pair of pereiopoda is chelate, but differs from it in having a shorter rostrum. It appears to be in a younger stage of development, as all the pereiopoda except the posterior pair are furnished with long basephyses, and none of them exhibit the chelate condition shown in the second pair of the preceding species.

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

Animal slender. Carapace short, anteriorly produced to a horizontal rostrum. Frontal margin having the orbit slightly excavate; lateral angle produced to a sharp tooth.

Third somite of the pleon as long as the preceding two, and dorsally arcuate; fourth somite articulating at a right angle with the preceding; sixth somite long and laterally compressed.

Telson long and slender.

Ophthalmopoda long, narrow, and articulating by a slender pedicle.

First pair of antennæ biflagellate.

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

Second gnathopod long, slender, and seven-jointed.

First pair of pereiopoda short and simple. Second pair chelate. Third, fourth, and fifth pairs simple and subequal.

Posterior pair of pleopoda subequal in length with the telson.

*Geographical Distribution.*—There is only one species, and of that but one specimen, in the collection. It was obtained in the Philippine Sea.

<sup>1</sup> *κυπτός*, bent; *καρίς*, shrimp.

*Kyptocaris stylofrontalis*, n. sp. (Pl. CXXI. fig. 1).

Carapace short, dorsal crest armed with two small teeth. Rostrum long, slender, and styliform.

Third somite of the pleon turgid; sixth somite longer than the preceding two and posteriorly furnished with a slender dorsal tooth.

Telson half the length of the sixth somite.

Ophthalmopoda nearly as long as the carapace, clavate.

Length, entire, . . . . .	7 mm. (0.2 in.).
„ of carapace, . . . . .	1.4 „
„ of rostrum, . . . . .	1.4 „
„ of pleon, . . . . .	5.6 „
„ of third somite of pleon, . . . . .	1 „
„ of sixth somite of pleon, . . . . .	2 „
„ of telson, . . . . .	1 „
„ of ophthalmopod, . . . . .	1.3 „

*Habitat*.—October 23, 1874, off Sibago, Samboangan, Philippine Islands; surface.

The carapace is one-fifth the length of the animal, armed on the frontal crest with two small teeth, and anteriorly produced to a long, slender, sharply pointed rostrum that is quite half as long as the carapace. The frontal margin is armed with a slender infraorbital tooth, and the fronto-lateral angle is produced to a sharp tooth, behind which, on the lateral margin, there is another smaller one.

The first somite of the pleon is divided into two subequal portions; the second is as long as the first, and laterally overlaps the somite both anterior and posterior to it; the third somite is as long as the two preceding, and is elevated to a hump, but the articulation of the posterior margin with the fourth somite is, as in the genus *Cari-cyphus*, subparallel with the dorsal surface; the fourth somite is shorter than the third, and the fifth shorter than the fourth; the sixth somite is longer than the preceding two together, and posteriorly produced to a sharp and slender tooth.

The telson is half the length of the sixth somite.

The ophthalmopoda are long, slender, and clavate, nearly equal in length to the carapace, and projected upon a small pedicle.

The first pair of antennæ has the first joint of the peduncle longer than the rostrum, and the second and third joints short and subequal; each of the two flagella is biarticulate.

The second pair of antennæ has the flagellum very slender in consequence of the length of each articulus, rather than of the number of them; the second joint is robust, armed with a tooth on the outer side, and supports a scaphocerite that is subequal in length with the peduncle of the first pair.

The oral appendages have not been examined in this solitary specimen.

The second pair of gnathopoda (fig. 1*i*) is long, slender, and pediform, longer than any of the pereopoda, which it resembles in the number of the articulations, but differs in having the meros and propodos longer and the carpos and dactylos shorter.

The first pair of pereopoda (fig. 1*k*) is monodactyle, and has the carpos and propodos subequal and the dactylos short. The second pair (fig. 1*l*) is more robust than the first, and chelate. The third (fig. 1*m*), fourth, and fifth pairs are rather more slender than the second, subequal in length, and terminate in a sharp and longer dactylos.

#### Family ATYIDÆ.

Carapace dorsally smooth, rounded, and anteriorly produced to a flattened rostrum. Pleon short and robust. First antennæ having a stylocerite. Second carrying a short scaphocerite. Mandibles having a molar process and psalistoma but no synnhipod. Second pair of gnathopoda four-jointed and pediform. First and second pairs of pereopoda chelate, dactylos and pollex spatuliform or spoon-shaped. Third, fourth, and fifth pairs simple. Pleopoda biramose. Rhipidura well developed. Telson flattened, truncate.

#### *Atya*, Leach.

*Atya*, Leach, Trans. Linn. Soc. Lond., vol. xi. p. 345, 1815.

*Atya*, Leach, Zool. Miscell., vol. viii. p. 29, 1817.

„ Latreille, Règne Anim. de Cuvier, tom. iv. p. 93.

„ Desmarest, Consid. sur les Crust., p. 215.

„ Roux, Mem. class. crust. Salicoques, p. 27; Férussac, Bull. Sci. Nat., tom. xxvii., 1831.

„ Wiegmann, Wiegmann's Archiv f. Naturgesch., Jahrg. iii. p. 145, 1836.

„ Milne-Edwards, Hist. Nat. Crust., tom. ii. p. 347, 1837.

„ Newport, Ann. and Mag. Nat. Hist., vol. xix. p. 158, 1847.

„ A. Milne-Edwards, Ann. Soc. Entom. France, tom. iv. p. 145, 1864.

*Atyoida*, Randall, Journ. Acad. Nat. Sci. Philad., vol. viii. p. 140. ...

Animal laterally compressed, dorsally smooth. Frontal margin produced to a rostrum in line with the carapace, not laterally compressed.

First and second pairs of pereopoda short and chelate; chelæ fringed with long hairs. Third pair large and long; fourth and fifth robust and shorter than the third.

Pleopoda short, broad, and foliaceous.

Rhipidura short, robust, and well developed.

The carapace is quite one-third the length of the animal, and in some species more. The dorsal surface projects to a rostrum and is anteriorly depressed in the same continuous line; it is flat and broad at the base and tapers to the apex.

The pleon is also laterally compressed, and is as deep anteriorly as the carapace, but posteriorly it gradually tapers to the extremity of the telson, corresponding with the line of the dorsal surface.

The ophthalmopoda are short but free.

The first pair of antennæ terminates in two flagella.

The second pair of antennæ carries a broad foliaceous scaphocerite armed with a tooth on the outer margin, and a long flagellum.

The mandibles have a psalistoma that is continuous with a molar process, but there is no synhipod.

The gnathopoda are short and membranous.

The first two pairs of pereopoda are short, submembranous, and chelate, with the extremity of the pollex and dactylos furnished with long hairs. The third pair is simple, long, and very robust. The fourth and fifth are shorter and robust.

The pleopoda are short and foliaceous. The rhipidura is well developed and robust, the telson being shorter than the lateral plates.

The description of the form to which Randall has given the name of *Atyoida* so closely corresponds with *Atya* that it is difficult to see how it can be retained as a separate genus. It is undoubtedly smaller in size, and has the posterior three pairs of pereopoda comparatively more feeble in character and proportionally smaller and subequal in size.

Dana, in his great work, expresses the opinion that "among the species of *Atya* there is a very great difference as to the relative size of the third and following pairs of legs; and it seems possible that the transition may be such as to render it unnecessary to sustain the genus *Atyoida*."

A close examination of the structural details confirms this opinion of Dana, and therefore place *Atyoida* in this Report under *Atya*, as at present it appears to me that the weight of our experience leads to the belief that the two named forms are but different species of the same genus.

*Development*.—Among the numerous specimens of *Atya* (*Atyoida*) *bisulcata*, procured in the market at Honolulu, there were several females carrying ova, of a long ovate form (Pl. CXXII. fig. 2ov), and of these one or two specimens had the embryo so far advanced in development that on rupturing the egg-case I was able to determine the form of the brephalos.

This is in an advanced Zoea stage (Pl. CXXII. fig. 2), corresponding with that of the marine forms of the normal Phyllobranchiata, differing from that of *Crangon* only in the absence of a tooth on the third somite of the pleon, and considerably resembling that of *Alpheus*, from which it differs in not having the ophthalmopoda detached from the frontal margin of the carapace, but large and apparently continuous with it. This, however, is a consequence of its embryonic condition, and probably

does not exist in those specimens that become fully matured, and escape under natural circumstances.

The carapace is well developed, and is about a third of the length of the animal, reaching as far as the extremity of the developed pereion.

The first pair of antennæ has a two-jointed peduncle that folds back against itself, and terminates in two slender branches, the rudiments of the future flagella, one of which is thick at the base and styliform, and the other slender and thread-like.

The second pair of antennæ consists of a single-jointed base supporting a long and wide plate, the scaphocerite, which is distally fringed with five or six long ciliated hairs, and a slender flagellum that is about half the length of the scaphocerite.

The mandibles have not been determined.

Posterior to the oral aperture there are three pairs of biramose appendages, which from analogy with the brephalos of *Crangon* represent, I believe, the maxillipedes and first and second gnathopoda.

The pleon is six-jointed, well developed, and terminates in a broad and foliaceous plate, fringed on each side of a deeply excavate median cleft with five long hairs and two spines; at the base of each of the former there is a thin crenated plate.

None of the pleopoda are yet apparent even in the most immature condition.

*Observation.*—Whatever changes the form undergoes in the development of the first and second pairs of pereiopoda must take place at a stage later than that in which they exist in the condition of the brephalos.

*Geographical Distribution.*—The habitat of the original specimen described and figured by Leach under the name of *Atys scabra*, which he afterwards changed to *Atya scabra*, has not been recorded, but since Leach's specimen has been found to correspond with *Atya mexicana*, Wiegmann, it may be assumed to have been found in the fresh-water rivers or ponds of Mexico or the West Indian Islands.

According to Newport and A. Milne-Edwards there are eight species of *Atya* already known, of which *Atya scabra* and *Atya occidentalis* are from Mexico and the West Indies, *Atya sulcatipes*, of which a figure is given on Pl. CXVIII., is from the Cape Verde Islands, *Atya robusta* and *Atya margaritacea* are from New Caledonia, *Atya*

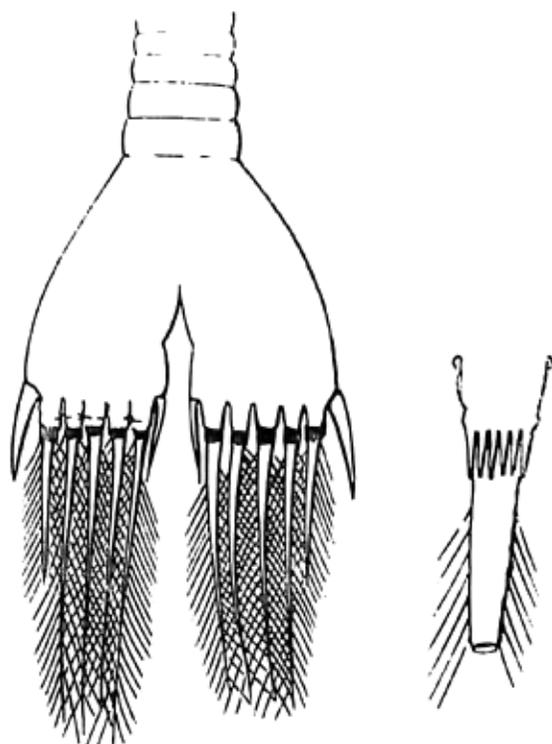


FIG. 71.—*Atya bisulcata*. Telson of Zoea; and one hair from the posterior margin, enlarged to show the serrate plate at its base.

*armata*, *Atya spinipes*, and *Atya pilipes* are from New Zealand. The last two are probably only varieties of the same species, since their distinction chiefly rests on the presence or absence of a smaller tooth posterior to that described as being on the under side of the meros of the third pair of pereiopoda in *Atya armata*.

Of the smaller species, which has been described under the generic name of *Atyoida*, specimens of *Atya bisulcata* have been recorded from the Islands of the Pacific, Randall, Dana, and Stimpson having obtained it from Hawaii. Stimpson has described a species that is difficult to separate from the above, but to which he has given the name of *Atyoida tahitensis*, from its having been procured at Tahiti. Specimens in the Challenger collection were obtained at Honolulu, which I cannot distinguish from *Atya bisulcata*. Fritz Müller obtained specimens, that he named *Atyoida potimirim*, from the fresh-water rivers of South America. Specimens that correspond closely with those from the Pacific Islands were procured during the voyage of the Challenger from the Cape Verde Islands. I have named them *Atya serrata* from the only distinguishing feature by which I could positively identify them. They were found associated with *Atya sulcatipes*, and with a damaged specimen of *Caridina typus*, which I am inclined to think may be only the young of the last named *Atya*.

*Atya sulcatipes*, Newport (Pl. CXVIII.; Pl. CXIX. fig. 1).

*Atya sulcatipes*, Newport, Ann. and Mag. Nat. Hist., vol. xix. p. 158, pl. iii. fig. 1, 1847.

„ „ A. Milne-Edwards, Ann. Soc. Entom. France, tom. iv. p. 147, 1864.

This species closely resembles the typical form of *Atya scabra*, but differs in having a prominent tooth on the inner distal angle of the carpos.

Length, entire, . . . . .	68	mm. (2.6 in.).
„ of carapace, . . . . .	26	„
„ of rostrum, . . . . .	0.3	„
„ of pleon, . . . . .	42	„
„ of first, second, and third somites, each . . . . .	6	„
„ of fourth, fifth, and sixth somites, each . . . . .	5	„
„ of telson, . . . . .	9	„
„ of peduncle of first antenna, . . . . .	8	„
„ of scaphocerite, . . . . .	8	„
„ of first pereiopod, . . . . .	18	„
„ of second pereiopod, . . . . .	20	„
„ of third pereiopod, . . . . .	47	„
„ of fourth pereiopod, . . . . .	30	„
„ of fifth pereiopod, . . . . .	25	„

*Habitat*.—From a fresh-water stream in the valley of San Antonio, San Iago, Cape Verde Islands.

The dorsal surface from the rostrum to the sixth somite is finely punctated with shallow depressions. Those on the carapace are confluent, while on the pleon they form small round hollows independent of each other. The surface of the carapace in the median line projects anteriorly to a rostrum that equals the length of the first joint of the first pair of antennæ, or about twice the length of the ophthalmopod. On each side of the median line is a deep groove that extends as far back as the orbital region, and gives the appearance of a carina to the median line, which, however, is not elevated above the rest of the carapace. The outer ridge of these grooves is longitudinally elevated and anteriorly produced, and indicates the inner canthus of the orbit, which forms a semicircle, the outer canthus being produced to a short point; the margin then curves round the base of the second pair of antennæ and is produced at the fronto-lateral angle to a sharp and rather prominent tooth, whence it recedes downwards obliquely to the postero-lateral angle, which is the deepest portion of the lateral margin of the carapace.

The pleon is anteriorly as deep as the carapace, equally compressed, it gradually lessens in depth posteriorly in a ratio nearly similar to the lessening of the depth of the carapace anteriorly, a circumstance that is due to the gradual and regular decrease of the somites and coxal plates posteriorly.

The telson (Pl. CXVIII., z) is dorsally grooved, the groove widening to the posterior lateral angles, the curved line of which is longitudinally armed with six small spines, and there is also one on the outer angle of the posterior margin, which is fringed with a row of hairs, in the centre of which is a small tooth representing the posterior extremity of a small longitudinal ridge which occupies the median line of the posterior portion of the groove.

The ophthalmopoda (Pl. CXIX. fig. 1) are short, scarcely reaching beyond the projecting point of the inner canthus of the orbit; the ophthalmus is small, orbicular, and not larger than the peduncle.

The first pair of antennæ (Pl. CXVIII., b) has the first joint of the peduncle subequal with the rostrum in length, excavate on the upper surface to receive the ophthalmopod, and furnished on the outer side with a sharp pointed stylocerite, that is shorter than the joint and fringed with hairs near the distal extremity. The second joint is subequal in length with the first, subcylindrical, and furnished on the upper and outer surface with a mat of short coarse hairs; the third joint is half the length of the preceding, longer on the inner than on the outer side, and terminally supports two flagella, of which the inner is the longer and more slender and the outer short and robust.

The second pair of antennæ (c) is nearly as long as the animal and carries a scaphocerite that reaches as far as the extremity of the peduncle of the first pair; it is broad, foliaceous, and fringed at the extremity with ciliated hairs and strengthened on the outer margin by a strong ridge that terminates in a tooth, which is little more than half the distance from the base and lies embayed within the edge, from which point a

diæresis similar to that which exists on the outer plate of the rhipidura bisects the appendage.

The mandibles (*d*) are strong; the molar process is robust and obliquely truncate, and from the lower side a thin wall fringed with hairs passes in a curve to the psalidoma, which is tipped with two or three small sharp teeth; it has no synnhipod, and the apophysis is matted over the outer surface with fine cilia.

The first pair of siagnopoda is thin-lobed; the inner and central lobes are broad, foliaceous, and fringed with hairs, and the outer short, curved, and tipped with one or two long hairs.

The second pair (*f*) of siagnopoda is bilobed; the inner lobe is broad and long-quadrate, it is biarticulate, and has the inner margin of both joints closely ciliated; the outer lobe projects anteriorly nearly as far in advance as the distal extremity of the inner and is produced posteriorly to an obliquely truncate extremity that supports a large number of very long free hairs. The rest of the margin is fringed with shorter hairs, those on the posterior portion are the shortest, and those on the anterior distal margin the longest; the posterior portion extends as far back in the branchial chamber as the second pair of pereopoda, and sends the long hairs as far as the posterior extremity of that chamber.

The third pair (*g*) is bilobed; the inner lobe is broad, matted with hairs on the inner surface, and has the margin fringed with long closely packed curved hairs; from the posterior margin of this lobe a uniarticulate process projects that I take to be the rudimentary homologue of the true appendage, the outer distal angle of which is produced to a tooth-like point, and the inner surmounted by a small fasciculus of hairs. The outer lobe is quadrate, and the distal and inner angle is produced into a long flat process with parallel margins and a rounded extremity; the entire margins are fringed with hairs, of which those at the base are the shortest, whence they gradually increase in length until they reach the distal process, where they attain an extreme length; on the inner margin between the two lobes the hairs are more numerous and form a double mat-like fringe.

The first pair of gnathopoda (*h*) is subpediform; the coxal joint supports a well-developed podobranchia and a fasciculus of hairs; the basis is long and supports a two-jointed ephysis, of which the distal joint is multiarticulate; the ischium is short, and the meros still shorter; the carpos is produced above the propodos and has the distal inner angle fringed with hairs; the propodos is broad, short, lunate, and reflexed against the meros, ischium and basis, the anterior edge is concave and thickly fringed with stiff hairs, amongst which the short, broad and marginal dactylos is immersed.

The second pair of gnathopoda (*i*) is four-jointed and pediform; the coxa or first joint carries a moderately developed podobranchial plume and a tubercle capped with long hairs; the second joint is long, curved, and carries a long two-jointed ephysis, which

is connected with the basis near the basal articulation ; the ischium is long but not so long as the preceding joint, and is furnished with a series of rows of hairs on the inner surface ; the meros, which forms the distal joint, is about half the length of the ischium and is longitudinally hollowed, or spoon-shaped, having the margins fringed with hairs.

The first two pairs of pereopoda (*k*) are similar in form, chelate, short, and somewhat feeble. The coxa carries a fasciculus of long hairs placed on a prominent tubercle, and the slender rudiment of a mastigobranchial plate, fringed on the lower or convex margin with long hairs ; the basis is short and carries no cephalopod ; the ischium and meros are subequally long and overlap each other obliquely, the upper margins of both being fringed with stout hairs, and the lower and outer surface with soft hairs ; the carpos is short, lunate, and produced to an angle on the upper surface. The propodus is subcylindrical, slightly curved, and has the anterior extremity lanceolate in form and flattened on the inner side, and the margins fringed with long, finely ciliated hairs ; it articulates near its centre with the lower angle of the carpos, and is produced nearly as much behind the articulation as in front of it, and it also articulates with the dactylos at the posterior extremity, the base of the dactylos being nearly as broad as the diameter of the propodus. The dactylos is formed on the same plan and is placed in an antagonistic position, so that these two joints together form a chela of a peculiar and unusual form. The second pair resembles the first and is of similar proportions. The third pair is simple and much larger than the preceding ; the coxa is as broad as long, and supports a rudimentary mastigobranchia similar to the preceding, but larger ; the basis is short, and the ischium and meros are fused together and very greatly enlarged, being nearly as long as the carapace ; it is covered with coarse tubercles that have much the appearance of pointed processes rubbed down by wear. The carpos is curved on the upper surface and waved on the lower, being narrowest near the meros ; near the centre of the inner and lower side is a prominent tooth standing on a slight elevation ; the propodus is broadest at the carpal extremity, and gradually narrows to the dactyloid articulation ; the dactylos is short and of smaller diameter than the distal extremity of the propodus. The carpos and propodus are covered with coarse teeth or pointed tubercles, smaller than the largest of those on the meros, among which, particularly on the lower surface, are some short stiff hairs. The fourth pair is much smaller than the third, but developed like it, and the fifth pair also differs only in being smaller and in having no rudiment of a mastigobranchial appendage.

The first pair of pleopoda (Pl. CXIX. fig. 1*p*) is biramose, the branches being subequal, are in the male short and deflected from each other ; the inner branch is rigid and terminates in a blunt point, the outer side is fringed with a closely packed row of short, reversely curved, hook-like spines, that are continuous to the base of the branch, while

near the apex on the inner margin is a short and robust stylamblys, tipped with cincinnuli. The outer branch is also short, rigid, and fringed with hairs that are planted in lateral rows. The second pair of pleopoda (fig. 1*q*) is subequal; the outer branch is long, ovate, foliaceous, and fringed with hairs, and the inner is nearly as long but having the margin straight, and the basal portion supports a transversely broad disc-like process that is matted with curved spines on the distal surface, from the centre of which there springs a short but well-developed stylamblys tipped with cincinnuli. The third pair of pleopoda is long, ovate, foliaceous, and fringed with hairs; on the distal margin of the inner branch there is a short stylamblys. The fourth and fifth pairs resemble the third, but are a little shorter; the stylamblydes in our specimen have the cincinnuli on either side hooked together, thus holding the two appendages in contact, and demonstrating their use. The sixth pair of pleopoda (Pl. CXVIII. *v, v*), which helps to form the rhipidura, has the basal joint short, with two clefts, one upon the outer side into which the outer ramus falls, the other on the upper surface in which the inner ramus rests when the tail-fan is extended. The outer margin of the external ramus is robust and rigid for a considerable distance, where it terminates in a small tooth and an obliquely transverse row of regular bead-like points, marking the line of the diæresis, which is separated or free for one-third of its extent. The distal extremity of both the branches is rounded and broader than their base. On the posterior ventral surface of the somite between the basal joints of the pleopoda there is a small longitudinally compressed tooth, and on each side an elevated lunate process, separated from the outer wall by a cleft and acting as a rest or support to the inward pressure of the rhipidura.

There are eight pairs of branchial plumes, six of which are pleurobranchial and two podobranchial, as shown in the following table:—

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

*Observations.*—A. Milne-Edwards considers this species to be a variety of *Atya scabra*, Leach, and says that "it appears to differ only in the feet, which are slightly grooved, by the median piece of the tail (telson) presenting a more marked triangular depression, and by the antennæ not being more than half the length of the body."

The original drawing, which is now in my possession, of Dr. Leach's figure in the *Zoological Miscellany*, shows that in *Atya scabra* the second antennæ are not so long as the carapace, whereas in our specimen they reach to the sixth somite of the pleon, or more than three-fourths the length of the animal, but I cannot discover any grooving along the legs to correspond with Newport's description.

The Challenger specimen was found at San Iago, Cape Verde Islands, and the type in the British Museum, being that from which Mr. Newport's description was taken, was obtained at San Nicolao, in the same group.

*Atya serrata*, n. sp. (Pl. CXIX. fig. 2).

Carapace less than one-third the length of the animal, anteriorly produced to a rostrum that is about one-third the length of the carapace, slightly elevated to a central carina on the upper surface, and produced on the under side to a ridge, the anterior margin of which is serrate with three small teeth.

The rest of the animal so closely corresponds with the specimens of *Atya* (*Atyoida*) *bisulcata*, Randall, from Honolulu, that it is difficult to distinguish them by any other feature.

Length, entire, . . . . .	37 mm. (1.4 in.).
" of carapace, . . . . .	10 "
" of rostrum, . . . . .	3 "
" of pleon, . . . . .	27 "
" of first three somites of pleon, . . . . .	4 "
" of fourth somite of pleon, . . . . .	3.5 "
" of fifth somite of pleon, . . . . .	3 "
" of sixth somite of pleon, . . . . .	4 "
" of telson, . . . . .	5.5 "
" of peduncle of first antenna, . . . . .	5.5 "
" of scaphocerite, . . . . .	5.5 "
" of first pereopod, . . . . .	8 "
" of second pereopod, . . . . .	9 "
" of third pereopod, . . . . .	13 "
" of fourth pereopod, . . . . .	13 "

*Habitat*.—Valley of San Antonio, San Iago, Cape Verde Islands; from a fresh-water stream.

This species, when placed side by side with the Honolulu specimens that I consider to belong to *Atya bisulcata* (Randall), exhibits only slight and unimportant differences.

The largest specimen from the Cape Verde Islands is nearly one-fourth longer than the largest from Honolulu. The rostrum of the Cape Verde specimens is a little longer in proportion than in those from Honolulu, it being three-tenths the length of the carapace as compared with two-tenths in the Honolulu specimens. In *Atya bisulcata* the dorsal median line of the rostrum is elevated as it is in *Atya serrata*, but the corresponding median line on the under surface is smooth and receding, whereas in *Atya serrata* it is deeper, laterally compressed, and furnished with three or four small, sharply defined teeth; this is the most distinguishing feature, and the one from which the species takes its name.

The ophthalmopoda are somewhat larger than in *Atya bisulcata*, reaching nearly to the extremity of the rostrum, and have the ophthalmus not broader than the peduncle.

The first pair of antennæ has the first joint of the peduncle subequal with the rostrum and the distal margin fringed with small, equal comb-like spinules; the stylocerite on the outer margin is equal in length with the rostrum and subequal with that of the first joint of the antenna. The second and third joints resemble those of *Atya bisulcata*, and the under surface of the third is anteriorly fringed with hairs, but not so densely as in the former species. The flagella in the type are broken, but a comparison with another specimen makes it probable that they are a little shorter than those of *Atya bisulcata*.

The second pair of antennæ is about half the length of the animal, and nearly corresponds in form with that of *Atya bisulcata*. The scaphocerite exhibits a corresponding diæresis, originating at the outer margin in front of the external tooth, and passing transversely across the squamous portion in a curved direction.

I have not disturbed the oral appendages in this species since there are only two specimens, but I assume that they differ in as small a degree from those of the typical species as do the other parts which have been fully examined.

The first two pairs of pereopoda appear to correspond specifically with those of *Atya bisulcata*. The third pair seems to differ by the presence of a small tooth on the under and outer side of the meros, and another at the anterior and lower angle of the carpos, and the unguis of the dactylos is a more decided feature.

The fourth and fifth pairs of pereopoda, so far as preserved, resemble the third, but are slightly more slender and the armature is more feeble.<sup>1</sup>

The first and succeeding pairs of pleopoda offer no distinctive feature, so far as can be determined without dismemberment, from those of other species, and the telson and lateral plates of the rhipidura likewise correspond.

### *Atya bisulcata* (Randall) (Pl. CXX.).

*Atyoida bisulcata*, Randall, Journ. Acad. Nat. Sci. Philad., vol. viii. p. 140, pl. v. fig. 5.

" " Dana, U.S. Explor. Exped., Crust., p. 540, pl. xxxiv. fig. 1.

" " Stimpson, Proc. Acad. Nat. Sci. Philad., January 1860, p. 97.

The dorsal surface of the carapace is smooth and not carinated until near the rostrum, which is elevated in the median line and produced anteriorly to beyond the extremity of the first joint of the first pair of antennæ; it is a little longer in the male than in the female. On each side of the central carina there is a small channel that dies out just behind the orbital margin. The anterior margin of the carapace is

<sup>1</sup> The three posterior pairs of pereopoda are more robust than they are represented in the figure of the whole animal (fig. 2), and correspond more nearly with the detached figure (fig. 2m) on the same Plate.

furnished with an antennal tooth that corresponds with the external canthus of the orbit, and with another situated above the fronto-lateral angle.

The pleon is dorsally smooth and has the sixth somite but little longer than the preceding, and terminates in a telson that is about a third shorter than the lateral plates of the rhipidura.

The ophthalmopoda are short, the ophthalmus being orbicular and scarcely of greater diameter than the stalk.

The first pair of antennæ (*b*) has the first joint of the peduncle excavate on the upper surface, and is distally fringed with a double row of short stiff spinules, regular in their length and comb-like in appearance, while on the outer side a sharp-pointed stylocerite projects quite equal to the length of the joint. The second and third joints are cylindrical, furnished with a mat of hairs on the lower surface, and terminate in two long, slender, multiarticulate flagella, the outer and upper of which is stouter near the base and divides into two rami at a short distance from its base, the inner of which is truncate; whereas the inner and lower flagellum is about two-thirds the length of the outer, and gradually tapers from the base to the apical extremity.

The second pair of antennæ (*c*) carries a slender flagellum that is as long as the animal, and a broad ovate scaphocerite, armed on the outer margin, half-way between the base and the apex, with a sharp tooth, from which a line of division, like the diæresis of the outer plates of the rhipidura, crosses the plate transversely in a curved line; a long, tapering, and slightly curved phymacerite springs from the inner surface of the coxal joint.

The mandibles (*d*) are without a synaphipod, but possess a molar process and distinct psalistoma, the latter being dentated with three sharp denticles, and the former obliquely truncate and furnished with minute spinules and denticles.

The first pair of siagnopoda (*e*) is small, feeble, foliaceous, and three-branched; the outer branch is short, ovate, and tipped with a couple of long hairs; the middle branch is broader at the distal extremity than at the base, and is fringed at the distal inner margin with short spinules, and the inner branch is short and circular.

The second pair of siagnopoda (*f*) carries a long foliaceous process, produced to a point and reaching posteriorly far into the branchial chamber; it is furnished with long hairs that sweep the surface of the branchial plumes to their furthest extremity.

The third pair of siagnopoda (*g*) is formed as in *Atya sulcatipes*, but has the digital process somewhat more slender.

The first pair of gnathopoda (*h*) resembles that of *Atya sulcatipes*, and like it the rudimentary mastigobranchial plate does not support a branchial plume, but is fringed with a series of flat pointed spinules, and the basephysis is proportionally more slender.

The second pair of gnathopoda (*i*) is pediform, and differs from that in *Atya sulcatipes* in being more slender and having the terminal joint longer in proportion.

The anterior two pairs of pereopoda resemble each other in form and nearly correspond in size, they differ from those of *Atya sulcatipes* in having the carpos more cup-shaped, for the reception of the posterior or carpal extremity of the propodos (*k*). The posterior three pairs are subequal in size and form, they are slender and have the margins subparallel and fringed with small spines, particularly on the posterior margin of the three distal joints.

	Male.	Female.
Length, entire, . . . . .	23 mm. (0·9 in.).	35 mm. (1·3 in.).
" of carapace, . . . . .	7 "	10 "
" of rostrum, . . . . .	1 "	2 "
" of pleon, . . . . .	16 "	25 "
" of first, second, third, fourth, } and fifth somites of pleon, }	2 "	3 "
" of sixth somite of pleon, . . . . .	3 "	3·5 "
" of telson, . . . . .	4 "	5 "
" of peduncle of first antenna, . . . . .	4 "	5 "
" of scaphocerite, . . . . .	4 "	5 "
" of first and second pereopoda, . . . . .	6 "	9 "
" of third pereopod, . . . . .	10 "	13 "
" of fourth pereopod, . . . . .	10 "	13 "
" of fifth pereopod, . . . . .	10 "	13 "

*Habitat*.—Honolulu. One hundred specimens, of which eleven were gravid with numerous long-ovate ova; the largest specimen was 35 mm. and the smallest 23 mm., which was also the size of the males, which differ in little else from the females.

Sandwich Islands, Randall, Dana, Hilgendorf, and Stimpson; Seychelles, Hoffman.

### *Caridina*, Milne-Edwards.

*Caridina*, Milne-Edwards, Hist. Nat. Crust., tom. ii. p. 362.

The carapace, according to Milne-Edwards, presents no special feature; it is anteriorly produced to a flattened tenuous rostrum ("rostre lamelleux"), of which the length varies in different species.

The ophthalmopoda are prominent.

The first pair of antennæ is very long and terminates in two flagella, one of which is stout at the base.

The second pair of antennæ resembles that of *Palæmon*.

The second pair of gnathopoda is long, slender, and pediform.

The anterior two pairs of pereopoda are didactyle. The first pair is very short, and possesses a very remarkable character, the carpos being triangular, and anteriorly produced in a concave border, and receives the posterior margin of the propodos, which is attached to its inferior angle; the propodos is short, the fingers being deeply hollowed

and terminating in a brush of ciliated hairs. The second pair of pereopoda is longer and more slender than the first, the carpos being narrow and cylindrical, while the propodos and dactylos resemble those of the first pair. The posterior three pairs are slender and nearly of the same length and proportion.

The pleon resembles that of *Palæmon*.

*Observations.*—There is but one specimen of this genus in the Challenger collection, and since it was preserved in the same bottle with *Atya sulcatipes* and two specimens of *Atya serrata*, it seems almost certain that all these specimens were taken from the same river in the Cape Verde Islands, for I assume from the known carefulness of the collectors that they would have otherwise been separated and labelled accordingly. My first opinion was that the three were successive stages in the growth of one species. But in the examination of a large number of specimens from Honolulu of the closely allied form *Atya (Atyoida) bisulcata* I found a few with ova, and in some of these the embryo so far advanced that by extracting it from the egg I was enabled to determine that the brephalos is a *Zoea* (p. 692).

This at all events settles that the *Atyoida* form could not be a stage in the growth of *Atya*, and the fact that several species of *Caridina* have been found in various localities, in few of which *Atya* has been recorded, makes one hesitate with our present experience to determine the true relationship, although it is clear that *Atya* must pass through some such form as *Caridina* before it can attain its full development.

The form which Milne-Edwards, under the name of *Caridina typus*, has described as a genus distinct from *Atya*, chiefly differs both from that genus and from *Atyoida*, according to its author, in the third pair of pereopoda being slender and the second pair having the carpos of the ordinary form.

The portion of a specimen figured on Pl. CXIX. fig. 3, appears to me to belong to the same species as that which Milne-Edwards has figured and described under the above name, and it is not improbable that Milne-Edwards' specimen may have come from the same locality.

The fragment consists of the pereion with its appendages, and those that belong to the mouth. It is part of an animal still young, but approaching the adult condition, a circumstance that inclined me to believe it to be an immature stage in the development of *Atya*, with which it was found associated. Milne-Edwards' specimen is only ten lines long, and this is probably about the length of the animal to which our fragment belonged.

The difficulty depends on the singular variation between the form of the carpos in the first two pairs of pereopoda. In the adult *Atya* the carpos of both pairs is short, robust and lunate, but in *Caridina* the carpos in the first pair corresponds with that of the adult *Atya*, while in the second pair it is long, slender and cylindrical.

But since appendages which are more or less peculiar in feature in the adult stage pass through forms of less normal character, I was strongly inclined to believe that *Caridina* was only a young stage of *Atya*. The locality of Milne-Edwards' *Caridina typus* is unknown, and it is not said whether it was found in fresh or salt water. Its association with the genus *Atya* from the Cape Verde Islands is significant, and its juvenile condition is suggestive of a relationship that can only be determined by a demonstration of the adult form of *Caridina*, or by more complete knowledge of the development of *Atya*.

*Geographical Distribution.*—Our specimen of *Caridina typus* was taken at San Iago, Cape Verde Islands, associated with *Atya sulcatipes* and *Atya (Atyoida) serrata*. It was probably here that Milne-Edwards' typical specimen was obtained. *Caridina longirostris* is stated by Milne-Edwards to have been found by Roux in the rivièrè de la Maeta, near Oran. Stimpson records *Caridina grandirostris*, *Caridina brevisrostris*, and *Caridina exilirostris* from the Island of Loo-Choo; *Caridina leucostica* from a river near the town of Simoda in Japan; *Caridina multidentata* and *Caridina acuminata* from the mountain streams in the island of Bonin, and *Caridina serrata* from rivulets in the Island of Hong Kong. *Caridina nilotica*, Roux, is recorded from Mozambique by Hilgendorf.<sup>1</sup>

*Caridina typus*, Milne-Edwards (Pl. CXIX. fig. 3).

*Caridina typus*, Milne-Edwards, Hist. Nat. Crust., tom. ii. p. 363, pl. xxv. bis, figs. 4, 5.

“Rostrum sharp pointed, straight, of moderate proportion, not reaching the extremity of the second joint of the first pair of antennæ, and armed on the under surface with three little teeth. First pair of pereopoda not so long as the second pair of gnathopoda. Extremity of the chela fringed with numerous hairs.

“Length about 10 lines.

“*Habitat?*”

Such is the account Milne-Edwards gives of a small animal similar to that obtained by the Challenger from a rivulet in the valley of San Antonio, San Iago, Cape Verde Islands, and which corresponds closely with his description and illustration in every detail, excepting that in our damaged specimen the first pair of pereopoda is longer than the second pair of gnathopoda. In our specimen the pereion is preserved, including all the appendages, from the mandibles to the posterior pair of pereopoda, but separated from the carapace and pleon, which were also found in the same bottle.

The mandibles and the other oral appendages, so far as they have been observed, correspond in form with those of *Atya*, which is found in the same locality.

The second pair of gnathopoda has the terminal joint shorter than the penultimate,

<sup>1</sup> *Monatshber. d. k. preuss. Akad. d. Wiss. Berlin*, p. 838, 1878.

and is armed with numerous spinules near the distal extremity; a prominent one stands at the apex, while at the base there is a series of several transverse rows of short curved hairs, and on the penultimate joint another series of shorter and more distant rows of hairs. Attached to the basal joint is an ephysis that reaches beyond the meral articulation of the carpal joint.

The first pair of pereopoda is short and stout, it has the carpos broad, short, and lunate, in the hollow of which the propodos rests when extended; the propodos has the inferior distal or polliciform angle stout and tipped with a brush of hairs, while the dactylos is short, curved, and thick, but narrower than the pollex, and like it distally furnished with a brush of hairs that are ciliated at their extremity and do not equal the joint in length. The second pair of pereopoda is longer than the first; the carpos and preceding joints are cylindrical and slender, the carpos being long and not distally lunate. The chela is formed as in *Atya*, but the propodos is more robust at the base, and the pollex and dactylos are tipped with a shorter brush of hairs. The third pair of pereopoda is slender, slightly longer than the second, and slightly more robust, particularly at the meral joint, which is armed on the posterior margin with three strong spinules. The carpos is long, with the margins subparallel, the posterior margin being armed with four small spinules and a fifth and larger one on the side; the upper distal angle projects over the propodal articulation; the propodos is nearly twice the length of the carpos, cylindrical, and armed on the posterior surface with a double row of spinules that increase in size as they approach the dactyloid articulation; the dactylos is slightly curved, armed with four or five spinules on the posterior margin, and terminates in a strong unguis.

The length of the living specimen, judging by what is preserved of it, must have been about 20 mm., or about the same length as the specimen recorded by Milne-Edwards.

It is desirable to notice that Milne-Edwards, in his description of *Caridina typus*, says that the rostrum is "aigu, médiocre, . . . et armé en dessous de trois petites dents." The carapace, with the rostrum, has been preserved in our specimen, but separated from the rest of the animal, and it shows the three little teeth corresponding with Milne-Edwards' description as well as with the description of *Atya serrata* from the Cape Verde Islands.

#### *Pontonia*, Latreille.

*Pontonia*, Latreille, Règne Anim. de Cuvier, ed. 2, tom. iv. p. 96.

" Roux, Mem. class. crust. Salicoques, p. 26.

" Milne-Edwards, Hist. Nat. Crust., tom. ii. p. 358.

" de Haan, in Siebold's Fauna Japonica, Crust., p. 75, tab. O.

" Dana, U.S. Explor. Exped., Crust., p. 570.

*Conchodytes*, Peters, Bericht. d. k. preuss. Akad. d. Wiss. Berlin, p. 588, 1852.

The species on which this genus was founded by Latreille, and confirmed by Milne-Edwards, was that which was described by Risso as *Alpheus tyrrhenus*. According to

Milne-Edwards it has the carapace short and rounded (renflée), anteriorly armed with a short, robust, and depressed rostrum.

The ophthalmopoda are cylindrical, prominent and very mobile.

The first pair of antennæ is very short and nearly similar to that of *Palæmon*. The first joint of the peduncle is broad and lamellose on the outer side; the two succeeding joints are small, cylindrical, and terminate in two flagella, one of which is bifid at the extremity.

The second pair of antennæ is inserted below and outside the first pair and carries a broad and short scaphocerite.

The second pair of gnathopoda (pates-mâchoires externes), according to Milne-Edwards, is small and narrow in its entire length.

The first two pairs of pereiopoda<sup>1</sup> are didactyle. The first pair is subequal, slender, and terminates in a well-formed but very small chela. Those of the second pair on the contrary are very unequal, one being extremely large and the other small, especially among the females. Sometimes the right and sometimes the left is the larger in different specimens of the same species. The three succeeding pairs of pereiopoda are of medium size, monodactyle, and terminate in a nearly rudimentary dactylos.

The pleon is broad, especially in the females, and presents a conformation analogous to that which exists in the genus *Palæmon*.

It only remains to be noted that the telson carries no spine on the dorsal surface.

The branchiæ are well developed; there are only five on each side, those belonging to the oral appendages being rudimentary, and the somites of the pereion carry only single pairs.

Dana's description corresponds with that of Milne-Edwards, excepting that he says the outer maxillipedes (second pair of gnathopoda) are suboperculiform.

There is but one specimen of this genus in the collection and that is much damaged, all the pereiopoda excepting the greater chela being lost, and the posterior somites, pleon, and rhipidura are wanting.

*Observations.*—This genus corresponds closely with *Typton*, Costa, but there are several points of difference. The dorsal surface is depressed and flattened, instead of being elevated and arcuate. The rostrum is dorsally flat, instead of being laterally compressed. There is no ocellus on the posterior margin of the ophthalmus as there is in *Typton*. The first pair of antennæ has the inner flagellum bifurcate at the extremity, whereas it is single in *Typton*; in both the stylocerite is reduced to a rudimentary condition. The second pair of antennæ in both genera is small and feeble; in *Pontonia* the scaphocerite is well developed but short and strong, whereas in *Typton* it is reduced to a rudimentary condition, forming a small membranous scale. The mandibles in

<sup>1</sup> In Milne-Edwards' description the paragraph runs "Les pates des quatre premières paires sont didactyles," which from the context is evidently a misprint for "deux paires."

both genera correspond in form and the oral appendages generally resemble each other. In *Typton* the branchiæ, however, number six or seven on each side, namely, a pair of pleurobranchiæ corresponding with each pair of pereopoda, and a pair of arthrobranchiæ attached to the membranous articulation of the second pair of gnathopoda.

*Geographical Distribution.*—Species of this genus have been found in the Mediterranean by Roux, Costa, Risso, Verany, Lucas, Guérin-Méneville, Heller, and Milne-Edwards. Roux<sup>1</sup> records *Pontonia parasitica* from the coast of Morea, and like *Pontonia tyrrhena* it was found lodged between the valves of a *Pinna* after the manner of *Pinnotheres* in the oyster; and it is probable that it is to this Crustacean that Aristotle refers when he says a little *Squilla* as well as a little crab is found in the shell of a Mollusc. Species, according to Milne-Edwards, have been taken in the Asiatic Seas by Dussumier, off the coast of New Ireland and Vanicoso by Quoy and Gaimard, and at Ceylon by Reynaud. Both Dana and Stimpson found species resident in the shell of *Tridacna*, the former off Tutuilla, one of the Samoan or Navigator group of islands in the Pacific, and the latter off the Island of Bonin. The species described in this collection was taken from the pearl oyster (*Meleagrina*?) in Torres Strait.

*Pontonia meleagrina* (Peters) (Pl. CXXIV. figs. 1, 2).

*Conchodytes meleagrina*, Peters, Bericht. d. k. preuss. Akad. d. Wiss. Berlin, p. 594, 1852.

" " Hilgendorf, Monatsber. d. k. preuss. Akad. d. Wiss. Berlin, p. 836, 1878.

Carapace more than one-half the length of the animal; dorsally broad and flattened, being wider across the cardiac region than anteriorly or posteriorly. Rostrum dorsally flattened, anteriorly depressed, inferiorly slightly compressed and produced. Frontal margin deeply excavate to form an orbit, the outer canthus of which is defined by a point. There is no tooth corresponding with the first or second antennæ.

Somites of pleon short and dorsally flattened; the anterior is the broadest and the posterior the narrowest. The fifth somite and telson are wanting.

*Ophthalmopoda* short, being about half the length of the rostrum.

First pair of antennæ having the peduncle equal in length with the rostrum and the flagella short, or about half the length of the peduncle. Upper and outer flagellum stout, inner slender.

Second pair of antennæ having the peduncle longer than the scaphocerite, which is broad, sharp pointed, and lanceolate in form.

Posterior to the oral organs all the appendages of the pereion, excepting the second right pereopod, are broken off in our specimen.

Gnathopoda subpediform, having the terminal joints broad, squamous, and reflexed.

<sup>1</sup> *Loc. cit.*

First pair of pereopoda having the propodos on the right side excessively developed, being as long as the animal and nearly as broad; the pollex is shorter than the dactylos and bicuspidate; the dactylos has the extremity hooked and the inner margin bears one cusp.

Pleopoda biramose, and furnished with a long and slender stylamblys.

The posterior somite and telson are broken off.

Length, entire,	.	.	.	.	.	18 mm. (0·7 in.).
„ of carapace,	.	„	.	.	.	7 „
„ of rostrum,	.	.	.	.	.	3 „
„ of pleon,	.	.	.	.	.	11 „
„ of large chela,	.	.	.	.	.	16 „

*Habitat.*—The label on the bottle containing the specimen says “Crustacean found in Pearl oyster, Torres Straits, presented at Sydney, June 1874.” It was, therefore, not dredged by the Challenger, which did not arrive at Torres Strait until the following September.

Ibo, on the south-east coast of Africa; between the folds of the mantle of *Meleagrina margaritifera*, Lam. (Peters).

The specimen, unfortunately, is damaged, but enough is preserved to show its true character. The body of the animal is dorsally slightly arcuate from the frontal region to the fifth somite of the pleon, which is bent downwards, and, judging from the character of the curve, the sixth somite and rhipidura, in the living animal, are compressed beneath it. The carapace is dorsally depressed and broadest over the genital and cardiac regions; anteriorly it is produced to a rostrum that continues the slight dorsal curve and bends downwards at the anterior extremity; it is about one-fourth the length of the carapace, sharp at the point, and produced on the under side to a narrow or compressed median ridge. From the sides of the rostrum the margin diverges to form the orbits, which are deeply excavate, almost to the extent of the ophthalmopoda, and defined at the outer angle by a sharp point between the orbit and the notch excavated to receive the second pair of antennæ, whence the carapace is deflected abruptly beneath the peduncle and forwards beyond the base of the scaphocerite, traversing in this incurved position the entire length of the carapace, the posterior portion of which is membranous and flexible.

The pleon has the first somite as broad as the carapace, over the postero-lateral border of which it projects; each somite gradually decreases in breadth and depth posteriorly. The sixth somite and the rhipidura are wanting, but from appearances it would seem that the posterior somite and the telson curve beneath the pleon, as represented by the dotted line on Pl. CXXIV. fig. 1.

The ophthalmopoda reach but little beyond the orbit, and are cylindrical and nearly as broad as long; the ophthalmus is wanting in colour.

The first pair of antennæ (fig. 1*b*) has the peduncle subequal in length with the rostrum, against the under side of which it lies; the first joint is broad and carries an *obtusely-pointed, squamous stylocerite on the outer side*; the other two joints are cylindrical and support at the extremity two flagella, one stout and the other slender, the former being bifurcated at the extremity into two short rami; neither is more than half the length of the peduncle.

The second pair of antennæ (fig. 1*c*) lies on the outer side of the first and is enclosed within a fold of the carapace formed by the lateral margin being bent acutely under it, the frontal angle, extending forwards beyond the articulation of the scaphocerite, is thickened to a strong ridge that precludes its downward movement. The scaphocerite is short and disc-like, being nearly as broad as long, and has the outer margin distally armed with a short point or tooth.

The mandible (fig. 1*d*) is divided into a molar process and a pointed psalidoma, but possesses no synhipod.

The first pair of siagnopoda (fig. 1*e*) is three-branched; the two inner branches are broad, flat, and disc-like, and have the inner margin thickly matted with short, stiff hairs; the third or outer branch is short, cylindrical, and truncate. The second pair (fig. 1*f*) is likewise three-branched; the inner branch is long, narrow, pointed, and has the inner margin thickly fringed with long hairs; the middle branch is short, narrow, cylindrical, and smooth; the outer or third forms a large mastigobranchial plate that projects anteriorly beyond the extremity of the other two branches and posteriorly into a rounded margin; it is fringed anteriorly and posteriorly with hairs; those on the rounded posterior portion tending to curve anteriorly; the longest hairs are at the posterior extremity, the next longest at the anterior, and the shortest, which are almost obsolete, at the broadest diameter of the plate.

The third pair of siagnopoda (fig. 1*g*) consists of four branches or divisions; the inner branch is broad and long and has the inner margin fringed with an even row of short hairs; the middle branch is short, narrow, cylindrical and smooth; and the outer is broad at the base and smooth at the margins, and from its inner margin near the apex there arises a long, narrow, compressed, ribbon-like process that is distally tipped with short hairs, and on the outer surface near the base is a small bilobed mastigobranchia.

The first pair of gnathopoda (fig. 1*h*) is six-jointed; the coxa is short, robust, and supports a broad, short, and square-shaped mastigobranchia; the basis is long, has the inner and outer margins parallel, and carries a two-jointed ephysis, of which the first joint is the more robust; the third joint or ischium is short and subcylindrical, as is also the meros, which anteriorly projects beyond the base of the next joint, and represents the meros and carpos combined; the terminal two joints are reflexed against the inner margin of the meros and together form a semilunar disc-like plate, the dactylos forming

a narrow plate along the inner margin of the propodos, and is studded with short, stiff hairs of equal length.

The second pair of gnathopoda (fig. 1*i*) is larger than the first; the coxal joint is broad; the basal joint is short and broad, and has the inner margin fringed with fine hairs, while the outer supports a long, slender, compressed ecpchysis, distally fringed with small hairs; the ischium is broad at the base, slightly curved, and narrows distally, forming a long and tapering operculiform plate; the next succeeding joint is short and broad, and articulated with the preceding obliquely across its longitudinal plane, and the terminal joint is sharp pointed, and both are thickly fringed with hairs on the inner margin.

The first pair of pereiopoda is wanting in our unique specimen, and so are all the others excepting the right one of the second pair. In this the carpos is triangulate; the propodos is about equal to the entire length of the animal, it is slightly curved in a longitudinal direction, broader near the base than at the distal extremity, the cross-section is ovate, being rather more distended on the outer than on the inner side; the distal extremity is produced to a pollex that has two cusps on the inner surface and is slightly curved at the apex, where it corresponds with that of the dactylos; the dactylos is short, deep, arcuate on the outer margin and unicuspidate on the inner, corresponding with the depression between the two cusps on the pollex.

This chela is therefore, in proportion to the size of the animal, a very weighty appendage, and, as in all Crustacea where the organ is so monstrously developed, it is useless in its adaptation to supply the mouth, and, therefore, is probably of value as an anchorage, by its great weight enabling the animal to hold its position more easily and with less muscular effort.

The pleopoda are short and biramose, the inner branch being furnished with a stylamblys. The rhipidura is wanting.

*Observations.*—The specimen does not appear to have been obtained by the Challenger at any of the recorded stations, and it might easily be taken for that described by Professor Milne-Edwards under the name of *Pontonic enflée*,<sup>1</sup> whose description I translate as follows:—

“No spine near the base of the external antennæ. Carapace having the lateral margins very much inflexed; rostrum reaching nearly to the extremity of the scaphocerite. Second pair of pereiopoda very large and nearly cylindrical. Length, one inch.” But, since the name applied by Milne-Edwards is suggestive of an inflated or swollen appearance, I have hesitated to believe this to be the same species, the more especially because the author says<sup>2</sup> that a short carapace is characteristic of the species of this genus, and this coincides with the figure given by Dana, whereas in our species the body is by no means inflated, although the chela is a large and weighty appendage; the pleon instead of being wide gradually narrows posteriorly from the first somite.

<sup>1</sup> Hist. Nat. Crust., tom. ii. p. 360.

<sup>2</sup> Loc. cit., p. 358.

Milne-Edwards describes the genus as having the second pair of gnathopoda small in size and very narrow. Dana describes it as being suboperculiform, which corresponds more nearly with the condition in our species.

Milne-Edwards also says that there are five well-developed branchial plumes on each side, and that those attached to the oral appendages are rudimentary. Dana says that in *Pontonia tyrrhena* there are but four branchiæ on either side of the pereion, and that there are none attached to the fifth pair of pereiopoda.

In our specimen there are four pairs of pleurobranchiæ, that belonging to the posterior somite being wanting.

This description may be reconciled with that of Milne-Edwards, since it is evident that what he describes as a branchia attached to the oral appendage, and therefore rudimentary, is what I have described as a mastigobranchial appendage connected with the posterior pair of siagnopoda (or maxillipede).

The branchial apparatus in this species consists of four pleurobranchial plumes on each side and may be tabulated as follows:—

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

The original description of Dr. W. Peters was communicated to the Academy of Berlin February 18, 1851, but so far as I can ascertain was not published until 1852, the same year that Dana published his description of *Pontonia tridacnæ*, which is probably the same species, and I am inclined to think from the description that *Conchodytes meleagrinx*, Peters, taken at Ibo on the Mozambique coast, is probably the same species as the Challenger specimen, *Pontonia meleagrinx*, from Torres Strait.

Our specific name was in type before I was aware of Peters' or Hilgendorf's memoirs. Peters' specimen was a female, 33 mm. long, and like ours was probably found in the pearl-oyster, hence the coincidence of its specific name.

#### Family PALÆMONIDÆ.

Carapace dorsally rounded and laterally compressed. Rostrum long, laterally compressed, and generally armed with teeth. Pleon laterally compressed. Telson long and gradually narrowing to a truncated extremity. Ophthalmopoda well developed and pyriform. Antennæ long and slender; first pair having the first joint of the peduncle hollowed on the upper surface, carrying a well-developed stylocerite on the outer side, and terminating in two flagella, of which one is frequently branched; second pair furnished with a long and narrow foliaceous scaphocerite, the outer margin of which is

rigid and armed with a small tooth. Mandible furnished with a molar process, psalidoma, and synnhipod. Second pair of gnathopoda pediform. First and second pairs of pereopoda chelate. Pleopoda biramose. Rhipidura well developed.

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

Carapace less than one-third the length of the animal, dorsally smooth and anteriorly produced to a small, sharp-pointed rostrum. The fronto-lateral angle is produced to a small tooth.

The pleon is long, the first three somites are as deep as the carapace and the succeeding ones are narrow and slender. The third somite is large, dorsally produced in the middle, and abruptly descends to the posterior margin, where it articulates with the fourth somite at a right angle with the preceding somites.

The telson is long and tapering.

The ophthalmopoda are well developed.

The first pair of antennæ is biflagellate.

The second pair of antennæ carries a large scaphocerite and a long flagellum.

The mandibles are without a synnhipod.

The first pair of gnathopoda is subpediform.

The second pair is pediform, six-jointed, and carries a long uniarticulate basephysis.

The first pair of pereopoda is chelate and carries a long, flat, uniarticulate basephysis. The second pair is a little larger than the first, chelate, and supports a similar basephysis. The third pair is simple, slender, subequal in length, and also bears a similar basephysis. The fourth and fifth pairs resemble the third in form and size, but do not carry a basephysis.

The pleopoda are biramose.

The terminal pair forms part of the rhipidura and is biramose, the branches being subequal with the extremity of the telson.

*Geographical Distribution.*—There are four or more species, and they range from the central area of the Pacific to the China Seas.

*Observation.*—They are evidently the young of some unrecognised form. The specimens were few, generally one of each species, and at this stage the mandibles are without a synnhipod. The pleonic hump is suggestive of a comparison with the genus *Tozeuma*.

*Caricyphus cornutus*, n. sp. (Pl. CXXI. fig. 2).

The carapace is about one-fifth the length of the animal and is anteriorly produced to a rostrum that is sharp pointed and armed on the upper surface with two sharp teeth.

<sup>1</sup> κρείς, κυφός.

The first two somites of the pleon are short; the third is very long, and has the posterior dorsal portion placed at a right angle to the anterior portion, the angle being posteriorly produced to a large curved tooth or hook; the fourth and fifth somites are shorter than the third by more than half its length. The sixth is very long and narrow.

The telson is about three-fourths of the length of the sixth somite and terminates in a point tipped with a few hairs.

Length, entire, . . . . .	6 mm. (0.2 in.).
„ of carapace, . . . . .	1.5 „
„ of rostrum, . . . . .	0.5 „
„ of pleon, . . . . .	4.5 „
„ of third somite of pleon, . . . . .	1 „
„ of sixth somite of pleon, . . . . .	1.5 „
„ of telson, . . . . .	0.7 „
„ of ophthalmopod, . . . . .	1 „
Diameter of ophthalmopod, . . . . .	0.8 „

*Habitat.*—October 27, 1874, near Samboangan, Philippine Islands. One specimen.

The carapace corresponds in length with the anterior portion of the pleon as far as the dorsal angle on the third somite, or about one-fourth the length of the entire pleon; it is anteriorly produced to a rostrum that is about one-third the length of the carapace, and armed with two sharp teeth on the crest, or frontal region, and smooth on the lower margin. The fronto-lateral angle of the carapace is produced to a sharp tooth.

The pleon has the first two somites short, but laterally almost as deep as the carapace, and has the fronto-lateral angle anteriorly produced to a sharp tooth. The third somite appears quadrate when viewed laterally, the dorsal surface being produced near the middle, so that the anterior and posterior portions are situated at right angles to each other, and the angle formed by the two is posteriorly produced to a large tooth-like process that is curved posteriorly downwards, and like the two preceding has the fronto-lateral angle produced to a sharp tooth. The fourth somite articulates with the third at a right angle with the anterior somites; it is less deep and narrower than those anterior to it. The fifth somite is a little smaller than the fourth, and the sixth is three times as long, much narrower and less deep, and is produced on each side posteriorly to a small tooth.

The telson is long, tapers to a point, and equals about three-fourths the length of the sixth somite.

The ophthalmopoda are very large and orbicular, forming with the ophthalmus a nearly spherical body, that reaches beyond and above the rostrum, and projects laterally on each side, the ophthalmus occupying about the anterior third.

The first pair of antennæ has the peduncle three-jointed; the first joint is not quite as long as the ophthalmopod, and is slightly excavate to correspond with it; the second

and third joints are short, cylindrical, and terminate in two flagella, of which the inner is short and immature, and the outer is broken off.

The second pair of antennæ is long and slender, and carries a scaphocerite that is as long as the peduncle of the first pair and armed with a small tooth on the outer distal angle. The flagellum is slender, but it is broken off a little beyond the peduncle.

The mandibles have not been examined.

The first pair of gnathopoda is short and subpediform.

The second pair (fig. 2i) is long, slender, and pediform; it consists of six joints and terminates in a sharp-pointed unguis that is flanked by two short hairs, and resembles an unguiculate dactylos.

The first pair of pereopoda (fig. 2k) is robust, gradually increasing in diameter from the meros to the propodos, whence it as gradually narrows to the extremity of the pollex, which is pointed, and terminates in a sharp unguis; the dactylos is short and apparently in an immature condition, it is rounded at the distal extremity, shorter than the pollex, and subapically tipped with a small spinule; the ischium and meros are short, and the basis carries a long, flat, and uniaarticulate ecpysis. The second pair of pereopoda resembles the first in form and appearance, but is a little longer and more robust; the dactylos, as in the first pair, is immature, and the basis is furnished with a similarly formed ecpysis. The third, fourth, and fifth pairs are uniform in character and size, they are subequal in length and terminate in a short, sharp dactylos; only the third pair is furnished with a basecpysis, which in form and appearance resembles those anterior to it.

The pleopoda are short and biramose, those of the sixth pair, forming part of the rhipidura, have the outer margin smooth and the inner fringed with hairs.

*Observations.*—The specimen from which the above description is taken is evidently an immature animal, but one that has nearly attained the characteristic features of the adult. The ophthalmopod may probably be relatively smaller in the mature specimen, and the flagella of the first pair of antennæ may be longer. The dactylos of the first two pairs of gnathopoda has probably an unguis attached to its extremity, and it is highly probable that the basecpyses, which resemble in appearance those of the genus *Oplophorus*, may like them be persistent throughout life. The pleopoda probably undergo a proportional change of size, but only a modification in form, and will have the branches fringed with hairs, which in our specimen are not developed; and the posterior pair may become longer in relation to the telson.

*Caricyphus serramarginis*, n. sp. (Pl. CXXI. fig. 3).

Carapace short, anteriorly produced to a horizontal rostrum, and dorsally armed on the frontal crest with a small papilla and a similar one on the cardiac region.

Pleon smooth on the dorsal surface, except for a tooth on the third somite. Lateral margins of the second and third somites fringed with a series of small teeth.

Length, entire, . . . . .	10 mm. (0.4 in.).
„ of carapace, . . . . .	1.5 „
„ of rostrum, . . . . .	1 „
„ of pleon, to dorsal protuberance, . . . . .	3 mm.
„ „ from dorsal protuberance to extremity of the telson, . . . . .	5.5 „
„ of sixth somite of pleon, . . . . .	2 „
„ of telson, . . . . .	1.5 „

*Habitat.*—August 11, 1874, Kandavu, Fiji Islands; surface. One specimen.

The carapace is about one-seventh the length of the animal, anteriorly produced to a long, sharp-pointed rostrum, it is dorsally smooth except for a small papilla on the frontal crest, and another somewhat larger on the cardiac region. The frontal margin is laterally produced to a point at the fronto-lateral angle, behind which, on the lateral margin, are two or three small teeth, which after a hiatus are repeated in a series to the posterior extremity.

The first somite of the pleon is divided into two subequal portions; the second somite is subequal in length with the first but not divided; and both have the lateral margins fringed with a serrature that is bolder on the first than on the second; the third somite has the generic condition of having one part, which is generally the longer, horizontal, and the other part perpendicular, the angle between the two being produced to a posteriorly directed tooth; the fourth somite is shorter than either of the preceding, and has the lateral margin smooth and posteriorly rounded; the fifth somite is still shorter, and has the lateral margin smooth and posteriorly produced to an angle; the sixth somite is as long as the three preceding, laterally compressed, and gradually narrowing to the extremity, where it articulates with the telson. The telson is about two-thirds the length of the sixth somite.

The ophthalmopoda are pyriform and about one-half the length of the rostrum. The ophthalmus is large and orbicular.

The first pair of antennæ has the peduncle subequal with the rostrum, the first joint long and the second and third short; the flagella are short and subequal, and there is a thick bundle of membranous cilia attached to the base of the stouter branch.

The second pair of antennæ is furnished with a scaphocerite that reaches beyond the extremity of the rostrum, and is armed with a tooth on the outer distal angle. The flagellum is wanting.

Since there is only one specimen the oral appendages have not been examined.

The pereopoda are all developed as short, simple, seven-jointed appendages, each carrying a basephysis equal to itself in length.

The pleopoda are biramose, the sixth pair being a little shorter than the telson and furnished with a tooth on the outer distal angle.

*Observations.*—I do not remember a species of any other form in which the lateral margins of the pleon are serrate. This species differs from the preceding in having basephyses attached to the five posterior pairs of pereopoda, but the immature stage of the specimen precludes a too rigid generic classification.

*Caricyphus gibberosus*, n. sp. (Pl. CXXI. fig. 4).

Carapace long, narrow, cylindrical, anteriorly produced to a small sharp-pointed rostrum that is armed on the upper margin with three or four teeth.

Pleon having the third somite posteriorly elevated to a large hunch; sixth somite longer than the preceding two. Telson nearly half as long as the sixth somite.

Length, entire, . . . . .	13.5 mm. (0.5 in.).
„ of carapace, . . . . .	4 „
„ of rostrum, . . . . .	0.8 „
„ of pleon, . . . . .	9.5 „
„ of third somite of pleon, . . . . .	1.5 „
„ of sixth somite of pleon, . . . . .	3 „
„ of telson, . . . . .	1.5 „

*Habitat.*—September, 1875, Pacific Ocean, near the Sandwich Islands; surface. One specimen.

The carapace is rather more than a third the length of the animal, and has the dorsal surface anteriorly produced to a sharp-pointed rostrum, the upper margin of which is armed with three or four teeth. The anterior two somites of the pleon are short and subequal; the third is dorsally long, and projects posteriorly to a rounded hunch-like prominence that is produced horizontally in a line with the preceding somites; the lateral margins are shorter than the dorsal, and are anteriorly convex and posteriorly concave; the fourth somite inferiorly articulates with the posterior division of the third, and is, therefore placed at a right angle with the preceding somites, it is shorter than the third, and subequal with the fifth. The sixth is about three times the length of the fifth, and much narrower, gradually narrowing posteriorly.

The telson is about one-half the length of the sixth somite, and terminates in a styliform extremity.

The ophthalmopoda are ovate and scarcely longer than the rostrum (?).

The first pair of antennæ has the first joint about twice the length of the ophthalmopod, and the second and third subequal, short, and cylindrical. The flagella are broken off.

The second pair of antennæ has the flagellum broken off subequal with the peduncle of the first pair, and carries a scaphocerite that is subequal with the same.

The oral appendages have not been examined.

All the pereopoda are broken off excepting the posterior pair, which is short and robust, and carries a long and slender basepysis, which is also preserved attached to the third pair.

The pleopoda are biramose; the sixth pair is longer than the telson, and has the outer branch armed with a small tooth at the outer distal angle.

*Caricyphus turgidus*, n. sp. (Pl. CXXI. fig. 5).

Carapace one-fourth the length of the animal, dorsally produced anteriorly to a short, sharp, smooth rostrum. Third somite of the pleon posteriorly produced to a small hunch; sixth somite subequal with the two preceding.

Telson half the length of the sixth somite.

Ophthalmopod clavate, half the length of the carapace.

Length, entire, . . . . .	8 mm. (0.3 in.)
„ of carapace, . . . . .	1.8 „
„ of rostrum, . . . . .	0.3 „
„ of pleon, . . . . .	6.2 „
„ of third somite of pleon, . . . . .	1.3 „
„ of sixth somite of pleon, . . . . .	2 „
„ of telson, . . . . .	1.3 „
„ of ophthalmopod, . . . . .	1 „
„ of scaphocerite, . . . . .	2 „

*Habitat.*—January 9, 1875, China Sea, off Luzon; surface.

The carapace is scarcely one-fourth the length of the animal, and anteriorly projects to a sharp-pointed rostrum that is scarcely one-third the length of the ophthalmopod; it is slightly elevated on the frontal crest, but not adorned with teeth, and over the cardiac region there is a small papilla in the median line.

The pleon has the anterior two somites subequal in length on the dorsal surface, but laterally the second is much longer than the first. The third somite is dorsally as long as the preceding two, and posteriorly projects to a small and angular hunch; the lateral margins are subequal in length with the dorsal but not parallel to it, the anterior portion being deep and convex, and the posterior narrow, concave, and parallel with the dorsal surface. The fourth somite articulates with the third at right angles, and is subequal in length; the fifth is shorter and narrower, and the sixth is long, slender, and subequal with the preceding two.

The telson is about half the length of the sixth somite, and terminates in a sharp point.

The ophthalmopoda are clavate, stout, and about half the length of the carapace; the ophthalmus is continuous with the peduncle and ovate.

The first pair of antennæ has the first joint subequal with the ophthalmopod, the second joint about half the length of the first, and the third subequal with the second. The flagella are wanting.

The oral appendages have not been examined.

The pereopoda are broken off.

The pleopoda are biramose; the sixth pair is slender and has the outer ramus a little longer than the telson and armed with a small tooth at the outer distal angle.

*Observations.*—This specimen has a general resemblance to *Caricyphus gibberosus*, but differs in having the rostrum without teeth, the hunch on the third somite of the pleon not quite so prominent, and the ophthalmopoda much longer and more robust.

*Caricyphus angulatus*, n. sp. (Pl. CXXI. fig. 6).

Carapace one-fourth the length of the animal and anteriorly projected to a rostrum armed with small teeth; a small obtuse tooth stands on the frontal crest and another near the posterior margin on the dorsal surface.

The third somite of the pleon has the dorsal surface produced to an acute angle posteriorly; the sixth somite is about one-third the length of the pleon, or the same length as the carapace, and the telson is three-fourths the length of the sixth somite.

The ophthalmopoda are about half the length of the carapace.

The first pair of antennæ has the peduncle a little longer than the rostrum.

The second pair has the scaphocerite subequal to the rostrum in length.

The pereopoda are in an immature stage and support long and slender baseophyses.

The posterior pair of pleopoda is biramose and about half the length of the telson.

Length, entire,	.	.	.	.	.	17 mm. (0.6 in.).
„ of carapace,	.	.	.	.	.	4 „
„ of rostrum,	.	.	.	.	.	2 „
„ of pleon,	.	.	.	.	.	13 „
„ of third somite of pleon,	.	.	.	.	.	2 „
„ of sixth somite of pleon,	.	.	.	.	.	4 „
„ of telson,	.	.	.	.	.	3 „

*Habitat.*—Station 146, December 29, 1873; lat. 46° 46' S., long. 45° 31' E.; near Marion Island; at the surface during the day-time. One specimen.

This species is long and slender, having the carapace one-fourth the length of the

animal, not including the rostrum ; it is smooth generally except for two small tubercles in the median line, one standing on the postcardiac region, the other on the frontal crest at the base of the rostrum, which projects anteriorly in a straight line and is half the length of the carapace, it is armed on the upper margin with five or six small teeth, and with one on the lower margin near the apical extremity. The orbit is defined by a small, sharp tooth at the outer angle, whence the frontal margin recedes to the fronto-lateral angle, which is defined by a sharp and well-developed tooth.

The first two somites of the pleon are short, subequal in depth with the carapace, and have the lateral margins fringed with hairs. The third somite is continued dorsally in the same line to about twice the length of the preceding two, and is then bent at an acute angle downwards and forwards to the posterior part of the lateral margin, which lies subparallel to the dorsal surface, thus producing the dorsal surface into a huge posteriorly directed projection or hunch. The fourth somite is short, articulates with the third at a right angle, and appears to be incapable of extension in a more direct line with the preceding somites. The fifth somite is long and narrow. The sixth is about the same length as the carapace or three times as long as the fifth somite, and terminates abruptly in the median line posteriorly ; it is armed on each side of the posterior margin with a long and slender tooth and inferiorly with another. The lateral margins of all the somites are fringed with hairs, which appear to increase in length posteriorly. The telson is long and narrow, fringed at the extremity with small hairs and on the lateral margin with small spinules.

The ophthalmopoda are pyriform, tolerably robust, and about the length of the rostrum. The ophthalmus is large and ovate.

The first pair of antennæ has the first joint of the peduncle longer than the ophthalmopod and curved to allow space for the movement of that organ ; the second and third joints are short and cylindrical, reach as far as the apex of the rostrum, and support two short and apparently immature flagella.

The second pair is furnished with a scaphocerite that is about the same length as the peduncle of the first.

As there is only one specimen of this species in the collection, I have not attempted to dissect out the oral appendages, which have, therefore, not been examined further than what can be observed of them in their natural position. The mandibles are situated only a little less than half the distance between the frontal and posterior margins of the carapace ; they have no synaphipod, and are placed between two prominent labra.

The gnathopoda and pereiopoda appear to be incompletely developed ; they each consist of six joints and a long basephysis, of which the anterior is the shortest and the third pair of pereiopoda the longest, whereas the fourth and fifth pairs are as yet in an incipient condition.

The pleopoda are not apparent in the undissected animal, except the sixth pair, which is comparatively short, but foliaceous in character, and reaches to about half the length of the telson, and is armed on the outer margin with a small sharp tooth.

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

Animal short and stout. Carapace dorsally round and smooth, anteriorly produced to a short straight rostrum, smooth on the upper surface, slightly dentate on the lower near the apex. Frontal margin produced to a strong tooth between the ophthalmopoda and antennæ; fronto-lateral angle produced to a point.

Pleon short, smooth; third somite the longest, and dorsally arcuate near its centre. Sixth somite short. Telson tapering.

Ophthalmopoda short and stout.

First pair of antennæ short, thick, and biramose.

Second pair of antennæ stout, and furnished with a short scaphocerite that is armed with a tooth on the outer margin.

First two pairs of pereiopoda chelate, and subequal in size. The three succeeding pairs short, robust, and simple, the posterior pair being a little the longest.

*Observations.*—It is difficult to determine the position of this genus in relation to the others. The specimens upon which it is founded are undoubtedly in an immature condition, and it is almost certain that several of the parts will become altered in relation to the rest in a very considerable degree. The flagella of both pairs of antennæ will probably become longer, the chelæ of the first two pairs of pereiopoda will acquire a more decided form, and the dactylos of the three posterior pairs of pereiopoda will possess a more distinct unguiculate character. Yet there are other parts which, however much they may vary, must still retain the generic characters, and these I have selected for the description of the genus.

*Rhomaleocaris hamulus*, n. sp. (Pl. CXIII. fig. 2).

Carapace one-fourth the length of the animal, smooth, anteriorly produced to a short lanceolate rostrum, serrate on the lower margin, and having the orbital tooth anteriorly produced to quite half the length of the ophthalmopod.

Pleon having the somites short and deep. Third somite dorsally arcuate and longer than the sixth. Sixth somite longer than the fifth, and not so long as the telson.

<sup>1</sup> ῥωμαλῖος, robust; κρις, a shrimp.

Length, entire, . . . . .	8 mm. (0.3 in.).
„ of carapace, . . . . .	2 „
Depth of carapace, . . . . .	1.5 „
Length of rostrum, . . . . .	1 „
„ of pleon, . . . . .	6 „
„ of third somite of pleon, . . . . .	1.5 „
„ of sixth somite of pleon, . . . . .	1 „
„ of telson, . . . . .	1.5 „

*Habitat.*—Pacific. Taken at the surface, associated with *Hectarthropus compressus*, on the passage from Api, New Hebrides, to Cape York.

The animal is broad, short and stout, and free from ornamentation on the carapace and pleon. The carapace is nearly as deep as the length between the orbital and posterior margins, it is anteriorly produced to a short rostrum (fig. 2c) that is laterally compressed and pointed at the apex, and only feebly serrate, if at all. The orbit is broadly excavate, and has the outer canthus armed with a long, straight tooth, the extremity of which is curved into a well-formed hook (fig. 2c''), whence the frontal margin is excavate to receive the second antennæ, the fronto-lateral angle being produced to a strong tooth.

The pleon is smooth, and all the somites are short; the third, which is the longest, is arcuate dorsally near the centre, and the fourth somite articulates with it at a right angle to the anterior somites; the sixth somite is a little longer than the fifth, and the telson is a little longer than the sixth, and tapers to the distal extremity.

The ophthalmopoda are short and pyriform, the ophthalmus being orbicular, and not reaching as far as the extremity of the rostrum.

The first pair of antennæ is short, the peduncle reaching scarcely beyond the ophthalmopod, and not as far as the apex of the rostrum, and it terminates in two rudimentary flagella.

The second pair of antennæ has the basal joints very short and thick; the scaphocerite is subequal in length with the first pair, and the flagellum is broken off a little beyond the peduncle.

The first two pairs of pereopoda are all short and chelate (fig. 2k); the others are short and simple, the posterior pair being a little longer than the preceding; they carry no baseophysis, but in each, attached to the membranous articulation of the coxal joint with the pereion, there is a small arthrobranchial plume.

The pleopoda are short and biramose. The posterior pair, which forms part of the rhipidura, is foliaceous and as long as the telson, which tapers to the posterior margin, which is fringed with hairs.

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

Differs from *Diaphoropus*, which it much resembles, in having the first pair of pereopoda chelate; from *Caricyphus* in being without the characteristic hump on the third somite of the pleon, and in the shortness of the sixth somite; from *Parathanas* in having the carpos of the second pair of pereopoda uniarticulate, and in having the carapace furnished with a supraorbital tooth.

*Anebocaris quadroculus*, n. sp. (Pl. CXXIII. fig. 1).

Animal robust. Carapace having a large protuberance over the gastric region; supraorbital tooth large.

Ophthalmopoda short, broad, and twice the length of the rostrum.

Chelæ of the first larger than those of the second pair of pereopoda. Fifth pair reaching beyond the ophthalmopoda.

Length, entire, . . . . .	8 mm. (0.3 in.).
„ of carapace, . . . . .	2.5 „
„ of rostrum, . . . . .	0.5 „
„ of pleon, . . . . .	5.5 „
„ of sixth somite of pleon, . . . . .	1 „
„ of telson, . . . . .	1 „
„ of fourth pereopod, . . . . .	1.5 „
„ of fifth pereopod, . . . . .	4 „

*Habitat*.—June 1874, off Port Jackson, Australia. One specimen; taken at the surface at night, associated with a specimen of *Leptochela reversa*.

Off Sibago, Samboangan, Philippine Islands. One specimen.

October 23, 1874, off Basilan Strait. Five imperfect specimens.

China Sea, off Luzon. One specimen, with *Caricyphus*, *Sergestes*, and *Lucifer*.

January 1873, Zebu Harbour, Philippine Islands. Three specimens, with *Gonerichthys*.

The carapace is about half the length of the pleon or one-third the length of the animal, and is dorsally smooth, except for a prominent tubercle on the gastric region. The frontal margin is anteriorly produced to a smooth, horizontal, and sharply pointed rostrum that is about one-fifth the length of the carapace. The outer canthus of the orbit is not defined, and the fronto-lateral angle is produced to a sharp tooth.

The pleon is about twice the length of the carapace and has the somites generally subequal in length, the sixth being the longest and about the same length as the telson.

<sup>1</sup> ἀνήβος, immature; καρίε, shrimp.

The ophthalmopoda are short, thick, and borne on a short pedicle; the ophthalmus is produced to an obtuse point at the upper distal angle, which gives to the organ a quadrate appearance; hence the specific name.

The first pair of antennæ has the first joint of the peduncle a little longer than the ophthalmopod and curved to afford room for the latter; the second joint is less than half the length of the first, and the third is about half the length of the second; at the extremity there are two slender flagella, but they are broken in the typical specimen.

The second pair of antennæ carries a scaphocerite that has the margins parallel and reaches as far as the distal extremity of the peduncle of the first pair.

The first pair of pereiopoda (fig. 1*k*) is chelate and more robust than the second. The second pair (fig. 1*l*) is slender and chelate. The third and fourth pairs resemble each other and are a little shorter than the preceding, whereas the fifth pair (fig. 1*o*) is more than twice their length and possesses a large, projecting, coxal joint. The entire limb is as yet within its exuvium, and the extremity of the dactylos is broken off, but the form of the inner or new structure appears rather to follow the lines of the exuvium than to assume the form of the dactylos, shown in *Diaphoropus versipellis* (Pl. CXVII. fig. 3*o*).

The pleopoda are biramose and supported on a well-developed peduncle.

The rhipidura is well developed and has the lateral plates subequal and reaching a little beyond the extremity of the telson.

*Observations.*—The second pair of pereiopoda is smaller than the first, but it exhibits no sign of becoming multiarticulate, or the species might be thought to belong to *Parathanas*.

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

Carapace scarcely one-third the length of the entire animal, smooth, anteriorly produced to a short rostrum. Frontal margin without any very decided tooth. Pleon having the five anterior somites subequal, the first two being rather the shorter, and the sixth longer than any of the preceding. Telson long and tapering.

Ophthalmopoda subequal with the rostrum, furnished with an ocellus mounted on a tubercle.

First pair of antennæ biramose.

Second pair supporting a scaphocerite of moderate proportions.

Mandible supporting a two-jointed synnaphipod.

Second pair of gnathopoda long, slender, and pediform, and furnished with a basephysis.

First pair of pereiopoda shorter than the second pair of gnathopoda, and terminating in a sharp point. Second pair of pereiopoda minutely chelate. Third pair long, slender,

<sup>1</sup> βένθος, καρίς.

and terminating in a simple dactylos. Fourth pair similar to the third. Fifth pair a little more robust.

Pleopoda biramose, the ultimate pair being a little longer than the telson, and having the outer branch furnished with a diæresis.

*Geographical Distribution.*—Only two species of this genus are known; they were both obtained at more than two miles in depth in mid ocean, one in the Pacific, and the other in the Atlantic.

*Bentheocaris exuens*, n. sp. (Pl. CXXIII. fig. 3).

Animal slender, having the dermal tissue soft and membranous. Carapace dorsally flat and smooth, except over the frontal region, where it is armed with a few small teeth that are continued on the rostrum, which is bent downwards and terminates in a fine, pointed tooth.

Pleon long and subequal in depth with the carapace. First somite short, second a little longer, and both dorsally smooth; third quite twice the length of the second, and terminating in a horizontal tooth in the median line of the dorsal surface; fourth and fifth somites similarly armed, but the tooth is smaller on each; sixth somite about twice the length of the fifth, and armed with a small tooth or spine.

Telson subequal in length with the sixth somite, and terminating in two or three small hairs.

Length, entire, . . . . .	16	mm. (0·6 in.).
„ of carapace, . . . . .	5	„
„ of pleon, . . . . .	11	„
„ of sixth somite of pleon, . . . . .	3·5	„
„ of telson, . . . . .	3·5	„

*Habitat.*—Station 285, October 14, 1875; lat. 32° 36' S., long. 137° 43' W.; South Pacific Ocean; depth, 2357 fathoms; bottom, red clay; bottom temperature, 35°. One specimen in the tow-net attached to the trawl.

The species resembles many of the deep-sea forms in being soft and membranous, and has a slender appearance owing to the shortness and want of depth of the pereion. The carapace is about one-third of the animal in length; its surface is smooth generally, and it is dorsally flat and anteriorly produced to a short, downwardly curved rostrum (fig. 3c), that is about one-fifth the length of the carapace, and armed on the dorsal surface with six teeth, those situated on the frontal region being short, while those towards the extremity of the rostrum are long and slender. The frontal margin of the carapace has an excavation above the orbit and beneath the rostrum, and a slight excavation below this represents the orbit, which is defined by a small point or pro-

jection corresponding with the first antennal tooth; the frontal margin then descends and is lost in its continuation with the lateral margin of the carapace.

The pleon is rather more than twice the length of the carapace; the first two somites are short and smooth, the third is longer, and armed with a sharp tooth that is horizontal, and when the pleon is extended impinges against the dorsal surface of the next somite; the three succeeding somites are similarly armed, but the teeth are much smaller. The sixth somite is laterally compressed, nearly twice the length of the fifth somite, and as long as the telson, which is tapering and longitudinally curved.

The ophthalmopod (fig. 3*a*) is about one-third the length of the carapace, and reaches a little beyond the rostrum; it is stout, being only twice as long as broad, and is furnished with an ophthalmus of less diameter than the stalk, and supports a protuberant ocellus.

The first pair of antennæ (fig. 3*b*) has a peduncle that reaches beyond the extremity of the rostrum; the first joint, which is subequal in length with the ophthalmopod, is broad and slightly excavate, and furnished on the outer side with a sharp stylocerite that is about half the length of the joint; the second and third joints are broad and short, and terminate in two flagella, the inner of which is short, slender, the articuli not being clearly defined, and the outer flagellum is multiarticulate, and fringed with hairs on the outer side and a series of membranous cilia corresponding with the number of articuli.

The second pair of antennæ is broken off at the extremity of the peduncle, the second joint of which is furnished with a long, flat, foliaceous scaphocerite (fig. 3*c''*), the inner margin of which is fringed with ciliated hairs, which are lost. Those present, being attached to the new skin, are seen protruding through the orifices left by the previous hairs.

The mandible and the other oral appendages have not been examined.

The second pair of gnathopoda is long and slender; it is probably six-jointed, but the terminal part is broken off. The second joint is furnished with a basephysis that is about one-third its length.

The first pair of pereopoda is shorter than the second pair of gnathopoda, and carries a long basephysis, and terminates in a straight-pointed chela, the posterior margin of the propodos being fringed with a series of closely planted ciliated hairs.

The second pair of pereopoda is considerably longer than the first, and like it is furnished with a long basephysis, and terminates in a small chela that is not more than one-fourth the length of the propodos; the latter joint is not quite as long as, nor of greater diameter than, the carpos; the meros and ischium are fringed on the posterior margin with a closely planted series of ciliated hairs. The third pair of pereopoda (fig. 3*m*) is longer than the second, it carries a long basephysis, and terminates in a simple dactylos that is smooth on the posterior margin until near the base of the unguis, where there is planted a fasciculus of long hairs, and this is also represented by similar long hairs that fringe the distal extremity of the propodos, on the posterior margin of

which, at regular distances, are planted a series of solitary spinules, also present on the same margin of the carpos and meros. The fourth pair of pereiopoda (fig. 3n) is shorter than the third, and like it carries a long basephysis, and terminates in a long, curved dactylos that is fringed at the posterior margin with a series of spinules, and furnished with a bundle of hairs at the base of the unguis; the distal extremity of the propodos is furnished with long spinules, and the posterior margin with distantly planted solitary ones, all of which have their margins near the base fringed with short stiff cilia. The fifth or posterior pair of pereiopoda (fig. 3o) is shorter than the fourth, and does not, like the preceding pairs, carry any basephysis; it terminates in a short, stout, biunguiculate dactylos, and is fringed on both sides with short hairs; the propodos is long, and gradually increases in breadth, the distal extremity being posteriorly excavate, and the posterior angle armed with two long and stiff spines, between which the dactylos impinges and forms an imperfect chela; the posterior margin of the propodos is thickly fringed with a series of short inversely curved spinules, fringed at the posterior margins only near the extremity with short hairs, and at the distal extremity of the anterior margin with a series of long hairs that are fringed with pointed cilia.

The pleopoda are all unequally biramose; the anterior two pairs appear to be the more robust, although all have strong peduncles. The sixth pair has the rami unequal, the inner being lanceolate and fringed with hairs, all of which are rubbed off, and the outer is furnished with a small tooth which stands at the extremity of the diæresis, and the distal and inner margins are fringed with hairs which are lost in our specimen, but the points of articulation are conspicuous.

*Observations.*—This species, which was taken probably within a fathom of the bottom, is in a very peculiar condition, which suggests that the animal when captured was approaching the period of exuviation. Most of the new parts are visible beneath the transparent outer covering, so that the next skin can be observed in its more perfect and mature condition. The armature on the rostrum shows that the new teeth correspond in number with those of the preceding moult.

*Bentheocaris stylorostratis*, n. sp. (Pl. CXXIII. fig. 4).

Carapace less than one-fourth the length of the animal, elevated above the frontal region to a thin, laterally compressed crest that projects over the frontal margin in the form of a rounded rostrum, fringed with slender teeth, of which the anterior is longer than the others, styliform, and projecting straight forwards. The orbit is only imperfectly defined by a small point, beyond which is another that represents the first antennal tooth, and corresponding with the position of the second antennal tooth is a longitudinal ridge.

The pleon has the third somite dorsally carinated and armed in the median line with a strong tooth, the fourth and fifth somites with a minute point, and the sixth unarmed.

The telson is long, narrow and tapering.

The ophthalmopoda are a little shorter than the longest style on the rostrum, and furnished with a protuberant ocellus.

The first pair of antennæ has the outer flagellum very stout at the base and rapidly tapering to the apex.

The second pair of antennæ has the scaphocerite half as long as the first pair of antennæ.

The second pair of gnathopoda is robust.

The first pair of pereopoda is robust and chelate. The second pair is more slender than the first and chelate. The third, fourth and fifth pairs are slender and monodactyle, each carrying a well-developed basephysis.

The pleopoda are biramose, the posterior pair being longer than the telson.

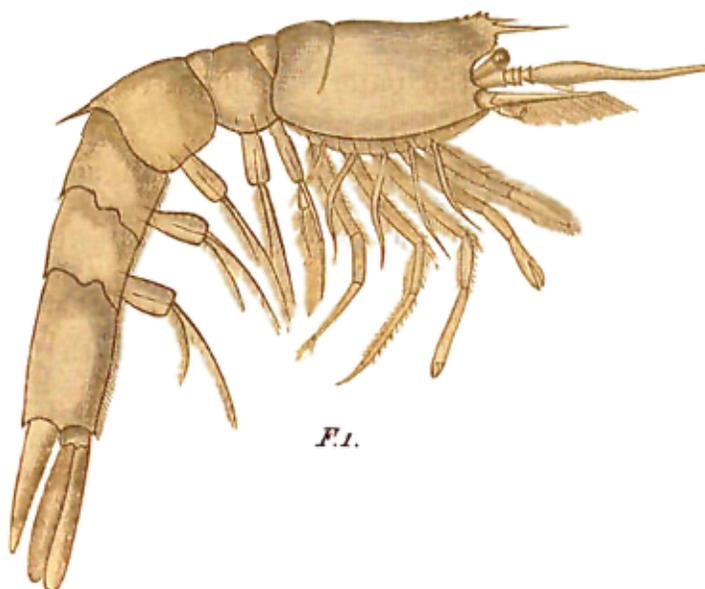
Length, entire, . . . . .	38 mm. (1.5 in.).
„ of carapace, . . . . .	11 „
„ of rostrum, . . . . .	1 „
„ of pleon, . . . . .	27 „
„ of sixth somite of pleon, . . . . .	6 „
„ of telson, . . . . .	6 „
„ of outer plate of rhipidura, . . . . .	8 „

*Habitat.*—Station 13, March 4, 1873; lat. 21° 38' N., long. 44° 39' W.; Mid North Atlantic; depth, 1900 fathoms; bottom, Globigerina ooze; bottom temperature, 36°.8. Two specimens, one male (?).

The carapace is not quite one-fourth the length of the animal and has the fronto-dorsal region elevated to a laterally compressed and very thin crest, the margin of which is fringed with seven teeth; the smallest tooth is the posterior, standing on the gastric region, they gradually increase in size, the anterior two, especially the most anterior, being long and styliform. Between the cardiac and genital regions a transverse furrow traverses the dorsal surface. The orbit is not deep or clearly defined; the first antennal tooth is but a small point, and the second appears to be absent or worn off, but from it a longitudinal ridge runs subparallel with the lateral, proceeding nearly to the posterior margin of the carapace.

The first somite of the pleon is short and smooth, and the second is also short and longitudinally furnished with a small carina. The third somite is dorsally longer than the preceding two and elevated to a strong carina, that commences abruptly at the anterior margin and posteriorly projects to a strong, laterally compressed tooth; the fourth is nearly as long and is dorsally furnished with a small carina that posteriorly

projects to a small tooth; the fifth is like the fourth but not so deep, and the postero-lateral angle projects to a point. The sixth somite is longer than the fifth, more compressed, and not posteriorly armed with a tooth on the dorsal surface.



*Fl.*

FIG. 72.—*Bentheocaris stylostratis*, from a drawing by Dr. R. von Willemoes Suhm.

The telson is as long as the sixth somite and gradually tapers to a point.

The ophthalmopod (fig. 4*a*) is short and bulbous. The ophthalmus is brown in colour and of smaller diameter than the base, which is furnished on the inner and upper surface with a translucent papilla, in which there appears to be no ocellus, but an opaque mass at the distal extremity.

The first pair of antennæ is large and massive; the first joint of the peduncle is excavate on the upper surface and furnished with a small stylocerite on the outer margin; the second and third joints are short and thick, and each is furnished on the under surface with a fasciculus of long plumose hairs. The outer flagellum is large and broad, the upper surface being smooth and the under surface longitudinally excavate and thickly covered with soft membranous cilia; the terminal portion of the flagellum rapidly tapers to a long and slender extremity. The flagellum on the inner side is long, slender and cylindrical.

The second pair of antennæ has the flagellum broken off at the extremity of the peduncle; the second joint is armed on the outer distal angle with a sharp tooth, and on the inner with a scaphocerite that is about two-thirds the length of the first pair of antennæ, foliaceous on the inner margin, which is fringed with hairs, and rigid on the outer, but not armed with a tooth at the distal extremity, unless it be broken off.

The mandible (fig. 4*d*) is furnished with a two-jointed synniphopod, the basal joint being long, and the distal short, ovate and fringed with hairs, some of which are plumose.

The psalistoma is broad and serrate with eight teeth, of which the apical is the largest, the fifth next pronounced and the eighth short and broad; a small gap separates the series from the molar process, which is cylindrical and covered with many finely serrate points.

The first pair of gnathopoda is six-jointed; the coxa is furnished with a short disc-like mastigobranhia that supports a small podobranhia; the basis is broad and flat, and from its outer margin springs a long and slender ecpysis; the ischium and meros are continuous with the basis, but the carpos is broad and reflexed against the meros and continuous with the propodos, which terminates ovately and is furnished on its inside margin with long curved spines and strong hairs.

The second pair of gnathopoda is long, pediform and six-jointed; the coxa supports a slender rudimentary mastigobranhia and the basis a short and slender ecpysis; the ischium and meros are probably fused into one, they are flattened and inversely arcuate; the carpos is cylindrical, long, and continuous with the propodos, which is longer than the dactylos, which is short and tipped with short fringed spines; the last three joints are thickly studded with hairs that increase in number and strength towards the distal extremity, where they become fringed with minute hairs or tooth-like processes.

The first pair of pereopoda is a little longer than the second gnathopod; the coxa carries a small rudimentary mastigobranhia and the basis a slender ecpysis; the ischium and meros are continuous; the carpos is moderately long and stouter than the meros, especially towards the distal extremity; the propodos is longer than the carpos but scarcely stouter, and terminates in a stout pollex and dactylos that form a chela that is about half the length of the palm. The second pair of pereopoda is longer and more slender than the first; it carries a similar rudimentary mastigobranhia and slender basecpysis; the carpos is as long as the propodos, which terminates in a small chela. The third and fourth pairs of pereopoda are longer than the second, quite as slender, and have the posterior margin of the meros and carpos fringed with distantly placed, slender, but strong, tooth-like spines; the dactylos is broken off both. The fifth pair resembles the preceding two excepting that the propodos increases in diameter distally and terminates in a short, robust, serrate dactylos (fig. 40) enclosed within a bush of long hairs which are attached to the distal extremity of the propodos, the anterior margin of which for half its length is fringed with short curved serrate spines.

The first pair of pleopoda is long and slender; the anterior or outer ramus is long and tapering, and the inner is reduced to a foliaceous oval plate furnished on the outer side with a long stylamblys tipped with cincinnuli. The succeeding pairs of pleopoda are subequally biramose; the posterior, which forms the outer plates of the rhipidura, is longer than the telson and has the outer distal angle of the outer branch armed with a small tooth, the inner margin being fringed with hairs.

*Acanthephyra*, A. Milne-Edwards.

*Acanthephyra*, A. Milne-Edwards, Ann. d. Sci. Nat., sér. 6, tom. xi. p. 12, 1881.

„ Sidney Smith, Dec. Crust. Albatross Dredgings, 1883—in Rep. Commiss. Fish and Fisheries, p. 372, 1884.

Non *Miersia*, Kingsley, Proc. Acad. Nat. Sci. Philad., p. 416, 1879.

„ Sidney Smith, Bull. Mus. Comp. Zoöl., vol. x. p. 66, 1882.

Body laterally compressed and dorsally arcuate from crest to telson. Carapace smooth, compressed anteriorly to a greater or less carina, and produced to a long and slender rostrum that is furnished with a larger or smaller number of teeth on the upper and lower margins; frontal margin depressed and excavated to form an orbit, the outer canthus being defined by a rounded angle, external to which stands the first antennal tooth, then a second excavation is formed to receive the second pair of antennæ, at the lower angle of which the second antennal tooth projects, and beyond this the frontal margin of the carapace recedes obliquely backwards and inwards for a short distance, and is then continued still more abruptly inwards as the lateral margin, making a distinct angle with the branchial walls of the carapace, recedes from the frontal to the posterior margin.

The first somite of the pleon is as deep as the carapace, the posterior surface of which it laterally overlaps. The second and following somites are carinated, the four posterior being generally produced posteriorly in the form of laterally compressed teeth, which, when the animal is fully extended, lie against the dorsal surface and form a cultriform carina.

The telson is long, slender, and tapering.

The ophthalmopoda are short, oblong, and carry a small and imperfect ocellus.

The first pair of antennæ has the peduncle short; the first joint is excavate on the upper surface and carries a stout stylocerite; the second and third joints are cylindrical, and terminate in two long flagella.

The second pair of antennæ is long and slender, and carries a long and sharp-pointed scaphocerite, that articulates between two strong teeth.

The mandibles are deeply placed within the oral cavity; they have the psalistoma strongly serrate, concave, and continuous with the molar process, and carry a two-jointed synaphipod.

The first pair of gnathopoda is subpediform, seven-jointed, and has the distal joints enlarged and reflexed; the basis carries a long ecphysis, and the coxa supports a short mastigobranchial plate, to which is attached a small podobranchial plume and another is attached to the membranous articulation.

The second pair of gnathopoda is long, straight, pediform, and five-jointed; the three terminal joints are long, the distal one ends in a sharp styliform point; the basis is

short, and carries a long ephysis; the coxa supports externally a lunate calcified plate that articulates with a rudimentary mastigobranchia, that is independent of any branchial plume, while near it a plume is attached to the membranous articulation.

The first two pairs of pereopoda are short, slender, and chelate, and have the carpos uniarticulate; the basis carries a long ephysis, and the coxa bears a short mastigobranchial plate. The posterior three pairs are simple in character, decrease successively in length, and terminate in a sharp-pointed dactylos, of which the posterior is much the shortest.

The pleopoda are biramose, narrow, and subfoliaceous. The terminal pair forms the outer plates of the rhipidura, which are subequal in length with the telson.

The branchiæ consist of twelve plumes and five mastigobranchial plates that are short and club-shaped, but sufficiently long to be able to penetrate for some distance between the plumes; the arrangement may be seen in the following table:—

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

Of these the anterior are the smallest and the posterior the largest.

The arrangement of the branchiæ corresponds most closely with that of *Notostomus*, *Calymarina*, and *Hymenodora*, and approximates to that of *Nematocarcinus*, *Campylonotus* and *Oplophorus*, from which it departs chiefly in the smaller number and less important condition of the mastigobranchial plates.

The plumes are attached to the body at a point nearer to the lower extremity than is usual in this order, they being generally suspended more centrally.

*Geographical Distribution.*—The species that belong to this genus were taken by the Challenger in the Atlantic, off the south-eastern coast of South America, at a depth of 2040 fathoms, off the north-eastern coast of Australia in 2440 fathoms, south of Japan in 2425 fathoms, and in the Indian Ocean, 600 miles south of Australia, at a depth of 2150 fathoms. Other species were obtained off New Zealand in 1100 and 700 fathoms, off the Kermadec Islands in 600 fathoms, close to Japan in 500 fathoms, and in the shallow sea between Australia and New Guinea in 200 fathoms.

*AcanthePHYRA acanthitelsonis* was taken in Mid Atlantic at only two stations, not far from the equator, in depths of 1500 and 1850 fathoms respectively.

*AcanthePHYRA brachytelsonis* has been found in five different localities, namely, off the Kermadec Islands in from 250 to 630 fathoms, south of the Philippine Islands in 500 fathoms, off the south-eastern shores of South America, associated with *AcanthePHYRA agassizii*, at a depth of 2040 fathoms, close to the southern shore of Japan at depths

of 345 and 775 fathoms, and in the Sea of Banda, associated with *Acantheephyra rouxii*, at 200 fathoms, where also *Acantheephyra armata* was captured. This latter species is also reported by A. Milne-Edwards from Mexico at 422 fathoms, and he has also described two other species from the Gulf of Mexico under the names of *Acantheephyra debilis* and *Acantheephyra ensis*, off the Bahama and Barbados Islands, at the respective depths of 500 and 237 fathoms.

*Acantheephyra brevis* was taken in the North Atlantic, in 1500 fathoms of water, and *Acantheephyra longidens* was found off the north-western extremity of Celebes at a depth of 2150 fathoms, and at the very middle of the South Pacific Ocean at 2375 fathoms. *Acantheephyra media* was taken off Tablas Island, among the Philippines, at a depth of 700 fathoms. *Acantheephyra kingsleyi* was taken in Mid Atlantic at 2500 fathoms, just under the equator, and not far from the Stations where *Acantheephyra acanthitelsonis* was found. *Acantheephyra carinata* and *Acantheephyra approxima* were taken in narrow channels between the islands and the continent of South America on the western coast of Patagonia, at a depth of 400 fathoms. At all these localities the bottom was of a soft mud or Globigerina ooze, except in one instance off the Kermadec Islands, and once in the Atlantic, at Station 87, where the bottom was rocky.

The geographical range of this genus is almost cosmopolitan, but does not include the Arctic regions. Specimens have been found in the West Indies, among the islands of the Australian Archipelago, as far north as Japan, as far south as Kerguelen Island, and in the middle of the Pacific and Atlantic they have been taken at depths ranging from 200 to 2500 fathoms.

*Observations.*—A form closely allied to this genus was first described by Risso, under the name of *Pandalus pelagicus*, from a specimen taken in the Mediterranean. This name was afterwards changed by Roux, who more correctly demonstrated its true position in natural classification, to *Ephyra*, and this was retained by Professor Milne-Edwards.<sup>1</sup> More recently Professor Kingsley<sup>2</sup> pointed out that the name given by Roux had been previously adopted for another genus, and proposed the name of *Miersia* for Risso's species. But, judging from the description of Risso as quoted by Milne-Edwards, *Ephyra pelagica* "is ornamented on the sides by a curved suture with four spines and a channelled rostrum, armed with five teeth above and two and a fringe of cilia below."

Kingsley, moreover, places *Miersia* as the type of his Eryphinae, making it a subfamily of Atyidæ, which, he says, "have the mandibles stout, non-palpigerous, with the crown broad, dilated, and slightly divided," neither of which characters correspond with those in the several species described under the name *Acantheephyra* of A. Milne-Edwards.

*Acantheephyra* of A. Milne-Edwards is not ornamented with a curved suture, unless one or two irregular depressions, as seen in *Acantheephyra armata*, but not universally

<sup>1</sup> Hist. Nat. Crust., tom. ii. p. 422.

<sup>2</sup> Loc. cit.

present, can be so interpreted; neither are the four spines and the channelled rostrum present in the several species of the genus. A. Milne-Edwards says that *Miersia gracilis*, Sidney Smith, is identical with his *Acanthephyra debilis*, var. *europæa*.

It consequently follows that as *Acanthephyra* of A. Milne-Edwards differs from Kingsley's description of *Miersia*, Milne-Edwards' name cannot be accepted as a synonym of Kingsley's type, viz., *Pandalus pelagicus* of Risso (*Ephyra pelagica*, Roux, *Miersia pelagica*, Kingsley). Mr. Sidney Smith<sup>1</sup> says—"As far as I know the only described species properly referred to this genus are *M. pelagica* and *punctulata* (Risso sp.), both apparently unknown to modern carcinologists, and *M. Haeckelii* (*Ephyra Haeckelii*, von Martens), all from the Mediterranean. *Ephyra compressa*, de Haan, placed in *Miersia* by Kingsley, had already been referred to *Atyephyra* by von Martens (Archiv für Naturgesch., xxxiv., 1868, pl. i. figs. 4a to 4c), and is certainly not closely allied to the species here described nor to *M. Haeckelii*."

That to which de Haan gave the name of *Ephyra* is a fresh-water species from Japan, and some confusion appears to have arisen in consequence.

Mr. Edward Miers, late of the British Museum, in a Note on a Fresh-water Macrurous Crustacean from Japan,<sup>2</sup> says that the species described by de Haan as *Ephyra* ? *compressa*, von Martens refers to the genus *Atyephyra* of Brito-Capello, and that "*Miersia* (*Ephyra*) has a marine habitat, and, as von Martens has shown, is distinguished by possessing a mandibular palpus, by the position of the inferior lateral spine of the carapace, the carinated post-abdomen, and by other characters." Mr. Miers says also that Mr. Kingsley's diagnosis of his family Atyidæ needs emendation as regards the mandibular palp.

*Acanthephyra purpurea*, A. Milne-Edwards (Pl. CXXIV. fig. 3).

*Acanthephyra purpurea*, A. Milne-Edwards, Comptes rendus, t. xcii. p. 1396, 1881. Recueil de Fig. de Crust. nouveaux ou peu connus, 1883.

*Miersia agassizii*, Sidney Smith, Bull. Mus. Comp. Zoöl., vol. x. p. 67, pl. xi. figs. 5-7, pl. xii. figs. 1-4, 1882.

Carapace slightly compressed, and anteriorly produced to a long and slender rostrum, armed on the upper margin with nine or ten rather distant teeth, and on the under margin with five or six.

Pleon subcarinated from the posterior margin of the second somite to that of the sixth, the third, fifth, and sixth being posteriorly produced to a tooth.

Telson longer than the sixth somite, gradually tapering to the extremity, the dorso-lateral margin being armed with several minute spinules.

Ophthalmopoda rather small and somewhat pyriform.

<sup>1</sup> Bull. Mus. Comp. Zoöl., vol. x. p. 66.

<sup>2</sup> Ann. and Mag. Nat. Hist., ser. 5, vol. ix. p. 193, 1882.

First pair of antennæ having the first joint deeply excavate, and the outer flagellum very robust.

Second pair of antennæ having a long and pointed scaphocerite and a long slender flagellum.

None of the other appendages afford any character of specific value.

Length, entire, . . . . .	38 mm. (1.5 in.).
„ of carapace, . . . . .	10 „
„ of rostrum (broken), . . . . .	8 „
„ of pleon, . . . . .	28 „
„ of third somite of pleon, . . . . .	5 „
„ of sixth somite of pleon, . . . . .	7 „
„ of telson, . . . . .	8 „

*Habitat*.—Station 354, May 6, 1876; lat. 32° 41' N., long. 36° 6' W.; south-west of the Azores; depth, 1675 fathoms; bottom, Globigerina ooze; bottom temperature, 37°·8. One specimen; male. Type.

Station 40, April 28, 1873; lat. 34° 51' N., long. 68° 30' W.; north-west of Bermuda; depth, 2675 fathoms; bottom, blue mud. One specimen. Dredged.

Station 87, July 21, 1873; lat. 25° 49' N., long. 20° 12' W.; off the Canary Islands; depth, 1675 fathoms; bottom, rock. One specimen. Dredged.

The label attached to one of the specimens says “deep haul, 6th May, 1876, Atlantic,” and since the date corresponds with that of Station 354, there can be no doubt it was there obtained. The specimen is beautifully preserved both in form and colour, the latter being of a rich crimson-lake, which suffuses every part of the animal. The hairs which fringe the legs are long, delicate, and generally planted perpendicularly to the surface. There can be no doubt, I think, that it is the same species as that described by Mr. Sidney Smith as *Miersia agassizii*. When Kingsley changed the name of Roux's genus *Ephyra* into *Miersia*, he pronounced it to be a genus in which the mandible had neither synnhipod nor psalistoma, but since this species has both, it cannot belong to Kingsley's genus, *Miersia*, and undoubtedly belongs to A. Milne-Edwards' genus, *Acantheephyra*.

It is singular that every specimen that Mr. Sidney Smith obtained had the rostrum broken off; and this is also the case with our typical specimen, and is suggestive of its being very long and proportionally weak.

The only distinction between his species and the *Acantheephyra purpurea* of A. Milne-Edwards appears to exist in the armature of the rostrum, which Sidney Smith states has seven teeth on the upper surface, and four on the lower; but since in every specimen that came under his observation the rostrum was broken, I cannot see how he was able to determine either its length or the number of teeth on its surface. The ophthalmopoda are short, and the ophthalmus is not large. The antennæ and other appendages do not offer any feature of sufficient variation to denote specific distinction.

It closely resembles *Acanthephyra sica*, from the neighbourhood of New Zealand, from which it appears to differ only in having the denticles on the frontal crest larger and more distantly placed, and, according to A. Milne-Edwards and Sidney Smith, in having no tooth on the fourth somite of the pleon. Nevertheless Sidney Smith found it present in one out of the three specimens he examined: to quote his own words, "the carina being most conspicuous on the third somite, where it projects posteriorly in a very long and slender tooth. There is a similar but much smaller tooth on the three succeeding somites, though in two of the three specimens examined it is nearly or quite obsolete on the fourth somite."

Sidney Smith's specimen was taken in nearly the same degree of latitude, but between  $30^{\circ}$  and  $40^{\circ}$  further west.

*Acanthephyra longidens*, n. sp. (Pl. CXXIV. fig. 4).

Carapace smooth, anteriorly compressed, and slightly carinated and produced to a narrow, slender rostrum, directed obliquely upwards, dorsally armed with a crest of three small teeth, whence it is continuously smooth to the apex. Under margin smooth at the base, where it carries a series of long hairs, and armed towards the apical extremity with six small teeth. The two antennal teeth are small.

Anterior three somites of the pleon divided into two portions, dorsally smooth and without a carina. Third somite having the posterior division carinated and produced to a long, slender, spine-like tooth, that runs parallel with and extends beyond the posterior extremity of the next succeeding somite. Fourth and fifth somites slightly carinated but not posteriorly produced; the sixth is slightly carinated and posteriorly produced to a small tooth.

Telson dorsally smooth, rounded, laterally compressed, and armed with several small spines on each side; the extremity, terminating in two or three spines, reaches beyond the outer ramus of the rhipidura.

Ophthalmopoda small, and the other appendages rather short.

Length, entire,	.	.	.	.	.	68 mm. (2.6 in.).
" of carapace,	.	.	.	.	.	19 "
" of rostrum,	.	.	.	.	.	17 "
" of pleon,	.	.	.	.	.	49 "
" of third somite of pleon,	.	.	.	.	.	9 "
" of sixth somite of pleon,	.	.	.	.	.	10 "
" of telson,	.	.	.	.	.	18 "

*Habitat*.—Station 198, October 20, 1874; lat.  $2^{\circ} 55' N.$ , long.  $124^{\circ} 53' E.$ ; near the Philippine Islands; depth, 2150 fathoms; bottom, blue mud; bottom temperature,  $38^{\circ}.9$ . One specimen; male. Trawled.

Station 285, October 14, 1875; lat.  $32^{\circ} 36' S.$ , long.  $137^{\circ} 43' W.$ ; South Pacific Ocean; depth, 2375 fathoms; bottom, red clay; bottom temperature,  $35^{\circ}$ . One specimen; male. Trawled.

This species is remarkable for the long and slender spine-like tooth on the posterior margin of the third somite of the pleon, the length of which is in marked contrast with that of all the other teeth, which are peculiar for their smallness.

The ophthalmus (fig. 4a) is of smaller diameter than the ophthalmopod, and is situated on the outer surface of the extremity.

The first pair of antennæ has the sensory cilia long and thickly packed together, and attached to the under surface of the base of the larger flagellum. The tooth at the outer margin of the distal extremity of the scaphocerite is small and unimportant.

The chelæ of the two anterior pairs of pereiopoda are small; the dactylos of the third pair is rather short, slightly curved, and serrate on the inner surface, and that of the posterior pair is short and almost obsolete.

*Observations.*—There are only two specimens in the collection; the more perfect is a male, and has the anterior branch of the first pair of pleopoda small, foliaceous, sub-membranous, and furnished with a small stylamblys without cincinnuli.

Both specimens were taken at a great depth and about 7000 miles apart.

*Acanthephyra media*, n. sp. (Pl. CXXIV. fig. 5).

Carapace dorsally flat and smooth to the frontal region, where it is laterally compressed and horizontally produced to a rostrum that is subequal in length with the carapace, the upper surface is armed with small teeth, which are numerous and closely packed at the base and widely separated towards the apex, and on the under margin with one (or two) at the base.

Pleon carinated, third and three succeeding somites being armed with a small tooth.

Telson long, tapering, and fringed on the distal margins with five or six small spinules.

Ophthalmopoda short and pyriform.

First pair of antennæ having the peduncle less than half the length of the rostrum.

Second pair of antennæ having a scaphocerite that is shorter than the rostrum; the flagellum is broken off at the length of the rostrum.

The rest of the appendages are imperfect, excepting the second pair of gnathopoda, which is slender, and the sixth pair of pleopoda, which has the external branch subequal in length with the telson.

	Femalo.	Male.
Length, entire, . . . . .	52 mm. (2 in.)	66 mm. (2.6 in.).
„ of carapace, . . . . .	14 „	17 „
„ of rostrum, . . . . .	12 „	11 „
„ of pleon, . . . . .	38 „	49 „
„ of third somite of pleon, . . . . .	7 „	8 „
„ of sixth somite of pleon, . . . . .	8.5 „	9 „
„ of telson, . . . . .	10 „	12 „

*Habitat.*—Station 207, January 16, 1875; lat. 12° 21' N., long. 122° 15' E.; off Tablas Island; depth, 700 fathoms; bottom, blue mud; bottom temperature, 51°·6. Two specimens; male (?) and female. Trawled.

The carapace is anteriorly compressed and produced horizontally to a rostrum that is subequal with it in length; it is armed on the upper surface with numerous small irregularly planted teeth, nine or ten being closely situated on the frontal crest, and three more distant from each other on the rostrum. The under surface is armed with one long slightly curved tooth situated near the base just above the orbit. In the second specimen (fig. 5c) there is a second smaller tooth near the middle of the rostrum.

The second and succeeding somites of the pleon are slightly carinated; the third, fourth, fifth, and sixth being posteriorly produced to a small tooth.

The telson is long, slender, and dorsally smooth, and armed at the sides and extremity with several small spinules.

The ophthalmopoda are pear-shaped and of moderate proportions, but exhibit no sign of an ocellus.

The first pair of antennæ is about half the length of the animal, and the second carries a scaphocerite that is a little shorter than the rostrum, and tapers to a rounded extremity, the tooth standing on the outer margin.

The pereopoda are rather small but not feeble; most of them are broken off.

*Observations.*—There are two specimens of this species, and they differ in small details from one another, there being, for instance, two teeth on the under side of the rostrum in one specimen, and only one on the other. The latter is a female, and without being quite certain, I take the former, which is the larger of the two, to be a male. The most characteristic features are of little pronounced specific value, and are represented more or less decidedly in the different species of the genus.

*Acanthephyra angusta*, n. sp. (Pl. CXXIV. fig. 6).

Animal laterally compressed. Carapace dorsally smooth, anteriorly produced to a horizontal rostrum, armed on the frontal crest with six small teeth, and on the under margin with two near the middle.

Pleon having the third somite elevated to a large tooth, and the fourth, fifth, and sixth somites posteriorly produced to a small tooth.

Telson subequal in length with the sixth somite.

Length, entire, . . . . .	74 mm. (3 in.).
„ of carapace, . . . . .	20 „
„ of rostrum, . . . . .	14 „
„ of pleon, . . . . .	54 „
„ of third somite of pleon, including tooth (3 mm.), . . . . .	10 „
„ of sixth somite of pleon, . . . . .	10 „
„ of telson, . . . . .	12 „

*Habitat*.—Station 194, September 29, 1874; lat.  $4^{\circ} 34' 0''$  S., long.  $129^{\circ} 57' 30''$  E.; off Banda Island; depth, 200 fathoms; bottom, volcanic mud. Two specimens. Dredged.

The rostrum is about half the length of the carapace and projects horizontally, with a slight elevation towards the point; the upper surface is armed at the base, rather anterior to the frontal region, with six small teeth closely packed together, the rest being smooth; the lower margin is also smooth, excepting for the presence of two small teeth situated near the middle.

The pleon is dorsally carinated from the second to the sixth somite; the third somite is produced to a large tooth that overlaps the fourth for more than half its length; the fourth, fifth, and sixth somites are all produced posteriorly to a small tooth, the sixth somite is longer than the fifth, and the telson is subequal with it.

The ophthalmopoda (fig. 6a) are short, thick, and supported on a short and narrow stalk, which enlarges a little from the base and is distally as broad as the ophthalmus; there is a small ocellus communicating freely with the ophthalmus.

The first pair of antennæ has the first joint deeply excavate to receive the ophthalmopod, the second and third joints are short, thick, and subcylindrical, and do not reach beyond half the length of the rostrum; the outer flagellum is large and about the length of the carapace, the extremity being broken, the under surface is thickly fringed with sensory hairs; the inner and slender flagellum is missing.

The second pair of gnathopoda and first pair of pereopoda are robust, and the chela of the latter short and thick. The rest of the pereopoda are wanting, and the terminal pair of pleopoda is longer than the telson.

*Observation*.—The general aspect of the species is not unlike that of *AcanthePHYRA acanthitelsonis*, the chief points of distinction being the different armature of the rostrum and telson.

*Acantheephyra sica*, n. sp. (Pl. CXXV. fig. 1).

Dorsal surface of the pleon slightly arched, the four posterior somites terminating in small dorsal teeth, of which the anterior is occasionally slightly the largest.

Carapace smooth, slightly carinated dorsally, and produced anteriorly to a rostrum that is equal in length to the carapace, and armed on the upper surface with nine or ten widely separated small teeth, the posterior being closer to one another than the others, and with five on the lower corresponding with the anterior five on the dorsal surface.

Ophthalmopoda pear-shaped and not very large.

First pair of antennæ having the first joint deeply excavated for the reception of the ophthalmopoda, and having a thick stylocerite that is sharply pointed, and about as long as the ophthalmopod; the two following joints are short, cylindrical, and carry two flagella that are a little longer than the rostrum.

Second pair carrying a slender flagellum that is as long as the animal, and a rigid scaphocerite that gradually narrows to the extremity, where it terminates in a sharp point; at its base, standing on the margin of the second joint, are two short but strong and sharp teeth, one above the scaphocerite, and the other below it.

Mandible broad, and having the teeth on the incisive margin regularly serrate, the central one being the most prominent. The molar process is triangulate, and the synhipod has the terminal joint short, broad, and tipped with hairs.

There is nothing very remarkable in the form of the gnathopoda or pereopoda besides their generic features.

Posterior pair of pleopoda having the branches narrow, pointed, and scarcely as long as the telson; outer branch longer than the inner, and having a well-defined broad ridge, the outer side terminating in a small tooth corresponding with the diæresis.

Telson long and narrow, longitudinally channelled on the dorsal surface, and armed at the lateral margins with nine or ten short articulating spines.

	Female.	Male.
Length, entire, . . . . .	85 mm. (3·4 in.).	63 mm. (2·5 in.).
„ of carapace, . . . . .	21 „	16 „
„ of rostrum, . . . . .	21 „	17 „
„ of pleon, . . . . .	64 „	47 „
„ of third somite of pleon, . . . . .	12 „	8 „
„ of sixth somite of pleon, . . . . .	14 „	10 „
„ of telson, . . . . .	18 „	12 „

*Habitat.*—Station 168, July 8, 1874; lat. 40° 28' S., long. 177° 43' E.; off New Zealand; depth, 1100 fathoms; bottom, blue mud; bottom temperature, 37°·2. Four specimens; one male, three females. Trawled.

Station 40, April 28, 1873; lat. 34° 51' N., long. 68° 30' W.; north-west of Bermuda; depth, 2675 fathoms; bottom, blue mud. One specimen. Dredged.

Station 159, March 10, 1874; lat.  $47^{\circ} 25' S.$ , long.  $130^{\circ} 22' E.$ ; south of Australia; depth, 2150 fathoms; bottom, Globigerina ooze; bottom temperature,  $34^{\circ} \cdot 5$ . Two specimens; males. Trawled.

Station 169, July 10, 1874; lat.  $37^{\circ} 34' S.$ , long.  $179^{\circ} 22' E.$ ; near New Zealand; depth, 700 fathoms; bottom, blue mud; bottom temperature,  $40^{\circ}$ . Three specimens; one male (damaged), two females. Trawled.

Station 170, July 14, 1874; lat.  $29^{\circ} 55' S.$ , long.  $178^{\circ} 14' W.$ ; off the Kermadec Islands; depth, 520 fathoms; bottom, volcanic mud; bottom temperature,  $43^{\circ}$ . One specimen; male. Trawled.

Station 170A, July 14, 1874; lat.  $29^{\circ} 45' S.$ , long.  $178^{\circ} 11' W.$ ; near the Kermadec Islands; depth, 630 fathoms; bottom, volcanic mud; bottom temperature,  $39^{\circ} \cdot 5$ . Trawled.

Station 181, August 25, 1875; lat.  $13^{\circ} 50' S.$ , long.  $151^{\circ} 49' E.$ ; between Australia and the Solomon Islands; depth, 2440 fathoms; bottom, red clay; bottom temperature,  $35^{\circ} \cdot 8$ . One specimen; male. Trawled.

Station 194, September 29, 1874; lat.  $4^{\circ} 34' 0'' S.$ , long.  $129^{\circ} 57' 30'' E.$ ; off Banda Island; depth, 200 fathoms; bottom, volcanic mud. Four specimens; damaged. Dredged.

Station 230, April 5, 1875; lat.  $26^{\circ} 29' N.$ , long.  $137^{\circ} 57' E.$ ; south of Japan; depth, 2425 fathoms; bottom, red clay; bottom temperature,  $35^{\circ} \cdot 5$ . Two specimens; males. Trawled.

Station 235, June 4, 1875; lat.  $34^{\circ} 7' N.$ , long.  $138^{\circ} 0' E.$ ; south of Japan; depth, 565 fathoms; bottom, green mud; bottom temperature,  $38^{\circ} \cdot 1$ . Two specimens; one male, one female. Trawled.

Station 318, February 11, 1876; lat.  $42^{\circ} 32' S.$ , long.  $56^{\circ} 29' W.$ ; north of the Falkland Islands; depth, 2040 fathoms; bottom, blue mud; bottom temperature,  $33^{\circ} \cdot 7$ . One fine specimen; male. Trawled. Length, 84 mm.

When the animal is fully extended the carapace is about one-fourth the length of the animal, measured from the orbital margin to the extremity of the telson. The postero-lateral margins of the carapace pass under the coxal plates of the first somite of the pleon. A small carina traverses the dorsal surface from the cardiac region forwards, and is lost in the serrature of the rostrum. The rostrum projects forwards to a length that is subequal with the carapace, and is armed on the upper surface with ten small teeth that are closer together near the frontal region and more distant anteriorly; the under surface is armed with five teeth that coincide with the same number, tooth for tooth, on the upper surface, except the most anterior on the upper surface, which has no corresponding tooth on the lower. The outer canthus of the orbit is clearly defined by a rounded angle, and the first antennal tooth is small, and lies closely impacted between the bases

of the first and second pairs of antennæ. The second antennal tooth is also small, and continued as an angular ridge posteriorly to the hepatic fissure.

The pleon is carinated, the first somite is smooth, and separated into two portions, the anterior portion is equal in length to the posterior, and passes under the dorsal surface of the carapace, so as to be entirely hidden when the animal is extended, and the coxal plate overrides the lateral walls of the carapace, and has the anterior margin, which is as deep as the carapace, excavate to correspond with the curve of the latter. The second somite is also dorsally divided into two portions, of which the anterior passes beneath the first when the animal is extended; it is dorsally carinated on the posterior division, the carina commencing and terminating abruptly, the posterior extremity in the median line being emarginate to admit the anterior edge of the carina of the following somite. The third somite is also divided into two portions, of which the anterior, that passes under the preceding somite, is much smaller than the posterior, which is strongly carinated, the carina commencing abruptly with the posterior division, and continuing posteriorly to a small, laterally compressed tooth. The fourth and fifth somites resemble the third, but have no anterior division, and the dorsal carina and dental elevation are less conspicuous. The sixth somite is nearly as long as the preceding two, and like them is dorsally carinated and posteriorly produced to a tooth, and the coxal plates are either wanting or reduced to a minimum condition, as the lateral walls of the somite are continuous with the ventral surface.

The telson (fig. 1z) is narrow, tapering, and considerably longer than the sixth somite, and not much shorter than the carapace; it is dorsally grooved from just beyond the base to just within the apex, the sides are longitudinally depressed suddenly, and armed on the distal half with nine separate small spinules, and terminally with four.

The ophthalmopoda (fig. 1a) are somewhat pyriform and supported upon a small pedicle, from which they suddenly enlarge; they are slightly compressed laterally, and increase in size as they approach the ophthalmus, which is orbicular, and separated by a constriction from the base on which it stands, and which projects to a small tubercle on the inner side, and carries a small and somewhat imperfect ocellus on the posterior part, connected by a thin line of pigment with the ophthalmus.

The first pair of antennæ (fig. 1b) has the peduncle short or about a fourth of the length of the rostrum. The first joint is deeply hollowed on the upper surface to receive the ophthalmopod, and carries a stylocerite that is shorter than the first joint, and has the outer wall perpendicular, the apex of which is suddenly narrowed to a small sharp tooth, and the base strengthened by two small tubercles that project upon the dorsal surface between the outer canthus of the orbit and the first antennal tooth, against which the outer surface of the stylocerite presses and receives support when the antennæ are directed outwards. The second and third joints are short and cylindrical, and support two flagella, of which the outer is much larger in both sexes than the inner; the latter is

slender, cylindrical, and a little longer than the carapace, the former is broad at the base, and then suddenly tapers to a slender termination which is subequal with the inner in length; the lower surface is thickly matted with closely packed membranous cilia that stand on the rounded surface, and not in a hollow as in some genera.

The second pair of antennæ (fig. 1c) carries a long and pointed scaphocerite that is but little shorter than the rostrum; the inner or foliaceous portion tapers to the apex, where it gradually merges into the strong distal tooth; the outer margin is strengthened by a ridge which falls between two rigid and strong teeth standing on the outer and distal margin of the second joint of the peduncle. On the outer side of the ridge the upper tooth checks the backward action of the outwardly extended scaphocerite by falling into a longitudinal groove (fig. 1c''), and pressing against the elevated ridge on that side, and so making this organ an efficient weapon of offence.

The mandibles (fig. 1d) are deeply embedded in the oral cavity between the cheilognossa in front (*ch.a.*), which extends into and fills the cavity between the mandibles (*d.*) and the metastomata (*m.a.*), which falls against them posteriorly. The psalistoma is broad, thin, concavo-convex, and serrate at the margin; it is continuous with the molar process, and carries a two-jointed synnhipod, of which the first joint is long, and the second short and disc-shaped.

The first pair of siagnopoda (fig. 1e) does not differ much from that of other allied genera; it is small, of considerable tenuity, and three-branched, the two inner branches being tipped with short, stiff spinules, and the outer smooth, membranous, and obtusely pointed.

The second pair (fig. 1f) consists of three broad plates of extreme tenuity, and one short and narrow; one of the inner plates is divided into two, and fringed on the inner margin with numerous closely packed short spinules, the inner basal one with long and slender hairs; the central is short, narrow, and obtusely pointed, and the outer is developed into a large mastigobranchial plate of extreme tenuity, and fringed with cilia, all directed anteriorly in a centrifugal manner.

The third pair of siagnopoda (fig. 1g) has three plates; the outer plate is broad, curved, and of great tenuity, and fringed with hairs; the concave inner margin is reflexed at nearly right angles longitudinally; at the base is a bifid mastigobranchial plate, free from hairs or cilia.

The first pair of gnathopoda is subpediform and seven-jointed; the terminal joints are reflexed, the basis carrying a long ephysis, and the coxa a small mastigobranchial plate and podobranchial plume.

The second pair (fig. 1i) is pediform and five-jointed; the coxa carries a lunate disc-like plate, of which the upper horn is bifid, while to the lower horn is attached a short and rudimentary membranous mastigobranchial plate, and near the centre of the crescent a small podobranchial plume. The basis carries a slender ephysis that is two-thirds of

the length of the next succeeding joint, which consists most probably of the ischium and meros united, and is curved to leave space for the oral appendages. The next joint is long and narrow, and probably represents the carpos, and the terminal joint is long, slender, and straight, obliquely truncate, and laterally fringed with a soft fur of short hair.

The first and second pairs of pereiopoda are chelate, the anterior pair is slightly shorter than the succeeding, and a little more robust; the carpos is long, nearly as long as the propodos, which is not larger in diameter, and terminates in two closely impinging fingers, of which the movable dactylos is more curved than the fixed pollex. The third, fourth, and fifth pairs of pereiopoda are simple and rather short, being scarcely longer than the first two pairs; the ischium and meros are rather stout, and the carpos is long; the third and fourth pairs terminate in a long and slender dactylos, while in the fifth pair it is short and supported by a brush of hair. All the pereiopoda, including the chelate pairs, and also the gnathopoda, carry a slender basephysis that lessens in length on each posteriorly, but is never rudimentary, and all excepting the posterior pair carry a mastigobranchial appendage, which, though small, is sufficiently long to penetrate to about half their length between the branchial plumes, and fulfil, we may assume, some efficient duty connected with respiration.

The pleopoda are biramose, having a short basal joint and narrow, subfoliaceous, flexible branches; the inner in the female carries a long stylamblys tipped with a bundle of cincinnuli, except in the case of the first pair, which has the inner ramus reduced to a rudimentary condition and thickly fringed with plumose hairs, and without a stylamblys such as is present in *Acanthephyra armata*. The posterior pair of pleopoda, which forms the lateral plates of the rhipidura, is narrow and subequal in length to the telson, and the outer angle of the diæresis is armed with a tooth and small spinule.

The eggs are ovate and numerous, and of moderate dimensions.

The branchiæ are generic in character.

*Observations.*—This species appears to be both abundant and widely distributed; it was taken by the Challenger at eleven stations, more or less distant from one another, —in the Atlantic and Pacific Oceans, as far north as Japan, and as far south as New Zealand. It is a more perfect representative of the genus than *Acanthephyra armata*. Its bathymetrical range is also great, since it has been taken at a distance of from less than half a mile to about three miles from the surface of the ocean. It appears to be very prolific also, since some of the females that were captured carry a large number of small eggs.

The specimen taken at Station 318 in the South Atlantic Ocean is a variety that approximates somewhat both in size and features to *Acanthephyra acanthitelsonis*, which was taken in Mid Atlantic near the equator. It differs from the typical form in being larger, in having only three teeth on the lower margin of the rostrum, two of which

are near the apex, while the third stands alone near the centre of the rostrum, and none of them correspond with any on the upper margin, but stand nearly equidistant between them. It was taken associated with four specimens of *Acanthephyra brachytelsonis*.

*Acanthephyra armata*, A. Milne-Edwards (Pl. CXXV. fig. 2).

*Acanthephyra armata*, A. Milne-Edwards, Ann. d. Sci. Nat., sér. 6, tom. xi. p. 12, 1881.

Carapace armed on the frontal crest with five small teeth, closely packed together. Rostrum elevated anteriorly, smooth on the upper surface, and armed on the lower with one large tooth that gives a forked appearance to the rostrum.

Four posterior somites of the pleon dorsally carinated and posteriorly armed with four subequal teeth.

Telson subequal in length with the sixth somite of the pleon.

Length, entire (male),	.	.	.	.	.	88 mm. (3.4 in.).
„ of carapace,	.	.	.	.	.	25 „
„ of rostrum,	.	.	.	.	.	25 „
„ of pleon, ..	.	.	.	.	.	63 „
„ of third somite of pleon, including tooth (3 mm.),	.	.	.	.	.	15 „
„ of sixth somite of pleon,	.	.	.	.	.	11 „
„ telson,	.	.	.	.	.	15 „

*Habitat*.—Station 194, September 29, 1874; lat. 4° 34' 0" S., long. 129° 57' 30" E.; off Banda Island; depth, 200 fathoms; bottom, volcanic mud. One specimen, male. Dredged.

The carapace is smooth, dorsally carinated, and anteriorly produced to a rostrum as long as the carapace, strengthened at the base by a ridge on each side, and armed on the upper surface with a crest of five small teeth placed closely together over the frontal region, whence it is smooth to the apex; the lower surface is armed with a large solitary tooth rather more than half-way between the base and the apex, and beyond this tooth the rostrum curves upwards. On each side above the branchial region is a small longitudinal elevation, that dies out anteriorly above the hepatic region and posteriorly before it reaches the posterior margin, which lies under the lateral walls of the first somite of the pleon.

The pleon is laterally compressed and dorsally carinated, except the first somite, which is smooth, and has the anterior margin of the coxal plate overlapping the posterior margin of the carapace and widely excavated. The second somite is dorsally carinated, but not produced to a tooth; the third somite is dorsally carinated, the carina commencing abruptly with the posterior division and being produced posteriorly to a strong laterally compressed tooth; the fourth somite is dorsally carinated, the

carina, commencing with the anterior margin of the somite, being continued posteriorly to a tooth that is smaller than the preceding. The fifth and sixth somites resemble the fourth, except that the posterior teeth are successively smaller.

The telson is slightly carinated anteriorly, flattened posteriorly, and terminates in four small spines; it is laterally depressed and furnished with three or four almost rudimentary spinules.

The first pair of antennæ is subequal in length with the rostrum, and the upper flagellum carries on the under surface a thick mat of membranous cilia.

The second pair is slender and almost equal in length to the animal.

All the other parts appear to possess only generic characters.

*Observations.*—After having had the opportunity of examining the specimens in the possession of Professor Alphonse Milne-Edwards, I felt convinced that those procured by Professor Agassiz, off St. Lucia, in the West Indies, at a depth of 422 fathoms, were specifically the same as that taken by the Challenger in the Polynesian Archipelago at 200 fathoms; although the localities are distant, the variations between them are few and unimportant.

The type has the rostrum subequal in length with the carapace and gradually curves upwards from the base, the solitary tooth upon the lower margin being nearly on a level with the distal extremity of the scaphocerite.

The Challenger specimen has the rostrum rather shorter than the carapace, slightly curving upwards from the horizontal until the solitary tooth is reached, whence the direction is upwards and forwards, the apex being somewhat depressed. The five small teeth on the dorsal crest increase gradually in size from the posterior to the anterior, forming part of a carina, which commences on the cardiac region.

*Acanthephyra acanthitelsonis*, n. sp. (Pl. CXXV. fig. 3).

Carapace smooth, dorsum slightly elevated posteriorly. Rostrum slender, horizontal, armed on the upper surface with seven or eight small teeth and with four or five on the lower, and a small fasciculus of ciliated hairs at the base.

Pleon smooth, laterally compressed, and dorsally carinated in all except the first somite, which is smooth and posteriorly notched in the median line, as is also the second, whereas the third and succeeding somites are posteriorly produced to a small overlapping tooth, of which that on the third somite is the largest.

Telson longer than the outer plates of the rhipidura, slender, armed with about forty strong articulating spines, twenty on each side, and terminating in two smaller ones at the extremity.

The first pair of antennæ is about two-thirds the length of the animal.

The second pair has the scaphocerite a little longer than the rostrum, longitudinally grooved, tapering, and abruptly terminating in a sharp point.

Length, entire, . . . . .	103 mm. (4 in.)
„ of carapace, . . . . .	25 „
„ of rostrum, . . . . .	15 „
„ of pleon, . . . . .	78 „
„ of third somite of pleon, including tooth (2.5 mm.),	14.5 „
„ of sixth somite of pleon, . . . . .	13 „
„ of telson, . . . . .	24 „

*Habitat*.—Station 106, August 25, 1873; lat. 1° 47' N., long. 24° 26' W.; Atlantic, south-west of Sierra Leone; depth, 1850 fathoms; bottom, Globigerina ooze; bottom temperature, 36°.6. One specimen; male. Trawled.

Station 107, August 26, 1873; lat. 1° 22' N., long. 26° 36' W.; Atlantic, south-west of Sierra Leone; depth, 1500 fathoms; bottom, Globigerina ooze; bottom temperature, 37°.9. One specimen; male. Trawled.

Length 96 mm.

This species bears some resemblance to *Acanthephyra purpurea*, but it may readily be distinguished from it by the shortness of the rostrum and the less important dental armature on the back of the pleon, and on closer inspection by the more abundant and important spinules on the telson and the obtuse character of the scaphocerite.

The ophthalmopod carries a small tubercle on the inner side, and the ocellus is small and near the margin of the ophthalmus. Between the several pairs of pereopoda, as they succeed each other, may be observed the small articulating plate that is very conspicuous in the genus *Astacus* and its fresh-water congeners, and also a strong tubercle carrying a fasciculus of extremely long, flexible, shortly ciliated hairs that penetrate between the branchial plumes.

The scaphocerite (fig. 3c) is a little longer than the rostrum and has the terminal tooth small and the inner squamous division slightly projecting beyond its point of union with the tooth; it is longitudinally grooved and ridged, and articulates between two supporting teeth on the distal margin of the second joint.

On the ventral surface, posterior to the fifth pair of pereopoda, are two projecting, large, and conspicuous tubercles placed closely together, that are connected with the coxal joint; they are apparently the calcified sheath of the penis, which I have observed in another species.

*Observations*.—Both specimens are larger than the Challenger specimens of *Acanthephyra purpurea* and that of A. Milne-Edwards taken in the West Indies, but they are of about the same size as a variety of the latter species taken at Station 318, in the South Atlantic, off the south-eastern coast of South America.

*Acantheephyra edwardsii*, n. sp. (Pl. CXXVI. fig. 1).

Carapace laterally compressed and dorsally carinated, and anteriorly produced to a straight rostrum that is armed on the crest and upper margin with seven small teeth, two at the base and five in advance of the orbit, and with four teeth on the lower margin near the apex, distally and unequally separated from one another.

The second somite of the pleon is feebly carinated, the third is more distinctly so and produced to a slender tooth about one-third the length of the next somite; the fourth, fifth, and sixth somites are produced to a point that can scarcely be called a tooth.

The telson is long and tapering.

The three posterior pairs of pereopoda are armed with numerous small spines on the posterior margin; the third and fourth pairs terminate in a long, styliform dactylos, and the fifth in a very small one.

	Female.	Male.
Length, entire, . . . . .	111 mm. (4.3 in.).	118 mm. (4.6 in.).
„ of carapace, . . . . .	32 „	38 „
„ of rostrum, . . . . .	23 „	22 „
„ of pleon, . . . . .	79 „	80 „
„ of third somite of pleon, } including tooth (3 mm.), }	17 „	{ including } { tooth (4 mm.), } 17 „
„ of sixth somite of pleon, .	13 „	14 „
„ of telson, . . . . .	19 „	21 „

*Habitat*.—Station 126, September 12, 1873; lat. 10° 46' S., long. 36° 8' W.; south of Pernambuco; depth, 770 fathoms; bottom, red mud. Two specimens; one male, one female. Trawled.

This species very much resembles *Acantheephyra carinata*, but may readily be distinguished from it by the form of the armature on the dorsal crest of the carapace. In *Acantheephyra carinata* the serrature is formed like a series of oblique divisions in the narrow carina, whereas in the present species it is formed as a row of distinctly separate teeth, five of which are near together and form the crest, and two or three others, which are more distant, upon the rostrum, the most distant being on a level with the posterior on the lower margin, from which to the apex the upper surface is smooth. The lower surface is armed with four teeth, the posterior corresponding with the anterior on the upper surface, the second is close to it, and the other two are subequally distant from each other and the apex. The dorsal carina is not very elevated and is continuous from the rostrum to the telson.

The pleon is arched and not strongly carinated, the carina culminating at the third somite, which is posteriorly produced to a tooth that is not very elevated but reaches to about one-third of the length of the fourth somite; the fourth somite terminates in the median line in a sharp tooth, almost at right angles; the fifth projects a very little, and the sixth is produced still more but not sufficiently to be described as a tooth.

The ophthalmopoda are short and flattened.

The joints of the peduncle of the first pair of antennæ are short and support a flagellum that is about as long as the carapace.

The second pair carries a scaphocerite that reaches to the extremity of the rostrum; it is broad at the base and gradually tapers to the distal extremity, where it is furnished on the outer margin with a small tooth. The flagellum in both specimens is broken short off.

The second pair of gnathopoda is a long and powerful organ, pediform in shape, and has the terminal joint long, robust, and styliform.

The second pair of pereopoda is longer and more slender than the first, and the three following are furnished with small but well-formed spines along the posterior margins of the ischium and meros, but none on the carpos or propodos; the latter joint is straight, slender, and terminates in a dactylos that is long and styliform in the third and fourth pairs, but short and almost rudimentary in the fifth pair.

The first pair of pleopoda carries a small bud-like branch, attached to the inner and anterior side in the female, but produced to a larger leaf-like plate, somewhat truncate at the extremity, in the male.

The telson (fig. 1z) is broad at the base and tapers to the extremity, which is on a level with the inner plate of the rhipidura. The dorsal surface is rounded and free from any carina, the sides are compressed and smooth, having no teeth or spines except at the extremity, which is furnished with three or four short spinules.

*Acanthephyra carinata*, n. sp. (Pl. CXXVI. fig. 2).

Dorsal surface carinated from the rostrum to the telson. Rostrum about half the length of the carapace, anteriorly slightly elevated, dorsal surface and crest armed with six or seven short teeth; under surface armed with one tooth near the middle and immediately below the most anterior tooth on the upper, whence the rostrum is smooth to the apex. On each side of its base the rostrum is strengthened by an obliquely horizontal ridge. The dorsal carina dies out just within the posterior margin of the carapace, but is reproduced on the first somite of the pleon.

The first somite of the pleon is anteriorly smooth and posteriorly carinated. All the other somites are carinated, and the third, fourth, fifth, and sixth are posteriorly produced to a sharp tooth.

The telson (fig. 2z) is dorsally carinated on the anterior half and terminates posteriorly in a central tooth, flanked by three smaller ones.

The ophthalmopoda (fig. 2a) are short, broad, and furnished with a small ocellus.

The first pair of antennæ is about half the length of the animal and is furnished with a stylocerite that equals the length of the first joint.