

half the length of the leg and divided into seven articuli, the first two of which are short, the third, fourth, and fifth being subequally long, the sixth short, and the seventh about the same length as the fifth. The fingers of the chela are a little shorter than the palm of the propodos, and the coxa is furnished with a rudimentary mastigobranchia, similar in form to that on the preceding pair, and corresponding with those on the following pereopoda. The last three pairs of pereopoda are simple, the dactylos being slightly curved and furnished with a few spines and a small tooth on the inner margin near the unguis (*m*).

The pleopoda are biramose.

The telson is nearly as long as the lateral plates of the rhipidura, posteriorly tapering and truncate, the distal margin being fringed with hairs, and bearing a spinule at each angle, and the dorsal surface bearing two rows of spinules, four in each row, which Leach thought sufficient to make a specific distinction

Length, entire, . . . . .	35 mm. (1.3 in.).
„ of carapace, . . . . .	10 „
„ of rostrum, . . . . .	6 „
„ of pleon, . . . . .	25 „
„ of third somite of pleon, . . . . .	5.5 „
„ of sixth somite of pleon, . . . . .	4 „
„ of telson, . . . . .	7 „

*Habitat*.—Station 49, May 20, 1873; lat. 43° 3' N., long. 63° 39' W.; south of Halifax; depth, 85 fathoms; bottom, gravel, stones; bottom temperature, 35°. Numerous specimens of both sexes and all the varieties. Associated with *Spirontocaris spinus*. Dredged.

A peculiar parasitic Cirriped was found on this species which will be described by Dr. Hoek in the Appendix A to this Report.

### *Nauticaris*, n. gen.

Carapace one-third the length of the animal, anteriorly compressed, dorsally crested, and produced to a well-developed rostrum, adorned with teeth on the upper and lower margins; orbital region without supraorbital teeth. Outer canthus defined by a small point; antennal tooth just behind the frontal margin, infero-lateral angle defined by a small point.

Pleon smooth, third somite slightly arcuate. Sixth somite but little longer than the fifth, and furnished with a movable spine at the posterior extremity of the lower margin, just in advance of the articulation of the rhipidura.

Telson tapering.

Ophthalmopoda pyriform and furnished with a small ocellus.

First pair of antennæ carrying a strong stylocerite and terminating in two moderately long flagella.

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

Mandible having the molar process cylindrical, without a psalistoma, but furnished with a slender three-jointed synnhipod.

Second pair of gnathopoda very long, straight, projecting beyond the rostrum, four-jointed, the coxa carrying a short, almost rudimentary, mastigobranchia.

First pair of pereiopoda chelate, robust; carpos long, and articulating with the propodos in the middle. Second pair long and slender, minutely chelate; carpos long and multiarticulate. Posterior three pairs of pereiopoda simple, unguiculate, and fringed with spinules.

Pleopoda biramose, foliaceous; terminal pair having the outer ramus furnished with a diæresis.

The branchial arrangement corresponds closely with that of *Merhippolyte agulhasensis*, but there is an additional plume, as seen in the following table:—

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

*Geographical Distribution*.—Southern area of the Atlantic and Indian Oceans.

*Observations*.—This genus may easily be recognised by such external features as the great length of the second pair of gnathopoda, and the small movable spine attached to the postero-inferior margin of the sixth somite of the pleon. From the appearance of Milne-Edwards' figure (*loc. cit.*, pl. xxv. fig. 8) I am inclined to believe that *Hippolyte marmoratus* of Olivier, Lamarck, and Milne-Edwards, and perhaps also *Hippolyte aculeatus* of Fabricius and Sabine, may belong to this genus.

*Nauticaris marionis*, n. sp. (Pl. CVIII.).

Carapace dorsally crested, laterally smooth, having no supraorbital, antennal, or hepatic tooth; produced to a strong laterally compressed rostrum, which is anteriorly deep, armed on the upper margin with from eight to twelve teeth, the posterior three of which stand upon the frontal crest posterior to the orbital notch, and with three upon the lower margin.

The ophthalmopoda are pyriform.

The first pair of pereiopoda is robust, the second pair slender and longer than the first, the carpos being long and numerously articulate.

The pleon is dorsally smooth and unarmed. Fifth somite short, and armed at its postero-inferior angle with a sharp pointed movable spine.

Telson tapering.

	Female.	Male.
Length, entire, . . . .	38 mm. (1.5 in.)	32 mm. (1.2 in.).
„ of carapace, . . . .	12 „	9 „
„ of rostrum, . . . .	8 „	7.8 „
„ of pleon, . . . .	26 „	23 „
„ of third somite of pleon, . . . .	5 „	5 „
„ of sixth somite of pleon, . . . .	4 „	3.5 „
„ of telson, . . . .	7.5 „	6 „

*Habitat*.—Station 144A, December 26, 1873; lat.  $46^{\circ} 48' 0''$  S., long.  $37^{\circ} 49' 30''$  E.; off Marion Island; depth, 69 fathoms; bottom, volcanic sand. Sixty-seven specimens; males and females, the former apparently predominating. Dredged. Some of the females were taken with ova attached, in which the embryo was far advanced in development.

Station 145, December 27, 1873; lat.  $46^{\circ} 43' 0''$  S., long.  $38^{\circ} 4' 30''$  E.; off Prince Edward Island; depth, 140 fathoms; bottom volcanic sand. Three specimens; males. Dredged.

Station 315, January 26, 1876; lat.  $51^{\circ} 40'$  S., long.  $57^{\circ} 50'$  W.; off the Falkland Islands; depth, 12 fathoms; bottom, sand, gravel. One specimen; male. Dredged.

The carapace is laterally smooth and free from any denticular ornamentations, excepting those which exist on the frontal crest and rostrum, and those on the frontal margin which mark the orbital and antennal regions. The dorsal surface culminates in a frontal carina that projects as a rostrum (fig. 2), which is armed on the upper surface with from eight to twelve teeth, the posterior situated on the gastric region and the anterior being subapical. The larger number of teeth appears to occur in the males and the smaller in the females. On the under surface there are three large teeth, the posterior being the largest, lying in advance of a deep excavation for the reception of the ophthalmopoda. The outer canthus of the orbit is defined by a tooth, and beyond it there exists an antennal tooth, from which the frontal margin of the carapace descends slightly forwards and forms a slightly projecting tooth at the junction with the inferior margin; the latter recedes posteriorly and downwards to form the branchial chamber.

The somites of the pleon are smooth, unarmed, and subequal in length; the third is slightly arcuate, rather more so in the males than in the females. The fifth somite is the shortest, and the sixth slightly the longest; the latter has the lateral walls confluent with the ventral surface of the somite, and is furnished at the postero-inferior angle with a movable spine (v) that, so far as my experience goes, is unique. It is broad and flat at the base and tapers to a sharp point; it appears to spring from a hollow space in the margin rather than being directly attached to it, it is slightly movable and fringed with ciliated hairs on the anterior margin only.

The telson (z) is rigid, tapers to a point, and is armed on each side of the dorsal surface

with three distant spinules, and with a long and a short one at each angle of the terminal extremity.

The ophthalmopoda (*a*) are nearly half the length of the rostrum, pear-shaped, and carry a small round ocellus, lodged in an excavation in the upper or posterior margin of the ophthalmus and connected with it.

The first pair of antennæ (*b*) carries a long and powerful stylocerite that is sharp pointed and reaches beyond the distal extremity of the first joint of the peduncle, the outer distal angle of which is armed with a small tooth; the second joint is shorter than the first and similarly armed; the third is still shorter and distally supports two unequal flagella. The outer flagellum is the shorter and more robust, and is only a little longer than the peduncle, the inner is very slender and longer than the carapace.

The second pair of antennæ is about the length of the animal and carries a scaphocerite (*c*) that reaches a little beyond the extremity of the rostrum, and gradually tapers from the base to the extremity, the distal tooth reaching, as a stiff sharp point, considerably beyond the foliaceous plate, which is fringed from base to apex on the inner margin with long ciliated hairs.

The mandible (*d*) has the molar process dentated and placed at a right angle to the apophysis; it carries a three-jointed synphipod, but has no trace of a psalistoma.

The first pair of siagnopoda (*e*) is three-branched; the inner branch is narrow, the middle one broad, discoidal, and fringed on the distal and inner margins with short fur-like hairs, and the third or outer branch broad at the base and gradually narrowing to a truncated extremity, which is tipped with three strong hairs.

The second pair of siagnopoda (*f*) is five-branched; the inner branch is narrow, subcylindrical and tipped with long ciliated hairs; the second and third are subequal, broad, flat, foliaceous, and fringed on the inner margin with thickly planted short hairs; the fourth branch is short, tapering, smooth and rudimentary; the fifth is broad, flat and foliaceous, homologises with the mastigobranchial plates and projects anteriorly and posteriorly beyond the preceding joints, and is fringed with short hairs.

The third pair of siagnopoda (*g*) has the inner joint broad, flat, and fringed with hairs; the second projects to a long, tapering, multiarticulate flagellum, supported on the outer side at the base by a broad foliaceous plate fringed with hairs; at the base of this plate there is a two-lobed mastigobranchial plate, one lobe of which projects anteriorly and the other posteriorly.

The first pair of gnathopoda (*h*) is seven-jointed. The basal joints are broad; the coxa carries a discoidal mastigobranchia to which is attached a small podobranchial plume; the basis supports a long ecphysis that terminates in a multiarticulate extremity; the ischium, which appears to be fused with the basis, gradually narrows to the extremity, where it joins the meros, which is short and distally supports the carpos; the latter is reflexed upon itself and carries the propodos, which appears to coalesce with the



dactylos, and falls against the inner surface of the ischium, which is narrowed to receive it.

The second pair of gnathopoda (*i*) is very long and powerful, but only formed of four joints; the first or coxa is short, broad, and supports a small mastigobranchia (*i''*) which is somewhat rigid, sharp pointed, lies close against the joint, and is furnished near the distal extremity with two small, curved, converging, pointed teeth; the second joint is long and trigonate, it is probably formed by the union of the basis and ischium, but it shows no trace of an articulation, it is excavate at the base for the greater play of the oral appendages. The third joint is not half the length of the second, it is smooth and subcylindrical; the fourth is nearly equal in length to the three preceding, gradually tapers to an obtuse point, and is fringed with small spinules.

The first pair of pereopoda is moderately long and tolerably robust, the propodos being about half as long again as the carpos and nearly twice the length of the dactylos, which is subequal with the pollex. The second pair of pereopoda (*l*) is long and considerably more slender than the first pair, it has the carpos multiarticulate and much longer than the rest of the limb. The first, second, third, and fourth pairs of pereopoda carry a small mastigobranchia similar to that which exists on the second pair of gnathopoda, and like it without a branchial plume. The fifth pair of pereopoda resembles the two preceding, and like them terminates in a simple dactylos, but carries no mastigobranchia.

The pleopoda are biramose, the sixth pair (*v*), forming part of the rhipidura, is only a little longer than the telson; the margins are fringed with long hairs and the outer plate is furnished with a short, stiff spinule at the outer angle of the diæresis.

From the depths at which the specimens were taken it appears that although they live near the bottom they are not inhabitants of deep water.

*Nauticaris futilirostris*, n. sp. (Pl. CIX. fig. 1).

Carapace about one-fourth of the length of the animal; sides free from armature; dorsal surface carinated, crested and armed with two teeth on the frontal and gastric regions, and with three beyond on the rostrum, the extremity of which is elevated, with one tooth on the lower margin near the apex.

Pleon smooth, fifth somite short, sixth nearly twice its length.

Telson long and tapering.

Ophthalmopoda pyriform.

First antennæ short, robust; inner flagellum stout, outer slender.

Second antennæ as long as the animal, and furnished with a scaphocerite that is as long as the first antennæ.

Second gnathopod long and robust.

First pereopod robust, carpos distally as wide as the propodos.

Length, 22 mm. (0.9 in.).

*Habitat*.—Station 233A, May 19, 1875; lat. 34° 38' N., long. 135° 1' E.; off Japan; depth, 50 fathoms; bottom, sand. One specimen; female, bearing ova. Dredged.

The carapace is smooth, slightly carinated on the frontal region, anteriorly produced to a slender rostrum that does not reach beyond the distal extremity of the peduncle of the first pair of antennæ; it is armed with five teeth on the upper margin, three of which stand on the frontal crest, the other two on the free portion of the rostrum, and with one on the lower margin near the apex, which terminates in a single, sharp, elevated point.

Pleon smooth, having the third and fourth somites gibbous, and the sixth somite short and furnished with a small tooth-like spine.

Ophthalmopoda long, pyriform; ocellus close to the margin of the ophthalmus.

First pair of antennæ having the peduncle about the length of the rostrum, and the flagella about equal in length to the peduncle. The inner and upper flagellum is very much more robust than the outer, and the basal joint of the peduncle is furnished with a sharp pointed stylocerite that reaches nearly to the extremity of the third joint.

The second pair of antennæ is furnished with a scaphocerite that is broad and rounded at the extremity, armed on the outer margin with a short strong tooth, and reaching beyond the distal extremity of the rostrum and nearly to that of the first pair of antennæ; it also carries a flagellum that is slender and about equal to the length of the animal.

The second pair of gnathopoda is long, robust, and reaches beyond the distal extremity of the rostrum.

The first pair of pereiopoda is tolerably robust, and has the carpos long and cylindrical, and the propodos still longer, and articulating near the middle of the carpos. The second pair is long and slender, the propodos being equally so with the carpos. The three posterior pairs of pereiopoda are not long but tolerably robust, having the anterior distal extremity of the carpos projecting to a strong process or blunt tooth over the base of the propodos; the dactylos is bi-unguiculate, the concave or posterior margin being furnished with several spines.

The telson is tapering, subequal in length to the lateral plates of the rhipidura, and tipped with two or three long spines.

*Observations*.—This species corresponds closely with Stimpson's description of *Hippolyte gracilirostris*,<sup>1</sup> which he found among stones at a depth of about 2 fathoms, in the Gulf of Hakodadi in North Japan, but it differs in several details. Stimpson describes his species as "having the carapace smooth, with an anterior very short carina; the anterior margin being armed with only a pterygostomianal [fronto-lateral] tooth. The rostrum being slender, straight, a little deflexed, short, not reaching

<sup>1</sup> *Proc. Acad. Nat. Sci. Philad.*, 1860, p. 103.

beyond the last joint of the peduncle of the first pair of antennæ, six equal teeth on the upper surface, the posterior two being on the carapace; apex bi-denticulate, inferior margin being armed with two teeth a little behind the apex."

In the Challenger specimen there are only five teeth on the dorsal crest and rostrum, of which two are posterior to the orbital margin, and three stand on the rostrum, and only one near the apex on the lower margin. The apex is also slightly turned upwards, whereas in Stimpson's description it is said to be straight and bifid, with two teeth on the lower margin. He also describes the frontal margin of the carapace as having no tooth but that which defines the frontal from the lateral margin, whereas in *Nauticaris futilirostris* the outer canthus of the orbit is defined by a small point or tooth; another and larger one corresponds with the first antenna, another but rather smaller one with the second antenna, and one still smaller is situated at the fronto-lateral angle.

The second pair of gnathopoda also appears to be longer in our specimen than in the one described by Stimpson, and the animal is more robust and thick, but this might in part be due to its being a female gravid with ova.

It may also be compared with Dana's species, *Hippolyte brevirostris*,<sup>1</sup> which was taken at Dungeness in the Straits of De Fuca, Oregon, but which has only four teeth on the upper margin of the rostrum and none on the lower.

*Nauticaris unirecedens*, n. sp. (Pl. CX. fig. 1).

Carapace anteriorly crested and produced to a rostrum that is armed on the upper surface with seven equidistant teeth, and one placed further back on the dorsal surface over the gastric region.

Length, entire, . . . . .	23 mm. (0.9 in.).
„ of carapace, . . . . .	7 „
„ of rostrum, . . . . .	3.5 „
„ of pleon, . . . . .	16 „
„ of third somite of pleon, . . . . .	3.5 „
„ of sixth somite of pleon, . . . . .	2.5 „
„ of telson, . . . . .	4.5 „

*Habitat*.—Hong Kong. One specimen; female.

The animal is robust in appearance, the dorso-frontal surface being slightly compressed and elevated to a small carina that is armed on the gastric region with one well-developed tooth, in front of which there is a space without any tooth. On the frontal region, posterior to the orbital margin, a series of seven teeth commences and continues on the

<sup>1</sup> Dana, *loc. cit.*, p. 566, pl. xxxvi. fig. 5.

rostrum nearly to its apex; on the lower surface of the rostrum near the distal extremity there are three teeth, behind which the inferior margin is excavate for the more free play of the ophthalmopoda, a condition that gives a somewhat arcuate appearance to the rostrum. The frontal margin has the orbit nearly coincident with the first antennal tooth, whence it descends vertically to the infra-lateral margin, the angle being defined by a small tooth; there are no teeth on the orbital or hepatic regions.

The pleon is smooth and dorsally rounded, the somites are subequal, the fifth and sixth being the shortest.

The telson is dorsally flattened, and laterally armed with two small, distantly situated spinules, placed a little within the margins; it gradually tapers to the extremity, which is furnished with a row of long and slender hairs.

The ophthalmopoda are cylindrical and about half the length of the rostrum, the stalk being as stout as the ophthalmus.

The first pair of antennæ is biramose; the peduncle reaching considerably beyond the distal extremity of the rostrum; the first joint is longer than the ophthalmopod, and supports a strong stylocerite that reaches to its extremity; the second joint is about half the length of the first, and extends beyond the extremity of the rostrum, and the third joint is short, being scarcely more than half the length of the second.

The second pair of antennæ is about once and a half the length of the animal and tapers to a delicately fine point, and the peduncle supports a scaphocerite that extends a little beyond the peduncle of the first pair of antennæ.

The mandibles and other oral appendages could not be thoroughly examined without destroying the single specimen.

The second pair of gnathopoda is moderately robust and four-jointed, the terminal joint, reaching beyond the distal extremity of the peduncle of the first pair of antennæ, is hirsute and tipped with three strong spinules.

The first pair of pereopoda is moderately robust; the propodos is subequal in length, but not much broader than the carpos, the hand is long, ovate, and terminates in a chela that has subequal fingers; the pollex and dactylos are convergent, meet at some little distance within the points, and are about half the length of the palm of the propodos. The second pair of pereopoda is long, slender and minutely chelate; the carpos, which forms about half the length of the limb, is multiarticulate. The fourth pair of pereopoda is robust and nearly as long as the second; the propodos is armed with a row of gradually enlarging spinules on the posterior margin, and the dactylos is slightly curved and biunguiculate. The third and fifth pairs are broken off at the basal joint.

The four anterior pairs of pereopoda support a small mastigobranchia below the margin of the carapace.

The pleopoda are biramose, the first pair having the inner branch smaller than the

outer, and between this pair of pleopoda are two teeth, one on each side of the ventral median line.

The posterior pair has the branches subequal in length and but little longer than the telson, the basal joint articulates with the sixth somite, in a deep excavation at the posterior angle.

*Observations.*—This species so nearly corresponds with *Nauticaris marionis* in all conveniently accessible parts that I have placed it in the same genus, although it does not possess the small peculiar spinule at the postero-inferior angle of the sixth somite, which may be only of specific value. Only one specimen of this species appears to have been taken during the voyage.

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

Rostrum horizontal, armed on the upper and lower margins with teeth, flanked at the base with a supraorbital tooth, below the orbit with an antennal tooth, and at the fronto-lateral angle with a small point.

The ophthalmopoda are large, pyriform, and furnished with a small ocellus.

The first pair of antennæ is short and biflagellate.

The second pair carries a large scaphocerite and a flagellum as long as the animal.

The mandibles consist of the molar process, a psalistoma, and a two-jointed synnhipod.

The first two pairs of siagnopoda correspond generically with those of *Hippolyte* and *Spirontocaris*. The third pair carries a two-lobed mastigobranchia.

The first pair of gnathopoda carries a mastigobranchia and a rudimentary podobranchial plume.

The second pair of gnathopoda carries a rudimentary mastigobranchia, but neither branchia nor basecephysis.

The first three pairs of pereopoda carry a rudimentary mastigobranchia, but the posterior two pairs are without it. The first pair is robust and chelate. The second is slender, long and minutely chelate, the carpos being seven-articulate.

The branchiæ consists of five pleurobranchial plumes, which may with the other parts be tabulated as follows:—

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

*Geographical Distribution.*—Atlantic Ocean.

*Observations.*—This genus has a peculiar interest. In many points it possesses

<sup>1</sup> From *ἡταῖρος*, an associate.

features that associate it with the genus *Spirontocaris*, and in others it has characters that correspond with those of *Hippolyte*.

Like *Hippolyte*, as restricted to correspond to Leach's type, it has a horizontal rostrum, one supraorbital and one antennal tooth, and the first pair of pereopoda has a slight tendency to have the propodal extremity of the carpos elevated and cup-like.

Like *Spirontocaris* it has three teeth on the lower margin of the rostrum, and carries a small tooth at the distal extremity of each joint of the first pair of antennæ. The mandible carries a two-jointed synnhipod. The second pair of pereopoda has the carpos seven-articulate, and the three anterior pairs of pereopoda carry a rudimentary mastigobranchial appendage. It differs from both *Hippolyte* and *Spirontocaris* in having no appendage attached to the basis of the second pair of gnathopoda; and in having no teeth on the ventral surface of the pereion.

Stimpson's species of *Hippolyte rectirostris*, from the north of Japan, corresponds closely with, and probably belongs to this genus.

*Hetairus gaimardii* (Milne-Edwards) (Pl. CIX. fig. 2).

*Hippolyte gaimardii*, Milne-Edwards, Hist. Nat. Crust., tom. ii. p. 378.

"Rostrum straight, commencing near the middle of the carapace, very slightly elevated, and extending nearly as far as the extremity of the scaphocerite, slightly enlarged below, and armed above with six widely spaced teeth, of which three are on the carapace; three teeth upon the inferior margin. Scaphocerite long and oval, reaching far beyond the second pair of gnathopoda, of which the last joint is styliform. Pereiopoda as in Sowerby's *Hippolyte* (*Spirontocaris spinus*). Third somite of the pleon less strongly toothed; four pairs of spines on the telson. Length about 18 lines."—(Milne-Edwards.)

Anteriorly robust; posteriorly slender. Rostrum armed on the upper margin with six teeth, and on the lower near the apical extremity with three.

Length, entire, . . . . .	31 mm. (1.2 in.).
" of carapace, . . . . .	8.5 "
Depth of carapace, . . . . .	7 "
Length of rostrum, . . . . .	6 "
" of pleon, . . . . .	22.5 "
" of third somite of pleon, . . . . .	6.5 "
" of sixth somite of pleon, . . . . .	5 "
" of telson, . . . . .	5 "

*Habitat*.—Station 49; lat. 43° 3' N., long. 63° 39' W.; south of Halifax, Nova Scotia; depth, 85 fathoms; bottom, gravel, stones; bottom temperature, 35°. One specimen; female. Dredged.



The body of the animal is anteriorly robust and continues so to the extremity of the third somite of the pleon, behind which it suddenly narrows and becomes smaller.

The carapace is nearly as deep as its length from the orbital to the postero-dorsal margin, and is dorsally carinated from near the posterior margin, where the elevation is broad, but anteriorly it gradually narrows to the apex of the rostrum. The rostrum is about two-thirds the length of the carapace, and is armed with six small, subequal teeth, the posterior of which stands upon the gastric region, and the others are subequally distant from each other and from the sharp apical extremity. The under surface is slightly dilated anteriorly and armed with three small, anteriorly directed, sharp teeth. A strong ridge runs from the apex of the rostrum to the orbital margin, and above the orbit there is a well-defined tooth from which an elevation passes back, traceable to the pyloric region. The orbit is defined at the outer canthus by a sharp angle, the margin then proceeds directly outwards and is armed with a well-formed antennal tooth, and then passes down perpendicularly to the fronto-lateral angle, which is defined by a small sharp tooth.

The pleon is anteriorly as broad and deep as the carapace. The first somite has the anterior division distinctly defined, the posterior being dorsally short, laterally broad, and overlapping the postero-lateral margin of the carapace. The second somite has the anterior division well defined from the posterior. The third somite is posteriorly compressed, dorsally arcuate, and posteriorly produced in the median line; the three following somites become somewhat suddenly narrower, and continue tapering posteriorly to the extremity of the telson.

The ophthalmopoda are large and pear-shaped, the ophthalmus being broad and carrying a small round ocellus, situated in contact with its posterior margin.

The first pair of antennæ has the peduncle subequal in length with the rostrum; the first joint is excavate on the upper surface for the reception of the eye, armed on the outer side with a sharp stylocerite, and has the extremity furnished with two short sharp teeth, one on the outer, the other on the upper surface; the next two joints are short and cylindrical, the distal being the smaller, and both are armed with a sharp tooth on the upper distal surface. The flagella at the extremity are short and unequal, the upper being the stouter and reaching but little beyond the extremity of the rostrum.

The second pair of antennæ carries a scaphocerite that is nearly as long as the first pair of antennæ, and a long flagellum that is broken off in the type specimen.

The mandibles (fig. 2*d*) have a cylindrical molar process, a flattened psalistoma, and a two-jointed synaphipod.

The first and second (fig. 2*f*) pairs of siagnopoda are unlike those of *Spirontocaris*.

The third pair carries a large, bilobed mastigobranchia and a broad basephysial plate of extreme tenuity, from the inner surface of which there springs a filiform extension. The base of the joint is broadly expanded on the inner ridge, the margin of which is

thickly fringed with short, stiff hairs, between which and the ecephysis stands a two-jointed continuation.

The first pair of gnathopoda (fig. 2*h*) corresponds both with that of *Hippolyte* and that of *Spirontocaris*, and supports a small mastigobranchia and a rudimentary podobranchia.

The second pair of gnathopoda is pediform, five-jointed, and robust; it differs from the same appendage in both *Hippolyte* and *Spirontocaris* in having no basecephysis, but it supports a rudimentary mastigobranchia.

The first pair of pereiopoda is short and robust, the carpos being long and distally increasing in diameter, and produced anteriorly a short distance above the propodos; the propodos is long, slightly curved, and not broader than the distal extremity of the carpos; the pollex and dactylos are short. The coxa supports a rudimentary mastigobranchial appendage. The second pair of pereiopoda is long, slender, and minutely chelate, having the carpos seven-articulate; the coxa carries a rudimentary mastigobranchial stump. The third pair is long and simple; it has the carpos long, cylindrical, and distally produced above the propodos, which is also long and cylindrical and slightly spinulose on the posterior margin; the dactylos is short, robust and serrate. The coxa supports the stump of a mastigobranchial appendage. The fourth and fifth pairs of pereiopoda resemble the third in general structure, but do not carry even the rudimentary stump of a mastigobranchial appendage.

The pleopoda are short, broad, biramose and foliaceous.

The rhipidura is strong and well developed, but the telson in our unique specimen is broken.

*Observations.*—This species appears to be identical with Milne-Edwards' description of *Hippolyte gaimardii* in all points, excepting that in our specimen the second pair of gnathopoda reaches as far as the extremity of the scaphocerite, whereas in his description it is described as being shorter. Milne-Edwards' specimens were obtained near Iceland. It also corresponds very closely with *Hippolyte rectirostris* of Stimpson,<sup>1</sup> which was taken in deep water off the Port of Hakodadi, at the northern extremity of Japan.

*Hetairus tenuis*, n. sp. (Pl. CIX. fig. 3).

Rostrum about two-thirds the length of the carapace, narrow immediately in advance of the frontal margin, and deepening slightly anteriorly, superiorly armed with six teeth inferiorly with three.

Ventral surface of each of the three posterior somites of the pereion armed with a pair of teeth.

Pleon smooth, third somite slightly gibbous and dorsally produced in the median line.

<sup>1</sup> *Proc. Acad. Nat. Sci. Philad.*, January 1860, p. 102.

The telson is subequally long with the outer plates of the rhipidura.

The ophthalmopoda are pyriform, and furnished with an ocellus.

The first pair of antennæ has the peduncle subequal with the rostrum, and carries a sharp and slender stylocerite that equals the length of the first joint; terminal flagella about the same length as the peduncle.

The second pair of antennæ carries a scaphocerite that is broad at the extremity and reaches beyond the apex of the rostrum, and a flagellum that is shorter than the animal.

The second pair of gnathopoda reaches as far as the extremity of the scaphocerite.

The first pair of pereopoda is short and moderately robust, the second pair is long, slender and subequal, and the three posterior pairs terminate in a biunguiculate dactylos.

Length, entire, . . . . .	31	mm. (1.2 in).
„ of carapace, . . . . .	7	„
„ of rostrum, . . . . .	6	„
„ of pleon, . . . . .	24	„
„ of third somite of pleon, . . . . .	6.5	„
„ of sixth somite of pleon, . . . . .	4.1	„
„ of telson, . . . . .	5.5	„

*Habitat*.—Station 49; lat. 43° 3' N., long. 63° 39' W.; south of Halifax, Nova Scotia; depth, 85 fathoms; bottom, gravel, stones; bottom temperature, 35° 0. One specimen; male. Dredged.

The animal is slender in general form, and has the rostrum straight and in the same horizontal line with the dorsal surface of the carapace, and about two-thirds of its length, measured in the median line from the orbital to the posterior margin. It is armed on the upper margin with six small teeth, of which two are posterior to the orbital margin; on the lower margin there are three near the distal extremity. The supraorbital and antennal teeth are well developed, but that at the fronto-lateral angle is small.

The ophthalmopoda are pear-shaped and about half the length of the rostrum.

The first pair of antennæ has the peduncle extending, by the length of the last joint, beyond the extremity of the rostrum; each joint is armed with a strong tooth and the two flagella are short and unequal. The second pair of antennæ is rather longer than the animal, and the scaphocerite reaches beyond the terminal joint of the peduncle.

The second pair of gnathopoda extends to a point subequal with the scaphocerite.

The first pair of pereopoda is short and robust; the carpos is nearly as long as the propodos; posteriorly it is narrow and distally as broad as the propodos, and overrides it on the upper margin. The second pair of pereopoda is long, slender, and has the carpos seven-articulate.

The pleon does not suddenly narrow at the third somite, which is dorsally arcuate and posteriorly only slightly produced in the median line.

The rhipidura is well developed and has the telson subequal in length with the lateral plates; the telson is dorso-laterally armed with four small pairs of spinules.

*Observations.*—This species was taken at the same station as the preceding, with which it was associated. It corresponds with it in many points, but differs in the more slender general appearance of the animal, in the slender and feeble character of the armature on the rostrum, and in the absence of any carina-like elevation on the dorsal surface of the carapace posterior to the gastric region; and in the presence of three pairs of teeth on the ventral surface of the posterior somites of the pereion.

*Hetairus debilis*, n. sp. (Pl. CIX. fig. 4).

Rostrum about half the length of the carapace; armed on the dorsal surface of the frontal crest with four small teeth, and without any on the rostrum proper, which terminates in a sharp pointed apex; under surface slightly broader near the apical extremity and armed with three minute teeth.

Length, entire (minus telson),	.	.	.	.	16	mm. (0.6 in.)
„ of carapace,	.	.	.	.	5	„
„ of rostrum,	.	.	.	.	2.5	„
„ of pleon (minus telson),	.	.	.	.	11	„
„ of third somite of pleon,	.	.	.	.	3	„
„ of sixth somite of pleon,	.	.	.	.	3	„
„ of telson,	.	.	.	.	1	„

*Habitat.*—Station 49, May 20, 1873; lat. 43° 3' N., long. 63° 39' W.; depth, 85 fathoms; bottom, gravel, stones; bottom temperature, 35°. Fifteen specimens, the majority of which were young and the sex not readily determined; of those full grown, two are females and one male. Dredged.

This species corresponds in many points with the preceding, but has the rostrum shorter and more slender. The upper surface is armed near the base with four small teeth, of which two are posterior to the orbital margin; nearer the apical extremity there are two small lobes, apparently the rudiments of more perfect teeth; there are three small teeth on the under surface. The ventral surface of each of the posterior three somites of the pereion is armed with a pair of teeth.

The rhipidura is broken off.

This specimen appears to me to form a link in a series by which extreme forms are united, or it may be only a younger form of *Hetairus tenuis*.

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

Carapace less than one-third of the length of the animal, posteriorly rounded, anteriorly compressed, and produced to a long rostrum that is dilated on the under surface anteriorly, and posteriorly excavated to receive the ophthalmopoda. Armed with teeth on the dorsal crest and on the rostrum, above and below. No tooth on the orbital region. Orbit defined by a tooth at the outer canthus. Frontal margin having an antennal tooth, and one at the infero-lateral angle of the carapace.

Pleon smooth, third somite arcuate, sixth somite twice the length of the fifth.

Telson long, narrow and tapering.

Ophthalmopoda pyriform, ophthalmus orbicular, ocellus imperfectly defined.

First pair of antennæ biramose, first joint furnished with a long, sharp stylocerite.

Second pair of antennæ having a long, slender flagellum, and a long scaphocerite that has a rounded foliaceous extremity, and is armed with an outer distal tooth.

Mandible furnished with a small and sharp pointed psalistoma, and a biarticulate synhipod placed at the base of the molar process, where it meets the apophysis.

First pair of gnathopoda furnished with a long basecephysis.

Second pair of gnathopoda without a basecephysis.

First pair of pereopoda robust and chelate. Second pair long, slender, and minutely chelate, having the carpos long and multiarticulate. Posterior three pairs of pereopoda subequal, robust, and terminating in a sharp pointed unguiculate dactylos, which is armed with stout spines on the posterior margin.

Branchiæ consisting of seven pairs; five pairs of pleurobranchiæ of nearly equal prominence, one pair of small arthrobranchiæ, and one of podobranchiæ. The podobranchiæ are attached to the mastigobranchial plate of the first pair of gnathopoda.

In external appearance this genus corresponds with *Merhippolyte*, but it is distinguishable from it by the character and number of the branchiæ, in which respect it more nearly resembles *Spirontocaris*, as may be seen in the following table:—

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

It differs from *Hippolyte* in the absence of the supraorbital tooth, in having no ecephysis to the second pair of gnathopoda, in having three instead of four small mastigobranchiæ following the first pair of gnathopoda, and in having the carpos of the second pair of pereopoda multiarticulate, instead of triarticulate.

*Geographical Distribution.*—There is only one species in the Challenger collection, and that is abundant in the South Indian Ocean.

<sup>1</sup> χωρισμός, separation.

*Chorismus tuberculatus*, n. sp. (Pl. CX. fig. 2).

Carapace smooth, anteriorly produced to a long, slightly upturned rostrum, armed on the upper surface near the base with four teeth, and on the under surface with seven; apex bifid. Frontal margin with a strong first antennal tooth, and a small tooth at the fronto-lateral angle.

Pleon smooth, except the third somite, which dorsally carries a strong tubercle, hence the specific name.

The telson is long, tapering, and furnished with two distinct spines on the dorso-lateral margin.

Length, entire,	.	.	.	.	.	69 mm. (2.7 in.).
„ of carapace,	.	.	.	.	.	16 „
„ of rostrum,	.	.	.	.	.	24 „
„ of pleon,	.	.	.	.	.	53 „
„ of third somite of pleon,	.	.	.	.	.	9 „
„ of sixth somite of pleon,	.	.	.	.	.	13 „
„ of telson,	.	.	.	.	.	14 „

*Habitat*.—Station 145A, December 27, 1873; lat. 46° 41' S., long. 38° 10' E.; off Marion Island; depth, 310 fathoms; bottom, volcanic sand. Fifteen specimens, the males appearing to predominate; none of the females bear ova. Dredged.

The main interest of this species arises from its external resemblance to the genus *Merhippolyte*, while its branchiæ approximate to those of *Spirontocaris*.

The mandibles do not exactly correspond with those of either of these two genera, nor does the second pair of gnathopoda, which carries no branch.

The rostrum is very long, and gradually curves upwards towards the apex, which terminates in a double point. Above the orbit, commencing posteriorly over the gastric region, there are four anteriorly pointed, sharp, low lying teeth, the anterior of which is in advance of the eye, and beyond it the rostrum is smooth to the apex. The lower margin is armed with six or seven teeth, which gradually increase in size and depth posteriorly. The orbit is defined by a small point or tooth at the outer canthus on the inner side of the first antennal tooth.

The ophthalmopod (fig. 2a) is pear-shaped, being smaller at the base than at the ophthalmus, and attached to the somite by a small but distinct pedicle; the ophthalmus is hemispherical, and has no distinct ocellus connected with it.

The first pair of antennæ is short, the peduncle reaching a little beyond the extremity of the eyes. The outer and more robust flagellum scarcely reaches to the extremity of the rostrum, and the inner, which is slender and filamentous, reaches a little beyond it.

The second pair of antennæ carries a strong scaphocerite, which is strengthened on the outer margin by a strong ridge, terminating in a sharp-pointed tooth that falls short



of the extremity of the appendage; the peduncle terminates in a flagellum that equals in length the entire animal from the orbit to the extremity of the telson.

The mandible (fig. 2*d*) has the psalisiform process developed as a small, pointed organ, of but little apparent utility; the molar process is strong, broad, and square, and the synnhipod is three-jointed, the first or basal joint being the shortest.

The siagnopoda bear a general resemblance to those of *Hippolyte*, as also does the first pair of gnathopoda. The second pair of gnathopoda is subpediform as in *Hippolyte*, but does not carry a basephysis.

The first pair of pereopoda is short, robust, and chelate, having the carpos nearly as long and stout as the propodos; the propodos is subcylindrical, about twice the length of the dactylos. The second pair is long, slender, terminates in a minute chela, and has the carpos long and multiarticulate. The posterior three pairs are moderately long and robust and terminate in a sharp pointed dactylos, armed on the inner margin with three fine teeth.

The pleopoda have the peduncle posteriorly longitudinally marginate and distally produced to a point, terminating in two subfoliaceous rami fringed with hairs. The first pair in the male has the outer branch more rigid than in the other pairs, and the inner is shorter.

The rhipidura has the outer plates subequal with the inner, and armed on the outer margin with a strong ridge, terminating in a sharp tooth that coincides with the outer extremity of the diæresis.

Many specimens of this species were taken by the dredge in the Southern Indian Ocean. They vary in size from 1 to 3 inches, and none of them were carrying ova. The females appear to differ from the males only in the varying length of the branches of the first pair of pleopoda.

*Tozeuma serratum*, A. Milne-Edwards,<sup>1</sup> which was taken at a depth of 40 fathoms off Barbados, belongs, I think, to this genus. It resembles *Chorismus tuberculatus* in general aspect, in the ornamentation of the rostrum and dorsal crest, and in having the first pair of antennæ and the second pair of pereopoda short. It is excluded from Stimpson's genus *Tozeuma* by having the carpos of the second pair of pereopoda multiarticulate instead of triarticulate, as described by that author.

### *Merhippolyte*, n. gen.

In general appearance this genus resembles *Spirontocaris*, but carries no teeth above the orbit. The frontal margin has an antennal tooth, and the fronto-lateral angle is produced to a point.

The ophthalmopoda are pyriform, the ophthalmus globular and furnished with a distinct ocellus.

<sup>1</sup> Recueil de Figures de Crustacés nouveaux ou peu connus, avril 1883.

The first pair of antennæ carries two flagella.

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

The mandibles have a small psalistoma and a three-jointed synhipod, distinct from the molar process.

The first pair of pereopoda is chelate and has the carpos continuous with the propodos. The second pair of pereopoda is long, slender, minutely chelate, and has the carpos multiarticulate. The three posterior pairs of pereopoda are simple and well developed.

The pleon has the third somite dorsally arcuate and slightly produced posteriorly.

The telson is tapering and dorsally furnished with two or three lateral pairs of solitary spinules.

The branchial plumes are more numerous in this genus than in *Spirontocaris*, there being five pairs of arthrobranchiæ in addition to the pleurobranchiæ, as shown in the annexed table, which represents the condition in *Merhippolyte agulhasensis*.

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

It is an interesting and instructive feature in this genus that so great a variation in the character of the branchiæ exists with such small external change.

*Geographical Distribution.*—The typical species *Merhippolyte agulhasensis* was first taken on the Agulhas Bank, which lies between the Southern Indian and Atlantic Oceans, about 100 miles south of the Cape of Good Hope. A second species, *Merhippolyte orientalis*, was found near the Arrou Islands, south of New Guinea.

*Merhippolyte agulhasensis*, n. sp. (Pl. CX. fig. 4).

Carapace having the dorsal surface anteriorly projected to a slender rostrum, that is nearly as long as the carapace; armed on the upper margin with five teeth, the most posterior standing on the gastric region and the anterior near the middle of the rostrum, and on the lower margin with five smaller teeth, remote from one another.

Pleon smooth. Telson tapering.

Ophthalmopoda pyriform.

First pair of antennæ with both flagella about as long as the animal.

Second pair of antennæ with flagellum longer than the animal, having the scaphocerite as long as the rostrum.

First pair of pereopoda short, strong, and chelate. Second pair long, slender, and chelate, the carpos being multiarticulate.

Length, entire,	.	.	.	.	.	44 mm. (1.7 in.).
„ of carapace,	.	.	.	.	.	11 „
„ of rostrum,	.	.	.	.	.	11 „
„ of pleon,	.	.	.	.	.	33 „
„ of third somite of pleon,	.	.	.	.	.	8 „
„ of sixth somite of pleon,	.	.	.	.	.	7.5 „
„ telson,	.	.	.	.	.	9 „

*Habitat*.—Station 142, December 18, 1873; lat.  $35^{\circ} 4' S$ ; long.  $18^{\circ} 37' E$ ; south of the Cape of Good Hope; depth, 150 fathoms; bottom, green sand; bottom temperature,  $47^{\circ}$ . Five specimens; one female, the others undetermined. Dredged.

The carapace is smooth, dorsally carinated in front of the gastric region, and anteriorly produced to a rostrum that is subequal with the dorsal surface of the carapace; it is armed on the upper surface with five large teeth, the posterior standing on the gastric region, and the anterior, which is smaller than the others and a little in advance of them, situated about half-way between the orbital margin and the apex of the rostrum. The frontal margin has a long spine-like tooth, corresponding with the outer margin of the first pair of antennæ, and a very minute one at the fronto-lateral angle of the carapace.

The pleon is smooth, but slightly compressed, having the third somite posteriorly arcuate. The sixth somite is once and a half as long as the fifth; the anterior three are posteriorly rounded at the infero-lateral angle, and the three posterior produced to a sharply pointed angle.

The telson is subequal in length with the sixth somite, and armed laterally on the dorsal surface with three small spinules on each side.

The ophthalmopoda (fig. 4a) are short, subglobular, pyriform, and furnished with a circular ocellus, situated within an indentation of the margin of the ophthalmus, with which it is continuous.

The first pair of antennæ has the first joint of the peduncle depressed on the upper surface, and laterally armed with a long pointed stylocerite, that reaches to the extremity of the joint, which is fringed with short hairs; the two succeeding joints are short and cylindrical, and terminate in two long, slender flagella, that are about equal in length to the entire animal.

The second pair of antennæ is once and a half as long as the whole animal, and carries a scaphocerite that reaches as far as the extremity of the rostrum, and is subapically furnished with a tooth on the outer margin.

The epistoma is deep, and the mandibles, which are embedded within the oral orifice, have the large molar prominence compressed and dentated. The psalistoma is reduced

to a rudimentary condition, being only a short, flat point, and beside it stands a three-jointed but rather feeble synaphipod, that is fringed with a few hairs.

The first pair of siagnopoda is two-branched, one branch being broad, foliaceous, and fringed with hairs.

The first pair of gnathopoda has a long basephysis and a mastigobranchial plate of extreme tenuity, with a small podobranchial plume attached.

The second pair of gnathopoda (fig. 4i) is long, robust and four-jointed; the first joint, which is the coxa, is short, the second is long, the third and fourth long and distally fringed with spinules. It has no basephysis attached, but supports a rather rudimentary mastigobranchia that originates in a broad discoidal base, and has no branchial plume.

The first pair of pereiopoda is short, strong, and chelate, having the basis and ischium anteriorly produced on the lower margin to a prominent tooth; the coxa supports a rudimentary mastigobranchial appendage, as do all the other pereiopoda except the posterior pair. There is a pair of arthrobranchial plumes attached to the articulation of the second pair of gnathopoda and anterior four pairs of pereiopoda. There are six pleurobranchiæ, of which the posterior is the largest and the anterior the smallest. The second pair of pereiopoda is long, slender, and chelate, having the carpos long, flexible, and multiarticulate. The three succeeding pairs are long and moderately robust, they have the meros posteriorly fringed with spines; the propodos is longer than the carpos, and terminates in a short and slightly curved dactylos, that has the posterior margin sharply serrate.

*Merhippolyte orientalis*, n. sp.

Rostrum armed on the upper surface with five or more strong teeth, of which the posterior corresponds with the gastric region, and is smaller than the others. The apex of the rostrum is broken off, and its length cannot therefore be determined.

The ophthalmopoda are pyriform, and as long as the first joint of the peduncle of the first pair of antennæ.

Length, entire, . . . . .	32 mm. (1.2 in.).
„ of carapace, . . . . .	8 „
„ of pleon, . . . . .	24 „

*Habitat*.—Station 191, September 23, 1874; lat.  $5^{\circ} 41' 0''$  S., long.  $134^{\circ} 4' 30''$  E; off New Guinea; depth, 800 fathoms; bottom, green mud; bottom temperature,  $39^{\circ} \cdot 5$ . One imperfect specimen. Trawled.

This specimen is much damaged, but the broken rostrum reaches beyond the extremity of the first joint of the first pair of antennæ, otherwise I should have considered it to be *Hippolyte spinifrons* of Milne-Edwards.<sup>1</sup> It is somewhat difficult to determine exactly.

<sup>1</sup> *Loc. cit.*, vol. ii. p. 377.

what tooth this author means by "*les épines suborbitaires*." If it refers to that which we call the antennal tooth, it differs from our species which has that tooth short in relation to the length of the ophthalmopod; but as it is not impossible that it was intended to mean the stylocerite, which in its proper position lies under the orbit and supports the eye, then it corresponds with the description (*dépassant les yeux et atteignant le tiers antérieur du rostre*).

*Amphiplectus*.<sup>1</sup>

Resembles *Merhippolyte*, but differs in the proportional size of the second pair of gnathopoda, the first two pairs of pereopoda, and in the form of the mandible.

The second pair of gnathopoda is short, feeble, and furnished with a long and slender basecephysis.

The first pair of pereopoda is also short, feeble and chelate. The second pair is more than twice the length of the first, and has the basal joint robust and the distal joints slender; the carpos is long, divided into numerous small articuli, and the terminal chela is slender and feeble.

The mandible has the molar process and psalistoma confluent, the former being the lower and robust portion, and the latter forming the upper and more thin division of the anterior serrate margin, from the base of which a two-jointed synnaphipod arises.

The pleopoda are subfoliaceous, biramose, and lanceolate in form.

The rhipidura has the outer plate a little longer than the telson, rounded at the extremity and armed on the outer margin with a sharp tooth and a spinule at the extremity of the diæresis.

The telson is long, slender, tapering to the extremity and distally truncate.

The branchiæ consist of a series of pleurobranchiæ and arthrobranchiæ as shown in the annexed table:—

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

*Observations.*—This genus bears a strong resemblance to *Merhippolyte*, from which it differs in the feebleness of the limbs, especially the anterior ones.

It also resembles *Nematocarcinus* in the peculiar articulations that exists between the ischium and meros, although the great length of the legs is wanting. The carpos in the first two pairs of pereopoda is also similar, but in the three posterior pairs this

<sup>1</sup> αμφιπληκτος, compressed on both sides.

joint is shorter, being but little longer than the propodos, and the dactylos also differs in form. The branchial apparatus, so characteristic of that genus, is also similar.

The antennæ have the terminal flagella, especially those of the first pair, short.

There is also a resemblance to *Merhippolyte* in the long and curved carpos of the second pair of pereopoda. So great is this resemblance that it was only after a very close inspection and the action of a reagent that I became convinced of its multiarticulate condition.

This genus is at present represented by only one species, and unfortunately there is only a solitary specimen in the collection.

*Amphiplectus depressus*, n. sp. (Pl. CX. fig. 3).

Carapace short, dorsally depressed on the gastric region, anteriorly produced to a rostrum that is nearly as long as the dorsal surface, and crested on the frontal region with numerous small teeth, whence it is smooth to the apex, which is forked; the under surface is armed with five or six small teeth near the base.

The first pair of antennæ is short and slender.

The second pair is about half as long as the animal, and carries a scaphocerite that reaches as far as the extremity of the rostrum.

The first two pairs of pereopoda are chelate, slender, and unequal in length, the first being short and chelate, the second long and minutely chelate. The posterior three pairs are short, and stronger than the preceding.

Length, entire, . . . . .	30	mm. (1.2 in.).
„ of carapace, . . . . .	9	„
„ of rostrum, . . . . .	7	„
„ of pleon, . . . . .	21	„
„ of third somite of pleon, . . . . .	3	„
„ of sixth somite of pleon, . . . . .	5	„
„ of telson, . . . . .	5.5	„
„ of second antenna, . . . . .	15	„
„ of scaphocerite, . . . . .	7	„
„ of second gnathopod, . . . . .	9	„
„ of first pereopod, . . . . .	12.5	„
„ of second pereopod, . . . . .	23	„
„ of third pereopod, . . . . .	15	„

*Habitat*.—Station 122, September 10, 1873; lat. 9° 5' S., long. 34° 50' W.; off Pernambuco; depth, 350 fathoms; bottom, red mud. One specimen, female. Trawled.

The carapace is short, rather less than one-fourth the length of the animal; the dorsal surface is depressed over the gastric region, and anteriorly produced to a slender



rostrum that is nearly as long as the carapace, armed on the frontal crest with a series of twelve small spinules, and on the under surface with six minute teeth, the apex is unequally forked, having a small tooth above and a large one below. There is no tooth over the orbital region, but the first antennal tooth is produced to a short point, and at the base of the second antennæ is a sharp tooth, but none is present at the fronto-lateral angle.

The pleon is more than twice the length of the carapace, measured from the orbit to the extremity of its dorsal surface, and from the posterior dorsal surface of the carapace to the extremity of the telson. The somites of the pleon are deeper than the lateral walls of the carapace, but they lessen in height after the fourth somite, all of which, including the fifth and sixth, are rounded at the postero-lateral margin. The sixth somite is nearly twice the length of the fifth, and a little longer than the telson, which is narrow and tapers to the extremity.

The ophthalmopoda are short, the ophthalmus is orbicular, but scarcely larger in diameter than the peduncle, and possesses no ocellus.

The first pair of antennæ is short; the first joint of the peduncle is about equal in length to the two succeeding, it is excavate on the upper surface to receive the ophthalmopod, and is furnished with a stylocerite that is broad at the base, sharp pointed, and of great tenuity, reaching quite to the extremity of the joint; the second and third joints are short, the last, which is the shortest, supports two multiarticulate flagella, that are unequal in diameter, the outer being the larger, and neither longer than the peduncle.

The second pair of antennæ is about two-thirds the length of the animal, and carries a scaphocerite that is rounded at the extremity, and armed at the outer angle with a sharp tooth that reaches beyond the end of the scaphocerite, and is subequal with the length of the rostrum.

The mandible (fig. 3*d*) has the molar process and cutting margin of the psalistoma continuous and serrate. The molar process is thick, and the psalistoma thin, and at their base a two-jointed synaphipod originates.

The other oral appendages have not been examined.

The second pair of gnathopoda (fig. 3*i*) is pediform, five-jointed and slender; the coxa supports a sharp and rigid tooth that I take to be the rudiment of a mastigobranchial appendage, and a small arthrobranchial plume; the basis is short, and supports a long and slender ecphysis, that is nearly as long as the appendage to which it belongs. The next joint is long, and probably represents the ischium and meros united; the carpos is half the length of the preceding joint, and is greater in diameter distally than at the meral extremity; the propodos is long, slender, and bluntly pointed, and fringed with long hairs, as is also the carpos and meros on the inner margin.

The first pair of pereopoda is a little longer than the second pair of gnathopoda. It is slender and chelate; the ischium and meros are united by an overlapping articulation;

the carpos is long and slender, but of greater diameter at the propodal extremity, where it is armed on the under surface with a sharp, spine-like tooth; the propodos is long and slender, not being broader than the distal extremity of the carpos; the fingers impinge closely and correspondingly. The second pair of pereopoda is twice as long as the first. The ischium and meros are together as long as the first pair of pereopoda, and are much more robust, but have no tooth at the lower distal angle; the carpos and propodos become suddenly more slender, and when at rest lie folded against the more robust basal joints, with which they agree in length; the carpos is long, slender, and cylindrical, and when extended is curved in an inverse direction to the basal joints, with which it corresponds when reflexed; the propodos is about a third of the length of the carpos, of somewhat less diameter, slightly curved, and terminates in a slender, long, fringed chela. The third pair of pereopoda is not so long as the second, but more robust throughout, and is armed with a sharp tooth at the infero-distal extremity of the meros; the carpos is long and cylindrical, and so is the propodos, but not so long as the carpos; the dactylos is stout, bidentate, and embedded in a brush of hairs. The fourth and fifth pairs resemble the third, but are each successively shorter.

The pleopoda are short, stiff, subfoliaceous, and biramose.

The rhipidura is strongly developed, the telson being nearly as long as the lateral plates, the outer of which is armed with a tooth and a spinule corresponding with the extremity of the feebly marked diæresis, and the extremity and inner margin are fringed with long hairs.

The only specimen obtained is a female, laden with numerous eggs of a slightly ovate form and of moderate size.

Our specimen was taken off Barra Grande, on the eastern coast of South America. M. Guérin-Méneville<sup>1</sup> figures a species under the name of *Hippolyte elongatus*, that corresponds much with this species, particularly in the form of the rostrum, which, however, is long and smooth on the lower margin, whereas in *Amphiplectus depressus* there are six small but well defined and widely separated teeth.

The habitats of these two species are in the same geographical region, and it is not improbable that they may belong to the same genus.

#### Family PANDALIDÆ.

Animal laterally compressed. Carapace not more than one-third the length of the animal, and anteriorly produced to a long and slender rostrum, more or less abundantly armed with teeth or spines. The ophthalmopoda are well developed but not remarkable for size. The first antennæ are biflagellate. The second are long and carry a well-developed scaphocerite. The second pair of gnathopoda is pediform. The first pair of

<sup>1</sup> Atlas, Zoologie de l'Île de Cuba, pl. ii.

pereiopoda is not chelate. The second pair is chelate and has the carpos multiarticulate. The succeeding three pairs are simple. The pleopoda are biramose. The rhipidura is well developed and strong.

This family contains several genera and connects the Hippolytidæ with the Palæmonidæ.

Several of the genera in this family much resemble each other in general appearance, but possess special features that offer means of ready distinction, and may conveniently be arranged under the following heads:—

*Heterocarpus*, A. Milne-Edwards.

Carapace laterally and dorsally carinated. Rostrum armed with teeth only, both above and below.

First pair of antennæ having a rudimentary stylocerite.

Second pair of pereiopoda unequal in length.

*Plesionika*, n. gen.

Carapace smooth, carinated anteriorly. Dorsal crest and rostrum armed with teeth only, above and below.

First pair of antennæ having a well-developed and pointed stylocerite.

Second pair of pereiopoda unequal in length.

*Nothocaris*, n. gen.

Carapace smooth. Dorsal crest armed with spines and teeth. Rostrum armed with teeth above and below.

First pair of antennæ having a large and pointed stylocerite.

Second pair of pereiopoda unequal in length.

*Pandalus*, Leach.

Carapace smooth. Frontal crest and rostrum armed on the upper surface with movable spines only, and on the lower with teeth.

First pair of antennæ not longer than the carapace, and furnished with a stylocerite that has the apex rounded.

Second pair of gnathopoda without a basecephysis.

Second pair of pereiopoda unequal in length.

*Pandalopsis*, n. gen. (A. Milne-Edwards in litt.).

Like *Pandalus*, but having the first pair of antennæ twice the length of the carapace.

*Chlorotocus*, A. Milne-Edwards.

Carapace smooth, dorsally carinate. Frontal crest and rostrum serrate above and below.

Second pair of pereopoda having the carpos biarticulate, and uniform in length.

*Dorodôtes*, n. gen.

Like *Chlorotocus*, but having the carpos of the second pair of pereopoda six-articulate.

*Heterocarpus*, A. Milne-Edwards.

*Heterocarpus*, A. Milne-Edwards, Ann. d. Sci. Nat., sér. 6, t. xi. art. 4, p. 8, 1881.

The carapace is laterally compressed, dorsally carinated, anteriorly elevated into a crest, and produced to a long rostrum that is generally armed with teeth on the upper and lower margins. The lateral surface of the carapace is traversed longitudinally by two or more carinæ. On the ventral surface of the sixth somite of the pereion there are two small processes.

The pleon is generally laterally compressed, frequently carinated, and dorsally armed on some one or more of the somites with denticular processes, but there are never any on the sixth somite, which is constantly smooth and short and produced posteriorly on each side at the base of the telson to small sharp teeth.

The telson is long and laterally compressed, and has the longitudinal dorso-lateral angle reduced by the lateral compression, and is generally armed with small spines, equidistant from each other but varying in number.

The ophthalmopoda are short, and the ophthalmus is orbicular.

The first pair of antennæ has the peduncle short, the first joint being furnished with a pointed stylocerite, and terminating in two long and slender flagella, the outer of which, especially in the males, is the more robust for a considerable distance, and then suddenly narrows to the diameter of the inner branch; the latter is the longer, but both only reach a little beyond the distal extremity of the rostrum.

The second pair of antennæ carrying at the anterior and inner angle of the first or coxal joint a long and narrow phymacerite, the external orifice of the green gland. The second joint is produced to a sharp tooth on the inner anterior margin, and there is

another on the outer margin; the distal extremity supports a long narrow scaphocerite that varies somewhat in form in different species, and the peduncle terminates in a long and slender flagellum.

The mandibles are deeply inserted within the oral margins, and consist of a narrow molar process, a psalistoma, and a slender three-jointed synaphipod.

The first pair of siagnopoda is three-branched, and resembles the same appendage in *Pandalus*.

The second pair is two-branched and furnished with a large, broad, mastigobranchial plate; the inner branch is double, short, broad and foliaceous, and the outer short and narrow. The mastigobranchia is produced anteriorly, rounded posteriorly, and bordered with long hairs; it differs from the same organ in *Pandalus* in not being prolonged posteriorly.

The third pair of siagnopoda is five-branched, the first or inner branch is broad, foliaceous, and fringed with cilia; the second is long, broad and membranous, and of extreme tenuity; the following branches are long, cylindrical, and tapering. A large mastigobranchial plate, which is divided into an anterior and a posterior portion, is attached to the first or coxal joint.

The first pair of gnathopoda is short, flat, and formed of six joints; the first joint is short, and supports a short, broad, mastigobranchial plate with a small podobranchial plume attached; the second or basal joint is long, flat on the inner side and rounded on the outer, where it carries a long two-jointed branch, the first joint of which is subcylindrical and the second multiarticulate. The ischium and meros are short, longer on the outer than on the inner margin, and consequently form a curve with each other. The carpos is broader than long, and terminates in a small propodos that corresponds with the carpos, and has the inner or distal margin thickly furred with hairs.

The second pair of gnathopoda is long and pediform, having the basal joint furnished with a slender, single-jointed, tapering branch; the meros is longer than the ischium, the carpos and propodos are subequal, and the dactylos is wanting. This appendage only carries the rudiment of a mastigobranchial plate but no podobranchial plume; a small arthrobranchia is attached to the membranous articulation.

The first pair of pereiopoda is long and pediform, scarcely so robust as the second pair of gnathopoda, but much resembling it. It has the dactylos rudimentary, the propodos long and slender, but shorter than the carpos and equally subcylindrical. It has no branch attached to the basis or second joint, and only a small and rudimentary mastigobranchia attached to the coxa, and is without a podobranchial plume. The second pair of pereiopoda is unequal in length, the right being the shorter and more robust; the right hand is also a little the larger. Both appendages have the carpos long and multiarticulate, that on the left being the more slender and extensively multiarticulate, and carry a rudimentary mastigobranchia but no podobranchial plume. The three

following pairs are similar to each other and not very long. The carpos is shorter than the propodos and the dactylos is small, slender, and armed; the posterior margin of these three pairs is generally fringed with sharp spine-like teeth.

The pleopoda have the basal joint long, broad, and obliquely compressed, the posterior distal angle being considerably produced, beyond which there are two long, narrow, subfoliaceous plates fringed with hairs, of which the inner is furnished with a compressed stylamblys but without cincinnuli. The first pair differs from the others in having the inner branch short and furnished with a very short stylamblys. The posterior pair helps to form the rhipidura, and it has the peduncle short and the branches long and foliaceous. The outer plate is strengthened on the outer side, and longitudinally fluted and furnished with a distinct diæresis, the outer angle of which is armed with a single tooth and spine.

Each pair of pereiopoda except the posterior is furnished with a rudimentary mastigobranchia, and all the branchial plumes increase proportionately very much in size as they proceed backwards. The branchial arrangement is shown in the following table:—

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

*Observations.*—This genus has been recently established by A. Milne-Edwards for two specimens taken in the West Indies. Those in the Challenger collection are from the seas around the Philippine Archipelago, and two of them appear to correspond very closely with the occidental species.

In structural details they correspond very closely with the genus *Pandalus*, but differ considerably in external form, on which Milne-Edwards has apparently relied for the generic characters. "The carapace," he says, "is carinated above, and the pleon carries upon some of its somites a strong median carina that terminates posteriorly in a point, but the legs are destitute of palps" (basephyses). Features of this kind are very liable to vary, as may be seen by our species *Heterocarpus gibbosus*, in which there is neither carina nor tooth on the dorsal surface of the pleon, and yet this species undoubtedly belongs to the same genus as *Heterocarpus ensifer*, A. Milne-Edwards.

*Geographical Distribution.*—The first specimen (*Heterocarpus ensifer*) of this genus was taken by the Challenger in 1874, near the Philippine Islands, and one very like, if not identical with it, was taken in the West Indies, near Barbados, by the American Expedition in 1878. About the latter time *Heterocarpus oryx*, A. Milne-Edwards, was taken in the Gulf of Orleans, and another almost identical, *Heterocarpus alphonsi*, was found by the Challenger near the Philippine Islands; a slender variety of the same



species was taken near the south coast of Japan, and a smooth or less dentated form off Manila in the Philippine Sea.

The depth at which the oriental specimens were taken was from 250 to 700 fathoms, while those from the West Indies were got in 218 and 955 fathoms respectively.

*Heterocarpus dorsalis*, n. sp. (Pl. CXI.).

Resembles *Heterocarpus oryx*, A. Milne-Edwards, but may be distinguished from it by having only eight teeth on the dorsal crest and upper margin of the rostrum and seven on the lower, by the first pair of antennæ being longer than the rostrum, and the second pair twice the length of the animal.

Length, entire, . . . . .	80 mm. (3.1 in.).
„ of carapace, . . . . .	25 „
„ of rostrum, . . . . .	35 „
„ of pleon, . . . . .	55 „
„ of third somite of pleon, . . . . .	15 „
„ of sixth somite of pleon, . . . . .	11 „
„ of telson, . . . . .	13 „

*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; females. Dredged.

The carapace is traversed longitudinally by five distinct carinæ, of which the central is anteriorly produced to a rostrum that is half as long again as the carapace, and is armed with eight well-defined teeth, the posterior being on the gastric region; the lower margin of the rostrum is furnished with seven strong teeth, of which the posterior is considerably in advance of the orbital margin.

The second or upper lateral carina commences at the orbital margin just above the tooth of the outer canthus, and passes a little outwards and downwards along the surface of the carapace to within a short distance of the posterior margin, at which point it is deflected at right angles inwards towards the median carina, posterior to which it meets the corresponding bend of the carina on the opposite side. The lower lateral carina commences at the fronto-lateral angle of the carapace, which is anteriorly produced to a long strong tooth, and traverses the carapace in a line parallel with the preceding ridge, and terminates gradually, being lost at a short distance from the posterior margin. The infero-lateral margin of the carapace is also traversed by a stout ridge that commences on the inner side of the fronto-lateral tooth, and is continuous to the posterior margin. There is moreover a small carina between this marginal ridge and the lower lateral; it is very short, commencing at the posterior edge of the carapace and disappearing at a point which corresponds with the coxa of the posterior pair of pereopoda.

The pleon has the anterior two somites dorsally smooth, but a carina commences abruptly at the anterior margin of the third and continues on the fourth and fifth somites, and on each of these three it is posteriorly produced to a sharp tooth. The sixth somite is longitudinally flat or channelled dorsally, and is furnished at the posterior margin on each side of the median line with a strong tooth, and with a smaller one at the postero-lateral angle.

The telson (*z*) is long, tapering, dorsally channelled and has the lateral margins depressed, and armed with three small spines, and the extremity with two.

The ophthalmopoda are short and pyriform, scarcely reaching beyond the apex of the first antennal tooth at the outer canthus of the orbit.

The first pair of antennæ (*b*) has the stylocerite reaching quite to the distal extremity of the first joint; the second and third joints are cylindrical and carry two unequal flagella, the upper and outer being stout for about two-thirds the length of the rostrum, from which point it suddenly becomes slender and extends a little beyond the extremity of the rostrum. The inner and lower branch is slender from the base, and is about once and a half as long as the rostrum.

The second pair of antennæ (*c*) carries a scaphocerite that is about half the length of the rostrum, the outer margin is rigid and terminates in a sharp tooth that falls considerably short of the distal extremity of the inner or submembranous portion, the margin of which is fringed with hairs.

The mandibles (*d*) are placed deeply within the oral cavity; the molar process is cylindrical, and at the angle with the apophysis the psalistoma projects as a long, flat, curved, rigid attachment, dentated only at the extremity; at its base there arises a broad triarticulate synphipod fringed with hairs and not longer than the molar process.

The first pair of siagnopoda is a small three-branched appendage; the outer branch is short and apically serrate, the median is broad, flat, and fringed on the inner, distal margin with numerous spines of different thicknesses and a few ciliated hairs, the inner branch is lunate, and distally and externally fringed with spines and hairs.

The second pair of siagnopoda (*f*) is formed on the inner side by two broad, short plates, distally fringed with numerous spines, a small central branch, narrowing suddenly towards the extremity, and a broad, flat, submembranous mastigobranchial plate that projects anteriorly, considerably beyond the other branches, and expands posteriorly into a broad, flat plate, rounded at the margins, and fringed with long ciliated hairs, all radiating outwards and anteriorly.

The third pair of siagnopoda (*g*) has a large squamous branch on the inner side, a central three-jointed branch, narrow and subcylindrical, and at its base a broad, squamous square-shaped plate, from the inner margin of which springs a long and slender flagellum; each branch is more or less fringed with ciliated hairs.

The first pair of gnathopoda (*h*) is subpediform and short; the propodos is reflexed

against the carpos; the dactylos is broad, short, and continuous with the distal extremity of the propodos; the coxa supports a short mastigobranchial plate and a branchial plume; the basis carries at its distal outer extremity a short ecphysis; each joint is thickly fringed with hairs.

The second pair of gnathopoda (*i*) is six-jointed and pediform; the coxa carries a rudimentary mastigobranchia and a tuft of long hairs, and the basis a rudimentary ecphysis reduced to a tubercle; the ischium is long, and the meros longer and more slender; the carpos is a little shorter than the meros, and fringed with short stiff hairs; the propodos is terminal, shorter than the carpos, cylindrical, tapering, and fringed with short hairs.

The first pair of perciopoda (*k*) closely resembles the second pair of gnathopoda, but is more slender. The second pair (*l*) has the right and left appendages unequal in length, owing to the carpos on the left side being nearly as long again as that upon the right, both are minutely chelate, the chela on the left side being smaller than that on the right. The posterior three pairs correspond in length, form and character, and are peculiar from the great length of the meros as compared with the ischium (*m*); the posterior margin is furnished with a series of strong and conspicuous spine-like teeth, and the dactylos is laterally compressed. The posterior pair is a little shorter than the preceding.

The pleopoda in the female have an elongated, flattened, longitudinally bent peduncle, supporting two long, foliaceous branches fringed with long hairs, and subequal in length in all excepting the first pair, which has the inner and anterior branch shorter for the purpose of supporting the ova, whereas in all the others it is free.

The sixth or terminal pair (*v*), which forms the lateral plates of the rhipidura, is strengthened down the median line of the outer branch as well as on the outer margin, and possesses a diæresis, the portion beyond which is narrower than that anterior to it.

*Heterocarpus alphonsi*, n. sp. (Pl. CXII. fig. 1).

Carapace furnished with five carinæ, of which the median is produced to a rostrum that is one and three-fourths longer than the carapace; it is armed dorsally with some large teeth, of which the posterior two stand near together upon the gastric region, and the most anterior a little distant from the apex of the rostrum; the under side is armed with eleven teeth, of which the anterior is subapical and the posterior in advance of the ophthalmopoda. The outer canthus of the orbit is armed with a strong tooth, which is not confluent with the upper lateral carina, and the infero-lateral angle is also armed with a short tooth, that is confluent with the lower lateral carina.

The first two somites of the pleon are smooth, but a distinct dorsal carina commences

abruptly at the anterior margin of the third somite, and is produced to a strong, sharp tooth at the posterior extremity of this and the two following somites. The sixth somite is smooth and the telson is dorsally flat, and armed at the lateral angles with three small spinules.

The ophthalmopoda are of moderate size and orbicular.

The first pair of antennæ has the flagella of unequal length; the shorter and more robust is subequal with the rostrum, and the longer and more slender is half as long again.

The second pair of antennæ is longer than the animal, and carries a scaphocerite which is nearly half the length of the rostrum.

The second pair of gnathopoda is slender, but does not reach to the extremity of the scaphocerite.

The first pair of pereopoda is more slender, and nearly as long as the second pair of gnathopoda. The second pair of pereopoda (figs. 1*l*, 1'*l*) has the appendage on the right side (fig. 1*l*) shorter and more robust than that on the left (fig. 1'*l*), and is long, slender, and minutely chelate. The three following pairs have the meros serrate posteriorly, the propodos fringed with short, stiff, hair-like spines, and the dactylos styliform.

The outer plates of the rhipidura are a little longer than the telson and furnished with a perfect diæresis, the outer angle of which is armed with small spines.

	Female.	Male.
Length, entire, . . . . .	83 mm. (3.2 in.).	67 mm. (2.6 in.).
„ of carapace, . . . . .	26 „	21 „
„ of rostrum, . . . . .	34 „	26 „
„ of pleon, . . . . .	57 „	46 „
„ of third somite of pleon, . . . . .	14 „	12 „
„ of sixth somite of pleon, . . . . .	12 „	10 „
„ of telson, . . . . .	15 „	13 „

*Habitat*.—Station 214, February 10, 1875; lat. 4° 33' N., long. 127° 6' E.; south of the Philippines; depth, 500 fathoms; bottom, blue mud; bottom temperature, 41°·8. Fourteen specimens; eight males, five females, and one young. Trawled.

Station 232, May 12, 1875; lat. 35° 11' N., long. 139° 28' E.; *Hyalonema*-ground, off Japan; depth, 345 fathoms; bottom, green mud; bottom temperature, 41°·1. One specimen; male. Trawl and dredge both used.

Length, 37 mm.

This species is not very far separated from *Heterocarpus oryx*, A. Milne-Edwards,<sup>1</sup> but the teeth that form the dorsal armature commence over the gastric region, so that there are only two small teeth on the carapace posterior to the rostrum. There are only nine altogether on the upper surface and eleven on the lower, all of which

<sup>1</sup> *Ann. d. Sci. Nat.*, sér. 6, tom. xi., art. 4, p. 10, 1881.

are remarkably long and slender. The upper lateral carina commences near the posterior margin of the carapace, traverses the line between the dorsal and branchial regions, and ends anteriorly near the middle of the orbit. The first antennal tooth, situated at the outer canthus of the orbit, is long, sharp and not confluent with any of the carinæ. The second antennal tooth is long, straight, and is continuous with a carina or ridge that extends to the posterior margin.

The pleon has the first two somites smooth; the third is carinated, the ridge, which commences abruptly at the anterior margin, is longitudinally fluted and produced to a tooth posteriorly; the fourth and fifth somites are carinated and produced posteriorly to a tooth parallel with the dorsal surface. The sixth somite is smooth, dorsally slightly fluted longitudinally, as is also the telson, which is likewise laterally compressed; the longitudinal angle is armed with three small spines and the extremity is tipped with four.

The ophthalmopoda are short and orbicular.

The first pair of antennæ carries a stylocerite that reaches considerably beyond the extremity of the ophthalmopod, and terminates in two flagella of unequal size; the shorter and upper is the more robust, and extends a little beyond the extremity of the rostrum; the inner and lower is more slender, and is about half as long again as the upper. The second pair of antennæ is about once and a half the length of the animal, and carries a scaphocerite, that has the margins subparallel, and armed with a tooth on the outer margin that does not reach to the extremity.

The pereopoda and other appendages offer no very decided features of specific character.

This species is represented by fourteen specimens, which were taken off the southeastern extremity of the Philippine Islands, the largest being 83 mm. long, and one taken off the southern shores of Japan which is only 37 mm. long; it is, moreover, more slender generally, and has the rostrum relatively longer and armed with ten teeth on the upper margin and thirteen on the under.

The specific name is derived from the Christian name of Alphonse Milne-Edwards, who was the first to define the genus.

*Heterocarpus gibbosus*, n. sp. (Pl. CXII. fig. 2).

Carapace having five imperfect carinæ. Dorsal carina scarcely visible at the posterior margin, but elevated to a strong crest, armed with six large teeth over the gastric and frontal regions, and produced anteriorly to a long laterally compressed rostrum, directed obliquely upwards, and armed on the upper margin with three small equidistant teeth, and on the lower with eleven or twelve, which diminish in size anteriorly. The lateral carinæ are rather elevations than distinct ridges, and are lost before reaching the posterior margin.



The pleon is smooth. The third somite is slightly gibbous but not produced to a tooth.

The telson is laterally armed with four small spines on each side, and is subequal in length with the outer plates of the rhipidura.

Length, entire,	43 mm. (1.7 in.).
„ of carapace,	16 „
„ of rostrum,	20 „
„ of pleon,	27 „
„ of third somite of pleon,	8 „
„ sixth somite of pleon,	5 „
„ telson,	5 „

*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. One specimen. Trawled.

This species may easily be distinguished from the others by the general smoothness of the carapace and pleon. There are only two lateral carinæ, but neither of them is very pronounced, only forming slight longitudinal elevations. The upper lateral carina commences just within the orbital margin, traverses the hepatic region, and then ascends in a curved line, approaching but not quite reaching the posterior margin; it coincides with the upper lateral carina in *Heterocarpus carinatus*. The carina, which in *Heterocarpus carinatus* is confluent with the tooth that stands on the frontal margin at the outer canthus of the orbit, is wanting, the elevation ending a little below the upper carina. The carina which commences at the second antennal tooth corresponds with the lower carina in *Heterocarpus carinatus*; in this species it is prominent anteriorly, but gradually loses its importance, and ceases before it reaches the posterior margin of the carapace. The dorsal carina is strongly elevated over the gastric region, where it is armed with six large subequal teeth; a seventh, not quite so large, stands on the rostrum anterior to the eyes, and two others, equally distant from each other and from the apex, stand on the upper margin of the rostrum, which is laterally compressed and obliquely elevated. The lower margin is armed with twelve teeth, all sharp and anteriorly directed, and gradually diminishing in size as they approach the apex.

The pleon is smooth and without any armature, but the third somite is elevated in the median line to a longitudinal ridge or tuberosity that gives it a gibbous appearance.

The telson (fig. 2z) is dorsally flattened and laterally compressed at the margins, and on each side the longitudinal angle formed by the lateral compression is armed with four small spines, and the extremity is fringed with four, of which the two outer are the larger.

The ophthalmopoda are orbicular, of moderate size, and projected upon a short and slender pedicle.



The first pair of antennæ carries a stylocerite that is sharp pointed and reaches beyond the extremity of the first joint, the flagella are both slender, and the longest is nearly as long again as the rostrum.

The second antennæ carries a scaphocerite that tapers but slightly distally, and the external tooth is subapical.

The pereiopoda are moderately strong; the meros in the three posterior pairs is sparsely armed with strong teeth on the posterior margin, and the dactylos is cylindrical.

The pleopoda increase in length posteriorly, and the outer branches of the last pair, which help to form the tail fan, are a little longer than the telson.

This species, which is represented by a single specimen, corresponds closely with the figure of *Heterocarpus lævis* given by A. Milne-Edwards, the chief distinction being that *Heterocarpus lævis* has a series of small teeth at the posterior extremity of the dorsal crest, and the flagella of the first pair of antennæ are much shorter, reaching, according to A. Milne-Edwards' figure, not beyond the extremity of the rostrum, whereas in *Heterocarpus gibbosus* they are unequal, one being a little longer than the rostrum, and the other about twice the length. In *Heterocarpus gibbosus* the third somite of the pleon is dorsally elevated into an elongated eminence, which gives the animal a more markedly sinuous appearance than in *Heterocarpus lævis*.

*Heterocarpus lævigatus*, n. sp. (Pl. CXII. fig. 3).

Pleon dorsally free from large teeth. Carapace furnished with a central and two lateral carinæ, the median armed with four teeth on the dorsal crest and one on the rostrum in advance of the orbit, anterior to which the rostrum is smooth and abruptly elevated obliquely, and armed with six teeth on the lower margin, of which the anterior is near the apex. The first lateral carina originates above and behind the outer orbital tooth, and passes back to just within the posterior margin of the carapace; the second carina commences in the fronto-lateral tooth and continues back for about two-thirds of the length of the carapace.

The first pair of antennæ has one flagellum as long as, and the other twice the length of, the rostrum. The second pair has the scaphocerite about half the length of the rostrum.

The third somite of the pleon is furnished with a dorsal longitudinal tubercle, and the telson is armed with four lateral and several terminal spines.

Length, entire,	.	.	.	.	.	.	55 mm. (2.1 in.).
„ of carapace,	.	.	.	.	.	.	20 „
„ of rostrum,	.	.	.	.	.	.	20 „
„ of pleon,	.	.	.	.	.	.	35 „
„ of third somite of pleon,	.	.	.	.	.	.	8 „
„ of sixth somite of pleon,	.	.	.	.	.	.	6 „
„ 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. One specimen, male, associated with two female specimens of *Heterocarpus dorsalis*. Dredged.

This species in many ways resembles *Heterocarpus lævis*, A. Milne-Edwards, but differs in several more or less important points from the figure given by him in the drawings of the Crustacea of the Blake<sup>1</sup> Expedition.

The carapace is dorsally compressed to a carina in the median line, which is armed with four large teeth, of which the posterior stands over the cardiac region and the anterior over the orbital, besides which there is a small tooth on the upper surface of the rostrum a little in advance of the ophthalmopoda. The rest of the rostrum is smooth to the extremity, the apex of which is broken off in our solitary specimen; it is bent somewhat abruptly and obliquely upwards. The lower surface is armed with six teeth, of which the anterior is not far from the apex and small, while the rest are larger. The upper lateral carina commences above and behind the tooth at the outer canthus of the orbit, and continues to within a short distance of the posterior margin of the carapace, where it abruptly turns towards the dorsal median line and is quite or nearly lost in the surrounding tissue; the lower or second lateral carina commences in a large and well-developed tooth at the fronto-lateral angle of the carapace, and passes longitudinally backwards to about three-fourths the length of the carapace, where it is lost in the surrounding tissue.

The anterior two somites of the pleon are dorsally rounded and smooth; the third is laterally compressed and dorsally elevated in the median line into an elongated tuberosity, which is smooth on the surface and lost at the anterior and posterior margins of the somite. The fourth somite is also laterally compressed and shows indications of a dorsal longitudinal tuberosity; the fifth somite is dorsally rounded and laterally compressed. The sixth is laterally compressed and dorsally flattened; the posterior margin is furnished with a tooth on each side above the articulation of the posterior pair of pleopoda, and projects directly backwards, forming a right angle on the upper side and a waved line on the lower.

The telson is dorsally flattened and anteriorly channelled; the sides are depressed and the angle formed by the depression is armed with four small spines; the extremity is formed by a small central rigid tooth with two movable spines on each side, of which the outer is the longer, and has at its base on the outer side another small spine. The ophthalmopoda are short and pyriform, and the ophthalmi are globular and brown in colour.

The first pair of antennæ has the first joint of the peduncle deeply excavate to receive the ophthalmopod, and is furnished on the outer margin with a long and slender stylocerite that reaches anteriorly as far as the distal extremity of the third joint of the

<sup>1</sup> Recueil de Figures de Crustacés nouveaux ou peu connus.—1<sup>re</sup> Livraison (comprenant 44 planches). Avril, 1883.

peduncle. At the base of the stylocerite on the outer margin is a smaller process, that is slightly curved upwards and forwards and appears to assist in protecting the ophthalmopod when at rest. The second and third joints are short and cylindrical, and support two slender flagella, of which the outer is the more robust and the inner the longer, equalling half the length of the animal.

The second pair of antennæ has attached to the first or coxal joint a well-developed phymacerite. The second joint supports a scaphocerite that is about half the length of the rostrum; the inner and outer margins are subparallel, and the distal extremity of the inner plate does not project anteriorly beyond the extremity of the outer distal tooth; the terminal two joints of the peduncle are subequal in length and distally support a flagellum that is longer than the animal.

The oral appendages have not been examined, but they are probably only of generic value. The second pair of gnathopoda is tolerably robust and has the terminal and penultimate joints subequal, whereas the antepenultimate is somewhat longer.

The first pair of pereopoda is about the same length as the preceding pair of gnathopoda but more slender, and has the terminal joint shorter than the penultimate. The second pair has the right appendage wanting, but the left has the carpos long and about equal in length to the rest of the pereopod. The posterior three pairs are more slender than in most species, and the teeth on the meros are smaller and less important.

The first pair of pleopoda is unequally branched. In the solitary specimen, which is a male, the inner and smaller branch is furnished near the distal extremity with a small rudimentary stylamblys; the second pair has the branches subequal and the inner and posterior carries a long stylamblys, as it also does in the third pair, while the fourth has one of smaller proportion and the fifth has none at all. The inner branches are more slender and feeble than the outer.

*Heterocarpus ensifer*, A. Milne-Edwards (Pl. CXII. fig. 4).

*Heterocarpus ensifer*, A. Milne-Edwards, Ann. d. Sci. Nat., sér. 6, tom. xi., art. 4, p. 8, 1881;  
Recueil d. Fig. Crust., 1883.

*Pandalus carinatus*, Sidney Smith, Bull. Mus. Comp. Zool., vol. x. p. 63, pl. x. figs. 2-2f.,  
pl. xi. figs. 1-3, 1882.

Carapace having seven carinæ; the central or dorsal is elevated into a crest, continuous with the rostrum, which equals the length of the carapace. It is armed on the upper surface with seventeen teeth, the posterior of which corresponds with the pyloric region and they continue nearly to the apex of the rostrum; the lower margin is armed with twelve teeth, of which the posterior are the larger.

The upper lateral carina extends from the gastric region to the posterior margin of the carapace; the median lateral carina passes from the tooth at the external canthus of the orbit, with which it is confluent, to the posterior margin of the carapace; the

lower lateral commences in the second antennal tooth and continues to the posterior margin of the carapace.

The first two somites of the pleon have a small carina in the median line; the third is strongly carinated and produced to a large, laterally compressed tooth; the fourth is slightly carinated and produced posteriorly to a strong tooth. The fifth and sixth somites are smooth, and the telson is armed with four little spines on the dorso-lateral angle.

Length, entire,	.	.	.	.	.	64 mm. (2.5 in.).
„ of carapace,	.	.	.	.	.	21 „
„ of rostrum,	.	.	.	.	.	23 „
„ of pleon,	.	.	.	.	.	43 „
„ of third somite of pleon,	.	.	.	.	.	14 „
„ of sixth somite of pleon,	.	.	.	.	.	7 „
„ of telson,	.	.	.	.	.	12 „

*Habitat*.—Station 200, October 23, 1874; lat. 6° 47' N., long. 122° 28' E.; between the Philippine Islands and Borneo; depth, 250 fathoms; bottom, green mud. Two specimens; males. Trawled.

West Indies ("Blake" Expedition).

These specimens so closely resemble *Heterocarpus ensifer*, A. Milne-Edwards, and *Pandalus carinatus*, Smith, that I do not hesitate to consider it the same species; any differences probably depend on the condensed description given by the authors. A. Milne-Edwards describes it as having a median dorsal carina projecting anteriorly to a rostrum that is laterally compressed, slightly elevated anteriorly, and armed on the upper side with seventeen teeth and on the lower with eight, which corresponds with the armature of the present specimens, and as being furnished with a third carina, which is above the other two lateral ones and much less prominent. In the Challenger specimens this carina, the upper of the three lateral, is very distinct from the hepatic region to the posterior margin, but wanting in front of the hepatic region, although in certain lights a ridge is visible, which terminates anteriorly near the middle of the orbital margin.

There is a low, thick carina on the median dorsal line of the first two somites of the pleon; on each side of the first somite there is a small tubercle and the trace of a second, and below it an elevated line, corresponding with the continuation of a carina on the carapace. The third somite is laterally compressed and strongly carinated, the carina commencing abruptly at the anterior margin and being produced posteriorly to a large, strong tooth; on the fourth somite the carina is but little marked at the anterior margin, but gradually rises, and is produced posteriorly to a long, narrowly compressed tooth, not quite so large as that on the preceding somite. The fifth and sixth somites are smooth, laterally compressed, and destitute of either carina or tooth.

The telson is as long as the lateral plates of the rhipidura; it is dorsally flattened and laterally compressed, the longitudinal angles being armed with four small spines on each side, and terminates in two long outer and two small inner spines.

The ophthalmopoda are short, thick and orbicular.

The first pair of antennæ has the peduncle short, the first joint being furnished with a short, sharp pointed stylocerite. The flagella are scarcely longer than the rostrum.

The second pair of antennæ carries a long, narrow scaphocerite, which tapers to the distal extremity and is armed with an external apical tooth, and bears a flagellum as long as the body of the animal. The appendages are slender, tolerably robust, and not of extreme length.

The pleopoda are short and strong, and the posterior pair, which helps to form the rhipidura, is not longer than the telson; the outer plate is longitudinally grooved, and furnished with a perfect diæresis, the outer limit of which is defined by a small spine.

*Observations.*—The close resemblance of the specimens taken by the Challenger in the Oriental Archipelago to those found at the West Indies, and, therefore, on the opposite side of the globe, is a matter of interest, since this species has not yet been found at any intermediate locality, and does not inhabit depths greater than about 500 fathoms.

*Plesionika*, n. gen.

Carapace smooth; dorsally carinated anteriorly, and produced to a long, narrow, laterally compressed rostrum, which as well as the frontal crest is armed with teeth.

Ophthalmopoda biarticulate.

First pair of antennæ armed with a sharp point and a wide stylocerite, and terminating in two long slender flagella.

Second pair of antennæ terminates in a long and slender flagellum, and carries a long, narrow scaphocerite, that is armed on the outer side with a strong subapical tooth.

Mandible having a three-jointed synhipod; psalistoma well developed and distinct from the molar tubercle.

Second pair of gnathopoda pediform, and destitute of a basecephysis.

First pair of pereopoda slender and simple, terminating in a small styliform dactylos. Second pair long, slender, and minutely chelate, the carpos being long, flexible and multi-articulate. Three following pairs long, slender, and simple, remarkable for the great length of the carpal and propodal joints.

Pleon about three times as long as the carapace, and terminating in a long, narrow and tapering telson, the sides of which are depressed. Pleopoda long, carrying flat sub-foliateous rami; outer plates of the rhipidura subequal with the telson.

The branchiæ are well developed and differ from those of *Pandalus* in having a



pleurobranchial plume attached to the somite that supports the second pair of gnathopoda, as shown in the annexed table:—

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

*Observations.*—This genus is closely allied to *Pandalus*, but is distinguishable from it by having the frontal crest and rostrum armed with fixed teeth instead of movable spines, the flagella of the first pair of antennæ very long and slender, the stylocerite sharply pointed instead of being rounded and disc-like, and the posterior extremity of the mastigobranchial plate of the second pair of siagnopoda rounded off, short and abrupt, instead of being produced to a long lash as it is in *Pandalus*. It differs also in having a pair of branchial plumes connected with the second pair of gnathopoda. From *Pandalopsis* it differs in a less degree, and that is in the existence of teeth instead of spines on the dorsal crest, and in the presence of small or rudimentary mastigobranchial appendages attached to all the pereopoda excepting the posterior pair, whereas in *Pandalus* they are absent from the four posterior pairs.

These three forms have been associated by authors in the single genus *Pandalus*, but I think the variation in their external structure is sufficiently important to warrant their separation into distinct genera.

*Plesionika uniproducta*, n. sp. (Pl. CXIII. fig. 1).

Carapace smooth, carinated anteriorly in front of the cardiac region. Rostrum as long as the carapace, dorsal surface at the base crested and armed with seven closely crowded teeth in the male, and with five in the female; upper margin of the rostrum smooth to the apex, under margin armed with sharp anteriorly directed teeth, extending from the base to the extremity.

Pleon smooth, laterally compressed. In the female the posterior margin of the third somite is produced to a sharp point in the median line; in the male only a trace of this feature exists.

Telson not so long as the lateral plates of the rhipidura, laterally compressed, dorsally flat, armed on each side at the dorso-lateral angles with three small spines and two or three terminal spine-like hairs.

Length, entire (male),	.	.	.	.	.	94 mm. (3·7 in.).
„ of carapace,	.	.	.	.	.	24 „
„ of rostrum,	.	.	.	.	.	31 „
„ of pleon,	.	.	.	.	.	70 „
„ of third somite of pleon,	.	.	.	.	.	10 „
„ of sixth somite of pleon,	.	.	.	.	.	15 „
„ of telson,	.	.	.	.	.	15 „



*Habitat*.—Station 122, September 10, 1873; lat.  $9^{\circ} 5' S.$ , long.  $34^{\circ} 50' W.$ ; off Barra Grande; depth, 350 fathoms; bottom, red mud. Two specimens; one male, one female. Trawled.

The rostrum is compressed laterally, depressed slightly from the level of the dorsal surface to beyond the reach of the eye, and then gradually rising in a straight line; it is smooth on the upper side from the apex to the base, where, on a line with the extremity of the third joint of the first pair of antennæ, there stands one small tooth, and at a little distance behind a row of teeth that gradually decrease in size posteriorly. In the male there are seven, in the female only five such teeth; but there is only one specimen of each for comparison. The surface of the carapace is smooth and polished; the anterior margin is produced to a small tooth at the antennal angle, and another at the fronto-lateral angle.

The pleon is smooth and laterally compressed, especially behind the third somite, which is produced posteriorly in the median line, to a slight extent in the male, but forming a sharp point in the female, the point, when the pleon is extended, lying in close proximity to the surface of the next succeeding somite.

The ophthalmopoda (fig. 1*a*, *a*) are orbicular, and stand upon extremely short and slender pedicles, attached to the ophthalmic somite, which is free and external to the carapace; it lies across the frontal surface, and is produced in the median line to a strong pointed cusp or tooth.

The first pair of antennæ (fig. 1*b*) has the first joint broad, deeply hollowed and furnished on the outer side with a broad, flattened, and pointed stylocerite, which follows the contour of the deep excavation in which the eye rests; the anterior margin of the joint is fringed with a row of posteriorly directed cilia. The second and third joints are short, and terminate in two flagella, the outer of which is the broader; it is compressed for a considerable distance, and then suddenly narrows, becoming slender and cylindrical. The two flagella are subequal, and about twice the length of the rostrum.

The second pair of antennæ (fig. 1*c*) is armed with a sharp spine-like tooth on the under side of the outer distal margin of the second joint, near the base of the scaphocerite, which is long, narrow, and rather more than half the length of the rostrum; the distal extremity is narrower than the base, and has on the outer margin a small subapical tooth passing beyond the apex; within the margin the upper surface is traversed by a longitudinal groove. The flagellum of this antenna is broken off in both specimens, but I judge it to be a little longer than those of the first pair.

The anterior labrum orepistom *a* (fig. 1, *ant.*) is transversely ridged and longitudinally short, and is produced anteriorly to a long projecting tooth in the median line. The metastoma (fig. 1, *post.*) is transversely wider and shorter; between these two the mandibles articulate on each side.

The mandible (fig. 1*d*) consists of a broad apophysis supporting a long, narrow, subcylindrical, molar process, a distinct narrow, flattened, and slightly curved psalidoma, and a triarticulate synhipod.

The first pair of siagnopoda (fig. 1*e*) is three-branched, the central branch being broad and disc-like.

The second pair (fig. 1*f*) is two-branched, the inner branch being bilobed, and each lobe fringed with short spicules; the second branch is short and tapering, and on the outer side, attached to the coxal joints, is a mastigobranthial plate produced as a broad foliaceous plate, anteriorly beyond the extremity of the inner branches, and posteriorly but little beyond the coxal joint, and fringed with hairs directed centrifugally to the front.

The third pair of siagnopoda (fig. 1*g*) is three-branched, and carries a mastigobranthia of two plates; the inner branch is broad and fringed with hair on the inner margin, the second is slender, cylindrical, and tipped with hairs, the third consists of a broad foliaceous plate, from the inner margin of which springs a long and slender flagellum fringed with small hairs, and on the outer margin attached to the coxal joint are two membranous plates springing from a common base, the one anteriorly, the other posteriorly.

The first pair of gnathopoda (fig. 1*h*) is six-jointed and subpediform; the coxal joint carries a mastigobranthial plate and an arthrobranchial plume; the basis supports a long ecphysis, and the two succeeding joints are subcylindrical and subequal in length, the two terminal being reflexed against the preceding, and fringed on the inner margin with closely packed hairs.

The second pair of gnathopoda is long, slender, and pediform, terminating in a long and tapering propodal joint, the dactylos being absent, and carries an ecphysis or branch attached to the basal joint.

The pereopoda are all slender, but not remarkably long; the carpos is about half the length of the meros, the posterior distal portion of which is dentated with spine-like points, and about the same length as the propodos, which terminates in a short and slightly curved dactylos.

The pleopoda are moderately long, except the first pair, which is short, one branch being much shorter than the other. The rest have the rami long, narrow, and subfoliaceous; in both sexes the posterior and inner branch carries a stylamblys that has the distal extremity oblique and armed with numerous cincinnuli. The posterior or sixth pair forms the lateral plates of the rhipidura; these are longer than the telson, and the outer plate carries a well-defined diæresis.

*Observations.*—The two specimens, a male and a female, belong, I think, to the same species; but had they been taken at separate stations, the variations between them might have appeared sufficient to justify their separation as distinct species. These are, the

different number of the teeth on the rostral crest, and the produced point on the third somite in the female, from which the specific name is derived, being so much reduced in the male.

This species bears some resemblance to *Pandalus martius*, A. Milne-Edwards, obtained during the expedition of the "Travailleur,"<sup>1</sup> from which it chiefly differs in having the rostrum not quite so long, and the serrature of the lower margin stronger, in the presence of the pointed or tooth-like process at the posterior dorsal margin of the third somite of the pleon, and in having the dactylos shorter in the three posterior pereopoda.

*Plesionika semilævis*, n. sp. (Pl. CXIII. fig. 3).

Carapace smooth, rostrum once and half as long as the dorsal surface of the carapace, smooth on the upper surface, minutely serrate on the lower, frontal crest armed with six teeth.

Pleon smooth and laterally compressed.

Telson dorsally flat and laterally compressed.

Ophthalmopoda large, reniform.

First pair of antennæ having the flagella as long again as the rostrum.

Second pair having the flagellum subequal with those of the first pair; scaphocerite about half the length of the rostrum.

Pereopoda long, but not extremely so.

Pleon smooth and polished.

Telson shorter than the outer plates of the rhipidura and equal with the inner.

		Female.	Male.
Length, entire,	.	74 mm.	74 mm. (2.9 in.).
" of carapace,	.	19 "	20 "
" of rostrum,	.	32 "	34 "
" of pleon,	.	55 "	54 "
" of third somite,	.	10 "	10 "
" of sixth somite,	.	13 "	13 "
" of telson,	.	13 "	14 "

*Habitat*.—Station 200, October 23, 1874; lat. 6° 47' N., long. 122° 28' E.; between the Philippine Islands and Borneo; depth, 250 fathoms; bottom, green mud. Sixteen specimens; nine males and seven females, five laden with ova. Trawled.

Station 164A, June 13, 1874; lat. 34° 9' S., long. 151° 55' W.; off Sydney Harbour, Australia; depth, 1200 fathoms; bottom, green mud. Two damaged specimens. Associated with *Nothocaris rostricrescentis*.

Station 170, July 14, 1874; lat. 29° 55' 9" S., long. 176° 14' W.; off the Kermadec

<sup>1</sup> Recueil de Figures de Crustacés nouveaux ou peu connus, 1883.

Islands; depth, 520 fathoms; bottom, volcanic mud; bottom temperature, 43°. Six specimens; five males and one female. Trawled.

Station 173, July 24, 1874; lat. 19° 9' 35" S., long. 179° 41' 50" E.; off Matuka, Fiji Islands; depth, 315 fathoms; bottom, coral mud. Seven specimens; three males and four females, two of which are young. Dredged.

*Observations.*—The general appearance of the specimens trawled near the Philippine Islands is not very different from that of *Plesionika uniproducta*, from off the Atlantic coast of South America, but they differ in having the teeth on the rostral crest more regularly disposed and constant in number; in both sexes there are six teeth, whereas in *Plesionika uniproducta* the male has seven and the female only five, and the anterior tooth is separated by a space from the rest, while in *Plesionika semilavis* the teeth are disposed at regular but gradually decreasing intervals from the first to the last, as they gradually diminish in size posteriorly. In this species also the third somite is not posteriorly produced in the median line to a point; and the ophthalmopoda are larger and the ophthalmi more reniform than orbicular. In most other points the two species correspond; in both the rostrum anterior to the eyes is depressed and then directed horizontally forwards in a straight line, the upper margin being smooth and the lower serrate, with sharp, evenly planted and anteriorly directed teeth, which appear to be a little finer in *Plesionika semilavis* than in *Plesionika uniproducta*. In both, also, the meros in the three posterior pairs of pereopoda is armed with small and sharp teeth. They were both taken from corresponding depths and from muddy bottoms.

The specimens taken near the Kermadec Islands are generally more slender, the legs rather longer and the rostrum longer and more rigidly straight, and some of the specimens have the rostral crest adorned with eight teeth, and the ocellus, although clearly defined, is not separated from the dark pigment of the ophthalmus. The length is from three to four inches, and the second antennæ is nearly as long again as the animal.

Comparing the specimens of this species from the different localities with *Pandalus martius*, A. Milne-Edwards, taken at from 400 to 1200 fathoms in the Atlantic, the differences are very slight. According to Milne-Edwards' figure the rostrum and the dactylos of the posterior three pairs of pereopoda are relatively longer, and the ophthalmopoda are not quite so large, and more orbicular.

A damaged specimen taken at Station 192 appears to belong to this species. It has been attacked by two species of parasitic Isopods; one, resembling *Phryxus hindmanni*, was found underlying the carapace, and almost filled the branchial chamber, but without doing much damage to it; the male was also present, hugging close round the telson of the female. The male of this species had not been determined at the time of publication of the British Sessile-Eyed Crustacea.

The other parasite found on the same animal closely approximates to *Phryxus*.

*abdominalis*, Kröyer, but differs in having the branchial plates of the female pointed at the extremity, instead of being rounded as in the typical specimens.

Both specimens were gravid with an enormous number of ova.

*Plesionika spinipes* (Pl. CXIII. fig. 2).

Carapace smooth; rostrum about twice the length of the carapace, serrate on the upper and lower margins.

Pleon smooth.

Telson slender; armed with two or four spines at the terminal extremity and three small ones on the dorso-lateral surface.

Pereiopoda slender and longer than the body of the animal, the three posterior pairs extending beyond the extremity, and having the meros posteriorly armed with spines.

The scaphocerite about half the length of the rostrum.

Length, entire (male),	.	.	.	.	.	43 mm. (1.7 in.).
„ of carapace,	.	.	.	.	.	12 „
„ of rostrum,	.	.	.	.	.	25 „
„ of pleon,	.	.	.	.	.	31 „
„ of third somite of pleon,	.	.	.	.	.	5 „
„ of sixth somite of pleon,	.	.	.	.	.	6 „
„ of telson,	.	.	.	.	.	7 „

*Habitat*.—Station 219, March 10, 1875; lat.  $1^{\circ} 54' 0''$  S., long.  $146^{\circ} 39' 40''$  E.; north of New Guinea; depth, 150 fathoms; bottom, coral mud. Eight specimens; seven males, one female. Trawled.

This species has the rostrum very straight, and finely and evenly serrate on the upper and lower margins with small closely packed teeth that have their apices directed forwards. The serrature on the upper surface commences on the anterior portion of the gastric region, that on the under margin begins a little in advance of the eye. The rest of the surface of the carapace is smooth. Two small teeth, one corresponding with the first pair of antennæ, the other with the fronto-lateral angles, stand on the frontal margin. The pleon is smooth and free from markings of any kind; the third somite is slightly arcuate. The telson is narrow and laterally compressed, the dorso-lateral angle being furnished with three small spinules, seen best in a lateral aspect, and there are two or three longer ones at the extremity.

The ophthalmopoda are of moderate size and stand on short pedicles.

The first pair of antennæ has the first joint deeply excavated to receive the ophthalmopod, and is furnished on the outer side with a sharp stylocerite; the second and third joints are short, and terminate in two unequally long flagella, the shorter of which passes

considerably beyond the rostrum, which is more than half the length of the animal. Both flagella are slender, but the outer is more robust towards the base.

The second pair of antennæ has the second or basal joint armed on the outer and under side with a small sharp tooth, and carries a scaphocerite that has nearly parallel sides, the outer being rigid and terminating in a small distal tooth that reaches to about half the length of the rostrum. The third joint terminates in a flagellum that reaches a little beyond the longest flagellum of the first pair.

The second pair of gnathopoda is long, slender, and pediform, the second joint or basis is furnished with a slender branch, the third or ischium is short, the fourth or meros is extremely long and slender, as is also the fifth joint or carpos, and the sixth or propodos is about half the length of the carpos, and terminates in a flattened point, the margins of which are notched for the reception of hairs or spines.

The first pair of pereopoda is more slender and longer than the second pair of gnathopoda, having the meros and propodos about half the length of the carpos and terminating in a rudimentary dactylos (fig. 2*k*). The second pair of pereopoda is unequal, that on the right side being shorter and more slender; the carpos is long and multiarticulate, the propodos scarcely longer or broader than the ultimate articulus of the carpos; the pollex and dactylos are small and form a perfect but minute chela. The three posterior pairs are very long, reaching forwards very considerably beyond the extremity of the rostrum; the meros is long, and furnished on the posterior or lower margin with a series of slender, sharp, spine-like teeth, from which the name of the species is derived; the carpos is very long and more slender than the meros, as is also the propodos, while the dactylos is short and styliform. The rest of the animal offers no peculiar feature of specific interest, except that the posterior pair of pleopoda, which forms the tail-fan, is longer than the telson.

The branchiæ in this species deviate from the typical arrangement of the genus in having no mastigobranchial appendage attached to the several pairs of pereopoda; they may be tabulated as follows:—

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

*Observations.*—All the specimens in the collection, except one, appear to be males, and bear a close comparison with *Pandalus stylopus*, A. Milne-Edwards, which was taken in the Atlantic during the expedition of the "Travailleur," at a depth of 530 fathoms. It differs, however, in several points of more or less importance. The first pair of antennæ, for instance, has the flagella much longer, being twice the length of the rostrum; the serrature of the rostrum is more alike on the two margins; the second pair of pereopoda



is unequal on the two sides, both in length and proportion; and the propodos of the three posterior pairs of pereopoda is more nearly equal in length to the carpos.

This species still more closely resembles *Pandalus longipes*, A. Milne-Edwards, but in the latter the first pair of antennæ and the rostrum are longer. It also appears to be nearly allied to *Pandalus narwal* (Fabricius), as described by Herbst, Latreille, Milne-Edwards and Heller, which was taken in the Mediterranean.

The Challenger species differs externally from either in having the serrature on the dorsal crest more slender, closely packed, and extending posteriorly to the pyloric region. *Pandalus stylopus*, *Pandalus longipes* and *Pandalus narwal*, all of which appear to me to belong to this genus, have the teeth on the crest and base of the rostrum coarse, whereas those on the distal portion of the rostrum are fine in *Plesionika spinipes*.

*Plesionika unidens*, n. sp. (Pl. CXIII. fig. 4).

Rostrum twice the length of the carapace, crested and armed with teeth at the base; smooth on the upper surface to the apex, except for the presence of one tooth a little posterior to the distal extremity; the lower margin is furnished with six or seven teeth.

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

Second pair having the flagellum but little longer.

Pereopoda slender but not remarkably long.

Third somite of the pleon dorsally compressed to a straight carina posteriorly.

Telson nearly as long as the outer rami of the rhipidura.

Length, entire (male), . . . . .	40	mm. (1.5 in.).
„ of carapace, . . . . .	11	„
„ of rostrum, . . . . .	22	„
„ of pleon, . . . . .	29	„
„ of third somite of pleon, . . . . .	6	„
„ of sixth somite of pleon, . . . . .	6	„
„ of telson, . . . . .	7	„
Breadth of ophthalmus, . . . . .	3.5	„

*Habitat*.—Station 219, March 10, 1875; lat.  $1^{\circ} 54' 0''$  S., long.  $146^{\circ} 39' 40''$  E.; north of New Guinea; depth, 150 fathoms; bottom, coral mud. Four specimens; two males and two (?) females. Trawled.

This species has the rostrum very long and straight. It may readily be distinguished from others by its having a solitary tooth on the upper margin of the rostrum, a little posterior to the apex, the rest is smooth and straight until near the base, where there are several teeth; those just in front of the eye are the largest; those behind the frontal margin are the smallest and most closely compressed together, they are all laterally compressed and stand like a crest above the eyes. From this crest a carina without

teeth extends to the posterior limit of the gastric region; the rest of the carapace is smooth, with a polished surface. The anterior or frontal margin carries a long antennal tooth, and the rudiment of one at the fronto-lateral angle.

The pleon is smooth and free from armature; it is laterally compressed, especially behind the third somite. In the third the compression is dorsally increased, so as to produce a small carina, that disappears both at the anterior and posterior extremities of the somite. The telson is laterally compressed, armed at the dorso-lateral angles with three small spines, and terminates in a few small hairs.

The ophthalmus is large and reniform, black in colour, and stands upon a short ophthalmopod.

The first pair of antennæ has the first joint short and deeply excavated for the reception of the ophthalmopoda; the two succeeding joints are short and hairy, and the two flagella do not reach beyond the extremity of the rostrum. The second pair carries a long, narrow scaphocerite, and a flagellum that scarcely reaches beyond the distal extremity of the rostrum.

The second pair of gnathopoda is robust, and reaches to half the length of the rostrum, the terminal joint being fringed with short, spine-like hairs.

The first pair of pereiopoda is nearly as long as the gnathopoda, but more slender. The second pair is minutely chelate, with a long multiarticulate carpos. The three following pairs are subequal, the posterior being the shortest and the anterior the longest, and have the lower or posterior margin of the meros sparsely dentate with small spine-like points. The carpos is smooth, about one-third the length of the meros, and is produced anteriorly to a small tooth on the propodal articulation; the propodos is smooth, and nearly, but not quite, as long again as the carpos; the dactylos is long, slightly curved, and sharply pointed.

The outer plate of the rhipidura has a diæresis armed with a small tooth on the outer margin; the inner plate is narrow and rounded terminally; it is fringed with long hairs, as is also the inner margin of the outer plate, and both are a little longer than the telson.

*Observations.*—The specimens of this species were taken at the same station as *Plesionika spinipes*, to which they bear a general resemblance, although they differ in the relative lengths of the pereiopoda, rostrum, and antennæ, and have proportionately larger eyes, and a differently formed rostrum. The meral joints of the three posterior pairs of pereiopoda resemble one another in the two species in having numerous little teeth along the posterior margin.

The branchiæ are arranged according to the typical condition in the genus; attached to the coxa of each pereiopod there is a small, almost rudimentary, mastigobranchial appendage, so diminished in size as to be apparently only a useless appendage.

Among the specimens appear to be two females, but of one I am uncertain.

*Plesionika brevirostris*, n. sp. (Pl. CXIII. fig. 5).

Rostrum a little shorter than the dorsal length of the carapace; free from spines on lower margin and on the upper anterior to the crest, which consists of six teeth. The rest of the carapace and pleon is smooth.

First pair of antennæ having the flagella as long as the animal.

Second pair having the flagellum a little longer than those of the first; scaphocerite subequal with the rostrum.

Second pair of gnathopoda reaching a little beyond the distal extremity of the rostrum.

Pereiopoda long and slender; first pair a little longer than the second pair of gnathopoda, but more slender. Second pair of pereiopoda a little shorter than the first and more robust; the carpos long and multiarticulate. Third, fourth, and fifth pairs increasing in length posteriorly, the last reaching beyond the extremity of the rostrum to a distance equal to the length of the carapace.

Telson dorsally depressed in the median line, shorter than the lateral plates of the rhipidura.

Length, entire,	.	.	.	.	.	97 mm. (3.8 in.).
„ of carapace,	.	.	.	.	.	26 „
„ of rostrum,	.	.	.	.	.	23 „
„ of pleon,	.	.	.	.	.	71 „
„ third somite of pleon,	.	.	.	.	.	13 „
„ sixth somite of pleon,	.	.	.	.	.	14 „
„ telson,	.	.	.	.	.	16 „

*Habitat*.—Station 200, October 23, 1874; lat. 6° 47' N., long. 122° 28' E.; between the Philippine Islands and Borneo; depth, 250 fathoms; bottom, green mud. One specimen, female. Trawled.

*Observations*.—The specimen was laden with numerous ova, of which I approximately counted 6000; it was trawled with considerable numbers of *Plesionika semilævis*, with which it appears to closely correspond in general aspect and in all parts, excepting in the shortness of the rostrum and the absence of teeth from the lower margin. It is not improbable that it is only an extreme variation in form of the latter species due to some accidental cause, and illustrating the early stage of a specific variation.

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

Carapace smooth; dorsally crested over the gastric region and produced to a long rostrum; armed on the crest with rigid teeth and movable spines; frontal margin having an antennal and fronto-lateral tooth.

<sup>1</sup> *νόθος*, illegitimate; *καρπός*, shrimp.

Pleon smooth ; third somite dorsally arcuate, sixth short, having the lateral margins anteriorly confluent with the ventral surface.

Telson long, narrow, tapering, laterally compressed and dorsally flattened, and subequal in length with the outer plates of the rhipidura.

Ophthalmopoda biarticulate, standing at the extremities of a distinct somite. Ophthalmus large, pear-shaped, projecting laterally, the posterior portion being furnished with a large and well-formed ocellus, which, although close to, appears to be distinct from the true ophthalmus, and as thickly faceted as the primary organ.

First pair of antennæ having the peduncle short, supporting two long, slender flagella that are as long as the rostrum ; first joint excavate on the upper surface and armed on the outer side with a sharp pointed stylocerite.

Second pair of antennæ carrying a long, narrow scaphocerite, armed on the outer side with a small tooth, and a long and slender flagellum about the length of the animal.

Mandibles furnished with a psalistoma and a three-jointed synhipod.

First pair of gnathopoda having the distal joints reflexed ; the basis armed with a long cephalopod, and the coxa with a small mastigobranchial plate and a small podobranchial plume.

Second pair of gnathopoda long and pediform ; the basis carries a well-developed cephalopod and the coxa a rudimentary mastigobranchia, but no podobranchial plume.

First pair of pereopoda slender and simple. Second pair long, slender and unequal, the left being longer and more feeble than the right, and minutely chelate ; carpus multiarticulate ; coxa supporting a rudimentary mastigobranchia, but no podobranchial plume. Three posterior pairs of pereopoda subequal, moderately robust, and terminating in a small dactylus ; coxa of third and fourth pairs supporting a rudimentary mastigobranchia, but the fifth has none.

Pleopoda biramous and semifoliate. Outer branch of the rhipidura furnished with a well-defined diæresis.

Telson laterally compressed and subequal with the caudal plates.

This genus is closely related to *Plesionika*, and, therefore, to *Pandalus*. In its external features it is most easily determined by the character of the armature of the dorsal crest, which consists of several spines that articulate in sockets, and several teeth that are fixed and rigid, being part of the dermal wall. It forms a link between *Heterocarpus*, A. Milne-Edwards, in which the armature of the crest consists entirely of fixed teeth, and *Pandalus*, in which they are all spines. Another feature which is strongly characteristic of this genus is the very perfect ocellus or secondary eye situated on the posterior surface of the ophthalmopod, which, when the eye is lying at rest in the excavation formed in the upper surface of the first joint of the first pair of antennæ, is vertically exposed.

In *Pandalus annulicornis* the ocellus also exists, but it is not exposed beyond the margin of the pigment that distinguishes the ophthalmus, but in *Nothocaris* it forms

a well-defined circular spot, or little eye, distinct from the primary organ. In *Plesionika*, *Pandalopsis* and *Pandalus* it is not conspicuous, but a process of the pigment extends beyond the margin as if it were an incipient condition of the more complete ocellus found in this genus.

In this genus, as distinguishing it from *Pandalus*, the stylocerite is sharp pointed and the flagella of the first pair of antennæ are long and slender, being as long as or longer than the rostrum or the carapace.

The mandibles are formed much like those in the genus *Heterocarpus*, in having the molar process cylindrical, and projecting at right angles to the apophysis; at the angle so formed the psalistoma and the three-jointed synhipod projects.

The oral appendages resemble generically those of *Heterocarpus*, but in *Pandalus* the mastigobranchial plate of the second siagnopod extends backwards into the branchial chamber, and by means of the long terminal hairs at its distal extremity brushes all the plumes, whereas in *Nothocaris*, as in *Plesionika*, it terminates abruptly in a rounded extremity fringed with fine cilia, and does not extend into the branchial chamber.

The first pair of gnathopoda has the propodos long, broad, and reflexed against the meros, and the dactylos broad and continuous with the propodos.

The second pair of gnathopoda is five-jointed and pediform; the first joint or coxa carries a rudimentary mastigobranchia, at the base of which a flattened calcified disc projects at right angles; the basis is short and carries an ephysis that is long, narrow, and about half the length of the ischium or succeeding joint; the ischium is long and has the margins parallel and fringed with tufts of hairs. The next joint is shorter, being not quite half the length of the preceding, and the terminal is longer but not quite so long as the ischium; it is cylindrical, and furnished at the extremity with two or three strong spines, and along the outer margin with a series of tufts of hairs, mingled with a few spines.

The first pair of pereopoda is long, slender and pediform; the coxa carries a small mastigobranchia, and is furnished with a tuft of long hairs on a prominent tubercle; the basis is short and carries no ephysis; the ischium is long, but not so long as the meros, with which it is connected by an oblique articulation, and it becomes slightly narrower towards the distal extremity, where it articulates with a long carpos; the propodos is straight and cylindrical, about half the length of the carpos, and is furnished at the distal extremity with a lanceolate point, which appears to represent a rudimentary dactylos ankylosed with it, and carries on its under surface a tuft or two of long hairs, directed backwards. The second pair of pereopoda is long and slender, the carpos being multiarticulate and longer on the right side than the left. The posterior three pairs of pereopoda are longer and more slender than in *Heterocarpus*, corresponding more with those of *Plesionika*, and are, moreover, furnished with spines on the posterior margin of the meros and ischium, which, however, are less numerous and not so large.



The pleopoda are biramose, narrow, subfoliaceous and tapering; the inner branch supports a long club-shaped stylamblys, the extremity of which is furnished with cincinnuli. The first pair has the rami short and unequal, and attached to a peduncle that has the extremity produced as a flat, squamous plate.

The females of this genus are extremely prolific, if I may judge from the number of ova that are borne by the few specimens obtained. The ova generally are small, smaller than those of *Heterocarpus*, and in *Nothocaris ocellus* the specimen obtained cannot carry less than ten thousand eggs, if the number on each of the pleopoda be equal to those on the first pair.

The branchial arrangement of the genus corresponds with that of *Heterocarpus* and *Pandalus*, as shown in the following table, and differs from that of *Plesionika* in the absence of a pleurobranchia from the second pair of gnathopoda.

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

*Observations.*—In this genus all the mastigobranchiæ are of a rudimentary character, excepting those of the first pair of gnathopoda, and terminate in small hooks as in *Plesionika*; they vary in number and form in the different species, but never terminate in a straight process as in *Pandalus* and *Pandalopsis*.

*Geographical Distribution.*—There are three or four species of this genus in the Challenger collection, and these were all found in the Eastern Archipelago, between New Guinea and the Philippine Islands, in depths of less than 150 fathoms. I am inclined to think, from an examination of Professor A. Milne-Edwards' figures, that several species that he has classified as belonging to *Pandalus* belong to this genus, more particularly *Pandalus sagitarius*, *Pandalus geniculatus*, *Pandalus longicarpus* and *Pandalus brevirostris*, taken during the expedition of the "Travailleur."

*Nothocaris rostricrescentis*, n. sp. (Pl. CXIV. fig. 1).

Carapace dorsally smooth over the cardiac and lateral regions, anteriorly carinated over the gastric region and produced to a long, upwardly curved, crescent-shaped rostrum, which is smooth on the upper surface from near the apex to the orbits, armed with two teeth at the apex and five spines and two teeth on the frontal crest. A small antennal tooth stands near the outer canthus of the orbit, and a very small one at the fronto-lateral angle.

Pleon smooth, and but slightly compressed; third somite arcuate and posteriorly



produced in the median line; the two following somites are short; the sixth is about once and a half the length of the fifth.

Telson long, slender, slightly depressed in the dorsal median line, and furnished with three small spines on each side on the dorso-lateral surface. Appendages rather long, slender, armed with small, feeble teeth.

Length, entire (female),	.	.	.	.	.	60 mm. (2.3 in.).
„ of carapace,	.	.	.	.	.	18 „
„ of rostrum,	.	.	.	.	.	27 „
„ of pleon,	.	.	.	.	.	42 „
„ of third somite of pleon,	.	.	.	.	.	11 „
„ of sixth somite of pleon,	.	.	.	.	.	7 „
„ of telson,	.	.	.	.	.	11 „

*Habitat*.—Station 192, September 26, 1874; lat.  $5^{\circ} 49' 15''$  S., long.  $132^{\circ} 14' 15''$  E.; off the Ki Islands, south of New Guinea; depth, 140 fathoms; bottom, blue mud. One specimen. Trawled.

The carapace is smooth and polished, laterally compressed and elevated to a carina over the gastric region, where the crest is armed anteriorly with two large fixed teeth, and posteriorly with five movable spines furnished between with fine hairs (fig. 1, *r.c.*). The rostrum is as long as the carapace, curved obliquely upwards in a crescentic form, it is smooth on the upper surface, except for the presence of two small teeth near the apex, and armed on the lower margin, from base to apex, with fifteen evenly disposed teeth. The frontal margin of the carapace is armed with a small antennal and a smaller fronto-lateral tooth.

The pleon is smooth, having the third somite arcuate, slightly compressed dorsally and posteriorly produced, but not carinated; the sixth somite is very short.

The telson (fig. 1z) is laterally compressed, shorter than the outer ramus of the rhipidura, and dorso-laterally armed on each side with three small solitary spines.

The ophthalmopoda (fig. 1a) are longitudinally pear-shaped; each stands on a small pedicle at the extremities of the ophthalmic somite, near the outer angle of the orbit, and directed obliquely outwards and forwards. The ophthalmus is hemispherical, the circumference being indented by a crescentic extension of the margins, which is produced by the presence of a large ocellus or secondary eye. This is circular in form and projects beyond the surrounding surface. Although close to the margin of the true eye it is distinctly separated from it, and divided into larger facets than those that exist on the principal organ.

The first pair of antennæ (fig. 1b) carries a long, sharp stylocerite that reaches as far as the distal extremity of the third joint of the peduncle. The flagella are slender and as long as the rostrum.

The second pair of antennæ is slender and rather longer than the animal, and has a scaphocerite with parallel margins, the outer being armed with a strong tooth; it reaches to half the length of the rostrum.

The mandibles (fig. 1*d*) have a stout molar process, a strongly toothed psalistoma separated from it, and a three-jointed synhipod, of which the terminal joint is the broadest.

The first pair of gnathopoda (fig. 1*h*) is subpediform and seven-jointed; the propodus is reflexed against the meros and ischium; the dactylos is broad and short; the basis carries a long ephysis, and the coxa supports a short mastigobranchia and a small podobranchial plume.

The second pair of gnathopoda (fig. 1*i*) is long and straight, reaching to the middle of the rostrum, and terminates in three or four short spines; the coxa has neither mastigobranchia nor podobranchial plume, but there stands on the outer surface near the articulation a strong, stout, calcified plate, the function of which I have not been able to determine; the second joint or basis carries an ephysis that is half the length of the next succeeding joint.

The first pair of pereopoda (fig. 1*k*) is long and more slender than the second pair of gnathopoda; the coxa carries a rudimentary basecephysis that terminates in a small hook, and also a fasciculus of long, slender, flexible hairs; the basis is short and the ischium long and produced to a strong tooth-like point on the anterior distal extremity, and it articulates obliquely with the meros, which is longer, and slightly tapering to the carpal joint; the latter is longer than the meros, and twice the length of the propodus, which gradually tapers, and terminates in a small, short, style-like dactylos, immersed in a terminal brush of hairs (fig. 1*k''*). The second pair of pereopoda is minutely chelate, and unequal, the appendage on the left side being as long as the body of the animal from the orbit to the base of the telson, and having the carpos multiarticulate and as long as the ischium and meros; that on the right side is a little more robust than the left, about half the entire length of the animal, and has the carpos as long as the preceding two joints. The posterior three pairs of pereopoda are similar to one another in appearance, increasing slightly in length posteriorly, and also in the spinous character of the ischium and meros; the dactylos is short, sharp, unguiculate, and fringed with spines on the inner surface.

The pleopoda are rather stiff, subfoliaceous, narrow and pointed, and furnished on the inner ramus with a small club-shaped stylamblys that diminishes in importance on each appendage posteriorly.

*Observations.*—With this species was associated a smaller damaged specimen which I believe belongs to *Plesionika spinipes*, but the spines on the posterior pairs of pereopoda are reduced in number and size.

*Nothocaris binoculus* (Pl. CXIV. fig. 2).

Carapace smooth and free from a dorsal carina posterior to the frontal crest, which is slightly elevated and laterally compressed, and anteriorly produced to a long rostrum extending beyond the orbital margin more than the length of the carapace. The frontal crest is armed with five movable spines and the rostrum on the upper surface with six or seven teeth distantly situated from each other, two being close together near the apex, and the lower margin with ten or more and a fringe of hairs near the base.

The sixth somite of the pleon is but a little longer than the fifth, and the telson is not so long as the lateral plates of the rhipidura.

The above description is from a female specimen. The male is considerably smaller than the female, more slender in appearance, and has comparatively a longer rostrum, but in detail the features correspond.

	Female.	Male.
Length, entire, . . . .	39 mm. (1.5 in.).	21 mm. (0.8 in.).
„ of carapace, . . . .	12 „	6 „
„ of rostrum, . . . .	15 „	12 „
„ of pleon, . . . .	27 „	15 „

*Habitat*.—Station 190, September 12, 1874; lat. 8° 56' S., long. 136° 5' E.; Arafura Sea, south of New Guinea; depth, 49 fathoms; bottom, green mud. Four specimens; one male, and three females bearing ova. Trawled.

This species is smaller than either of the preceding, but corresponds in all the generic features. The dorsal surface is smooth and rather conspicuously elevated at the third somite of the pleon and somewhat compressed posteriorly. The sixth somite is short, not being quite so long as the telson, which is a little shorter than the lateral branches of the rhipidura.

The carapace has a dorsal crest over the frontal region, but not extending to the gastric; it is armed with four or five spines and two teeth (fig. 2, *r.c.*), tolerably close together, of which the posterior is the smallest and stands just anterior to the gastric region, and the anterior the largest, standing on the rostrum at a level corresponding with the distal extremity of the ophthalmopod. Beyond this point the rostrum gradually rises anteriorly with a slight curve, and is furnished with five small teeth, of which three are subequally distant from each other, whilst the fourth and fifth near the apex are close together. The lower margin is furnished with ten or more teeth that lie nearly horizontal with the surface and therefore less conspicuous.

The ophthalmopoda (fig. 2*a*) are short and pyriform, furnished posteriorly with an ocellus, the distal margin of which is in contact with the pigment of the ophthalmus for a minute extent.

The first pair of antennæ has the first joint deeply excavate and furnished with a

stylocerite that is co-equal with the joint in length; the second and third joints are short, cylindrical, and fringed with hairs, supporting at the distal extremity two slender flagella that are subequal in length.

The second pair of antennæ carries a scaphocerite that does not extend to half the length of the rostrum, and a flagellum that is about half as long again as the animal.

The mandible has the psalistoma well developed, and the synhipod has the distal joint of greater diameter than the basal.

The other oral appendages offer no marked features to distinguish them from those of the other species.

The first pair of gnathopoda corresponds in general with the preceding, but has the three terminal joints distinguishable from each other, and the podobranchial plume is reduced to a rudimentary condition. The second pair is tolerably robust, has the baseophysis well developed and the rigid plate at the base ovate.

The pereopoda are slender and rather short. The first pair has the carpos on the right side longer than on the left. The second pair has the appendage on the left side shorter and more robust than that on the right. The posterior three pairs have the spines on the meros few and distant; the propodos is considerably longer than the carpos, and the dactylos is long, slender, sharp-pointed, and furnished at the base with several small spines. These three pairs of pereopoda diminish in length posteriorly.

The first pair of pleopoda has the inner and anterior branch in the male developed in the form of an ovate, membranous petasma.

The rest of the animal offers nothing very conspicuous to distinguish it from others of the genus.

The male is more slender and smaller than the female, being only about two-thirds of its length, and the rostrum is proportionately longer, being about one-third the total length of the animal in the female, and half the length in the male.

*Nothocaris ocellus*, n. sp. (Pl. CXIV. fig. 3).

Carapace having the dorsal surface posterior to the gastric region smooth, anteriorly depressed, and laterally compressed into a carina that commences on the gastric region and is produced anteriorly to a long rostrum, which is armed on the upper margin with two small spines at the posterior extremity, five or six conspicuous teeth, and six or seven considerably smaller extending to the apex; on the lower margin there are six small teeth near the apex, and the posterior portion is smooth and fringed with long hairs.

Ophthalmopoda short, pyriform, having a distinct ocellus posterior to the ophthalmus.

First pair of antennæ extending to a length equal to the animal.

Second pair about half as long again.

Pereiopoda long and slender.

	Female.	Male.
Length, entire, . . . . .	64 mm. (2.5 in.).	52 mm. (2 in.).
„ of carapace, . . . . .	19 „	16 „
„ of rostrum, . . . . .	1 „	23 „
„ of pleon, . . . . .	45 „	36 „
„ of third somite of pleon, . . . . .	10 „	9 „
„ of sixth somite of pleon, . . . . .	7 „	6 „
„ of telson, . . . . .	13 „	10 „

*Habitat*.—Station 201, October 26, 1874; lat. 7° 3' N., long. 121° 48' E.; near Samboangan, Philippine Islands; depth, 82 fathoms; bottom, stones, gravel. Two specimens; one male and one female. Trawled.

This species resembles *Nothocaris binocularis*, but it is large, and has the rostrum relatively shorter and armed with fewer spines and more teeth on the dorsal crest. It is free from the dorsal curvature at the third somite of the pleon so conspicuous in *Nothocaris rostricrescentis*.

The male is more slender than the female.

*Female*.—The carapace is posteriorly rounded on the dorsal surface and free from any trace of a carina until over the gastric region, where the lateral surface is anteriorly compressed, and a well-defined carina suddenly rises into a serrate crest on the frontal region, and projects into a long rostrum that is first depressed and then elevated, and is about one-fourth longer than the carapace. It is furnished with thirteen teeth on the upper margin, and two small posterior spines on the gastric region (fig. 3, r.c.); the posterior five teeth are larger, and the eight anterior, that range from the middle to the apex of the rostrum, are very small and are determinable only by the aid of a lens. On the distal half of the lower margin there are six teeth, somewhat larger than those on the corresponding portion of the upper, but less than those on the dorsal crest.

The ophthalmopoda are short and pyriform. The ocellus on the posterior surface is small, and its upper margin is in contact with the ophthalmus by a process from the latter dipping towards it.

The first pair of antennæ has the first joint of the peduncle deeply excavate to receive the ophthalmopoda, on the outer side is a flat and sharp-pointed stylocerite, at the base of which, on the outer side, stands a small curved process. The stylocerite suddenly narrows to a sharp point, the extremity of which does not reach beyond that of the first joint. The second joint is short, and with the third, which is the longer of the two, equals the first in length. These support two flagella, of which the

inner is slender at the base and tapers gradually to the extremity, and is nearly equal to the length of the animal; the outer is broad and flat at the base, gradually narrowing it becomes cylindrical, and tapers to the extremity, and it is a little longer than the inner. The under surface of the flattened portion is longitudinally channelled and is furnished with a series of membranous cilia.

The second pair of antennæ supports a small and not very conspicuous phymacerate, a small sharp tooth at the distal angle, and a scaphocerite which reaches to about half the length of the rostrum, and has the outer margin straight, thick and rigid; and separated from the squamous plate by a longitudinal channel. It is armed at the extremity with a sharp tooth that extends a little beyond the squamous portion, which somewhat suddenly enlarges at the base and then gradually narrows to the distal extremity, where it reaches beyond the base of the tooth on the outer margin. The inner margin is fringed with long ciliated hairs; the outer is smooth.

The mandibles are furnished with a hollow and broad apophysis, the outer surface of which is exposed and covered with a mat of short, fur-like hairs; the molar process is cylindrical, and projects at a right angle to the apophysis, and the psalistoma is produced from the curve, near which also springs the synhipod; they lie close together and assume a similar appearance, the contiguous margins being uniform and in contact; the former is fixed and tipped with two or three teeth, while the synhipod is broad, thin, curved and triarticulate, the terminal joint being quadrate, and tipped with short hairs.

The first pair of siagnopoda is three-branched; the outer branch is curved and bilobed at the extremity, where it is fringed with a few tolerably long, simple hairs; the second or middle branch is broad and flat, broader at the extremity than at the base, and has the inner margin fringed with ciliated hairs and the distal with short, strong, smooth spines; the third or inner branch is curved in a direction contrary to that of the outer, the concave margin is smooth, and the convex is fringed with short stiff hairs that gradually increase in rigidity until they become spines at the apex.

The second pair of siagnopoda consists of three foliaceous branches of extreme tenuity; the inner branch is bilobed and has the distal margin fringed with hairs, and among those on the basal lobe are a few strong spines; the median branch is short, flat, and tapers somewhat suddenly, especially towards the extremity, which forms a blunt point; the outer branch consists of a broad foliaceous plate of extreme tenuity, projecting anteriorly beyond the distal extremity of the inner plates, where it is obtusely rounded off, and posteriorly in a still broader and more rounded process, the entire margin of the plate being fringed with long ciliated hairs, which radiate centrifugally in the same direction.

The third pair of siagnopoda is three-branched; the inner branch is broad, flat, squamous and bilobed, each lobe being fringed at the distal and contiguous margins with a thick mat of hairs, closely placed towards the base; the second branch is



foliaceous at the base, and separated into two divisions; the inner, which consists of a small, narrow branch of great tenuity, projects a little beyond the preceding lobes, while the outer is broader, of extreme tenuity, and has the outer margin fringed with delicate ciliate hairs, and the inner traversed by a thicker margin that is prolonged into a fine subcylindrical process, sparsely fringed with hairs, which become more important towards the outer distal extremity; the third or outer branch is membranous and separated into an anterior and a posterior division; the anterior is flexible, long, narrow, and tapers to a small tooth-like point, while the posterior is broad, flat, ovate, and flexible.

The first pair of gnathopoda is subpediform; the coxa supports a rudimentary mastigobranchia, which terminates in two small rami; attached to the base there is a short and thick but well-developed podobranchial plume, and attached to the membranous articulation a small arthrobranchial plume; the basis carries a slender branch twice the length of the appendage; next to the basis follow two broad stout joints, which I take to represent the ischium and meros, the carpos, so far as I am able to decide, being fused with the propodos. The propodos is long, ovate, squamous, and concave, and has the outer lateral margin reflexed against that of the preceding joints, the inner or median margin approximating to the corresponding margin on the opposite appendage, and is thickly fringed with hairs and long, smooth spines; the dactylos is represented by a narrow joint that articulates in its entire width with the propodos, at its distal extremity it is short, broad, and thicker than the propodos, the inner surface being fringed with a thick brush of long, stiff hairs.

The second pair of gnathopoda is long, slender and pediform; the coxa carries no branchial plume and only the rudiment of a mastigobranchia, above the base of which is a large, projecting, disc-like plate, the significance of which I have not been able to determine; the basis is short and carries an ecphysis less than half the length of the next succeeding joint, which probably represents the ischium and meros combined. The next joint is more slender than the preceding and about half its length, and I presume represents the carpos; that which represents the propodos is shorter than the preceding, and gradually tapers to a point, which is armed with one or two small spines; the margins are fringed with hairs.

The first pair of pereiopoda resembles the second pair of gnathopoda in form, but is more slender owing to the meros and carpos being much longer; the dactylos is reduced to a mere point. The second pair of pereiopoda has the carpos on the left side nearly twice as long as that on the right. The third pair of pereiopoda is long; the meros reaching to a level with the distal extremity of the scaphocerite; the carpos is nearly as long as the meros; the propodos is a little more than half the length of the carpos; the dactylos is short and sharp-pointed, terminating in a distinct unguis. The fourth and fifth pairs resemble the third in form, but each is successively shorter.

The pleopoda are biramous, and foliaceous. The first pair has the branches unequal, but in the following pairs they are nearly equal and carry a long, cylindrical stylamblys attached to the inner and posterior branch. The posterior pair forming the lateral plates of the rhipidura, is subequal in length with the telson and fringed with ciliated hairs.

*Male*.—The male corresponds with the female in form, but is smaller and more slender, to judge from a single specimen of each, in which there is no evidence of age to assist in a comparison. The pleon is more compressed in the male than in the egg-bearing female, and all the parts are relatively similar, excepting that in the male the smaller branch of the first pair of pleopoda is developed into a large petasma, approaching somewhat to that which exists in the Penæidæ. The other pleopoda resemble those of the female, but support two stylamblydes.

*Nothocaris geniculatus* (A. Milne-Edwards) (Pl. CXVI. fig. 4).

*Pandalus geniculatus*, A. Milne-Edwards, Recueil d. Fig. Crust., 1883.

The carapace is smooth, the frontal region is slightly compressed and crested with five or six small articulating spines; the rostrum is upwardly curved, not quite so long as the carapace, and armed, for more than half its length on the upper margin, with eleven fixed and rigid teeth, directed almost horizontally forwards and closely pressed against each other; the distal extremity is smooth and free from armature; on the lower margin there are seven or more teeth, those at the extremity becoming feeble and diminishing in size.

The pleon is dorsally smooth and has the third somite elevated and posteriorly produced in the median line to a blunt point, which lies closely pressed against the surface of the fourth.

The telson is long, narrow and tapering.

		Female.	Male.
Length, entire, . . .	69	mm. (2·7 in.).	59 mm. (2·3 in.).
„ of carapace, . . .	19	„	16 „
„ of rostrum, . . .	13·16	„	13 „
„ of pleon, . . .	50	„	43 „
„ of third somite of pleon, .	11	„	8 „
„ of sixth somite of pleon, .	12	„	10 „
„ of telson, . . .	14	„	11 „

*Habitat*.—Station 122, September 10, 1873; lat. 9° 5' N., long. 34° 50' W.; off Barra Grande, Brazil; depth, 350 fathoms; bottom, red mud. Seventeen specimens; six males and eleven females. Trawled.

The ophthalmopoda are short, and the ocellus is in immediate contact with the pigment of the ophthalmus.

The first pair of antennæ is nearly as long as the animal, and carries a sharp-pointed stylocerite at the outer side of the base of the first joint, which reaches to the extremity of that joint; at the base of the stylocerite, on the outer margin, there is a protuberance that is probably of use in retaining the ophthalmopod in position, and protecting the ophthalmus from contact with the sharp point of the antennal tooth.

The second pair of antennæ is but slightly longer than the first, and about the length of the animal, and carries a scaphocerite that is subequal with the rostrum.

The mandible has an oblique, smooth, ovate, molar process, and a psalistoma that is smaller at the base than at the serrate extremity; at the base there is attached a three-jointed synhipod, the distal joint being flat and spatuliform.

The first pair of siagnopoda is three-branched; the outer branch is curved, rigid, and bifid, one process being tipped with a strong spine and the other with several hairs; the middle branch is broad, flat, and fringed with a series of spines and hairs; the inner branch is curved in a reverse direction to the outer, rapidly tapers to a point, and is fringed with stiff hairs chiefly prominent on the convex margin.

The second pair of siagnopoda is distinguishable from those of *Pandalus* by having the mastigobranchial plate short, posteriorly round, and not projecting into the branchial chamber.

The third pair of siagnopoda bears a close resemblance to those of other species of the genus.

The first pair of gnathopoda is deeply reflexed and supports a short, thick, mastigobranchial plate, which carries attached to it a podobranchial plume.

The second pair of gnathopoda is five-jointed; the first joint or coxa carries a rudimentary mastigobranchial appendage, at the base of which is a flattened disc-like plate that falls between and separates the base of the first pair of gnathopoda and the branchial plumes, and apparently supports the former appendage in position; the second joint is very short, supports a short, slender ecphysis, and is unyieldingly articulated with the next joint, which is extremely long, slender, and cylindrical; this is succeeded by one that is about half its length and a little more slender, and by a terminal joint that is subequal with the penultimate and slightly tapers to a rounded apex. The rest of the appendages bear a corresponding resemblance to those of other species.

The first pair of pereopoda resembles in form that of the second pair of gnathopoda, but it is more slender and carries a longer basal joint and no ecphysis. The second pair has the carpos long, slender, multiarticulate and subequal, the articulations are not well defined, but become more distinct as they approach the propodos, the last articulus equalling in length and thickness the palm of the latter joint. The three posterior pairs have the meros long, the anterior pair reaching to about the extremity of the rostrum, and are sparsely armed with long spines; the carpos is long, the propodos subequal with it, and the dactylos short.

There is nothing remarkable in the form of the pleopoda to distinguish them from those of other species, excepting perhaps in the posterior pair, which is armed at the outer angle of the diæresis with a fixed tooth and a movable spine.

The telson corresponds with that of most other species, although it is not quite so flat on the dorsal surface as in some of them, and has a spine or two on the dorso-lateral angle and spines and hairs at the terminal extremity.

*Observations.*—This species is evidently identical with that which has been figured by A. Milne-Edwards as having been taken during the expedition of the "Travailleur" in July 1882, in the Bay of Biscay, at a depth of 1350 metres. There are, however, slight differences between the two forms. Our specimens have invariably eleven or more teeth and five or six spines on the dorsal crest and upper margin of the rostrum, whereas A. Milne-Edwards' drawing shows six of the latter and only eight of the former on the upper margin, while the distal extremity is smooth, and the lower corresponds with that of the Barra Grande specimens. The three posterior pairs of pereopoda in our specimens are also longer than in that of A. Milne-Edwards, since in ours the carpal extremity of the meros reaches quite to a level with the apex of the rostrum. The posterior projection of the dorsal surface of the third somite is not so conspicuous as that figured by A. Milne-Edwards. These variations in the details may perhaps depend upon the draughtsman's want of accuracy, or they may be correlated with a different habitat.

*Nothocaris spiniserratus*, n. sp. (Pl. CXXXII. fig. 1).

Carapace anteriorly carinated and produced to a rostrum that is equal with it in length. The crest is armed with three movable spines and the rostrum with three rigid teeth, of which the most anterior is placed about the middle of the rostrum; apex of rostrum bidentate, the upper tooth being the smaller; lower margin convex and armed with three minute teeth.

Pleon smooth, with the third somite strongly arched, the fifth somite longer than the fourth, and the telson long, narrow and subequal with the lateral plates of the rhipidura.

Ophthalmopoda pyriform, and furnished with a distinct ocellus.

First pair of antennæ reaching a little beyond the extremity of the rostrum.

Second pair of antennæ nearly as long as the animal, and furnished with a scaphocerite that is equal with the rostrum.

Second pair of gnathopoda robust.

First pair of pereopoda slender. Second pair having a long, slender, and multiaarticulate carpos; the posterior three pairs of pereopoda carrying a long and slender dactylos.

Length, entire, . . . . .	12 mm. (0.4 in.).
„ of carapace, . . . . .	4 „
„ of rostrum, . . . . .	2 „
„ of pleon, . . . . .	8 „
„ of third somite of pleon, . . . . .	1.5 „
„ of sixth somite of pleon, . . . . .	2 „
„ of telson, . . . . .	3 „

*Habitat*.—Station 304, December 31, 1875; lat. 46° 53' 15" S., long. 75° 12' 0" W.; Port Otway, Messier Channel; depth, 45 fathoms; bottom, green sand. Eight specimens; all but one being more or less damaged. Dredged.

This species forms an interesting transition to *Plesionika*. The posterior spines on the frontal crest of the dorsal surface, when examined under the microscope, are seen to have a distinct articulation with the base, but their form corresponds with that of the succeeding teeth on the rostrum instead of being cylindrical and spine-like as seen in other species. Each of these spines is anteriorly serrate with three little teeth that have the points rounded or directed towards the base, and this serrature is continued on the teeth on the rostrum, but decreases in importance anteriorly on each succeeding tooth, so that it is scarcely visible on the most anterior, which stands near the centre of the rostrum. Beyond the most anterior tooth the margin is smooth and curved slightly upwards, terminating in an apex with two small teeth, of which the upper is the smaller and the lower the most advanced. The inferior margin is convex in a curve that is a little more arched than that of the upper margin, and furnished with four small teeth that lie almost parallel with it, and are scarcely distinguishable by an ordinary lens. The frontal margin of the carapace is furnished with a strong antennal tooth and a small one at the fronto-lateral angle.

The body of the animal is generally smooth and exhibits no differential specific feature. As in most of the species in this and other allied genera the third somite is arcuate, a condition that produces a gibbous appearance when the animal is extended.

The ophthalmopoda are pear-shaped and furnished with a distinct and almost isolated ocellus.

The first pair of antennæ has the peduncle about half the length of the rostrum, having the first joint deeply excavated to receive the ophthalmopod, and furnished with a sharp-pointed stylocerite. The flagella reach a little beyond the extremity of the rostrum, the outer being the stouter and furnished with hairs and numerous long membranous cilia that appear to increase in number towards the distal extremity; the inner is much more slender than the outer, a little longer, and supports only a few hairs.

The second pair of antennæ carries a scaphocerite that is armed with a strong tooth near the rounded distal extremity, and a flagellum which, although broken at the extremity, yet shows evidence of being nearly as long as the animal.



The mandible carries a three-jointed synnhipod, the first joint of which is stouter than the two following; the psalstoma is long and slender, and separated from the short robust molar process.

The second pair of gnathopoda is tolerably robust and long.

The first pair of pereopoda resembles it in form, but is shorter and more feeble and furnished with a few serrate spines at the carpal articulation. The second pair of pereopoda is long and slender; the propodos is short and not broader than the carpos, which is long, slender, and multiarticulate, the articuli being numerous and short; the meros is also multiarticulate, the condition becoming very evident when the joint is treated with a reagent. The third pair of pereopoda has the meros long and fringed with short spines, the carpos robust and anteriorly produced over the propodal articulation, the propodos more slender than the carpos, long and fringed with short spines, and terminally a long, strong, slightly curved dactylos that is armed with two teeth near the base on the inner or posterior margin. The fourth and fifth pairs of pereopoda resemble the third but decrease in size posteriorly.

The pleopoda are strong and powerful appendages; the terminal pair, which forms the outer plates of the rhipidura, has the inner plates narrower than the outer, which are furnished with a diæresis that is armed on the outer margin with a free long spine and a short fixed tooth.

The telson is long, narrow, and tapering; it is armed on the dorso-lateral surface with six or seven short spines, and terminally with six, two of which are short and sub-central, two long, situated at the angles, and two very short and planted on the lateral margins outside the angles.<sup>1</sup>

### *Pandalus*, Leach.

*Pandalus*, Leach, Malacos. Pod. Brit., tab. xl.

„ Milne-Edwards, Hist. Nat. Crust., tom. ii. p. 383.

Anterior portion of the carapace carinated and produced to a long rostrum that is armed on the dorsal or upper surface with movable spines, intermingled with hairs, and on the lower surface with fixed and rigid teeth. Frontal margin without an orbital tooth, but having a long antennal tooth and a small tooth corresponding with the antero-lateral angle of the carapace.

Pleon smooth, compressed or narrow posteriorly. Third somite laterally more

<sup>1</sup> Since the above description was in type I have received from Dr. Bruce a specimen of an immature Macrura, captured this summer in the Mediterranean, off Malta, which is apparently nearly allied to this species, but certainly does not belong to it. The teeth on the dorsal crest are armed on their anterior margin with numerous small reversed teeth. The rostrum is smooth, and there are only three teeth on the crest of the carapace, and one on each side behind the orbit is quite as large and more boldly serrate than those on the dorsum.

For the purpose of identification I propose to call this latter form *Odontolophus serratus*, on the assumption that it is the young of some undescribed genus.



compressed than the preceding, dorsally arcuate and posteriorly produced to a point. Sixth somite longer than the fifth.

Telson longer than the sixth somite, narrow, tapering, dorsally flattened and laterally compressed, longitudinally armed with a few solitary spinules and tipped with long and short rigid spines.

Ophthalmopoda short and pyriform, supported on a small pedicle, having the ophthalmus proportionally large, and furnished with an ocellus that, in the typical species, *Pandalus annulicornis*, is slightly elevated and surrounded by the dark pigment of the ophthalmus.

First pair of antennæ longer than the rostrum, carrying two flagella, and furnished at the base with a stylocerite that is rounded at the apex, and but half the length of the joint which carries it.

Second pair of antennæ rather longer than the animal and carrying a scaphocerite that is nearly as long as the carapace, narrow and slightly tapering to the distal extremity, where it is rounded on the inner and furnished with a sharp tooth on the outer distal margin.

Mandibles having the psalistoma and molar process distinct, and supporting a well-formed three-jointed synhipod.

First pair of siagnopoda small and three-branched.

Second pair having the outer or mastigobranchial plate produced posteriorly, slender and filamentous.

Third pair having the ecphysis of the basal joint produced anteriorly, and tapering to a slender process.

First pair of gnathopoda having the carpos and propodos reflexed, and carrying a long basecphysis.

Second pair pediform, without a basecphysis, and carrying only the rudiment of a mastigobranchial appendage similar to those of the pereopoda.

First pair of pereopoda long, slender and simple. Second pair unequally long, slender and chelate, having the carpos long and multiarticulate. Three following pairs tolerably robust and terminating in a strong, short dactylos.

Pleopoda biramose and foliaceous.

The branchiæ consist of eleven pairs of plumes and may be tabulated as follows:—

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

*Geographical Distribution.*—The type species, *Pandalus annulicornis*, Leach, is European, and mostly found on the French and British coasts. Milne-Edwards records a

species from the Mediterranean, Dana one from the coast of Oregon, Dr. Stimpson several species from Madeira, Australia, and the northern shores of Eastern Asia, Sidney Smith several from off the eastern coast of America, and Sars others from off the Scandinavian shores.

*Pandalus magnoculus*, n. sp. (Pl. CXV. fig. 1).

Rostrum a little longer than the carapace, measured from the orbital margin; dorsally armed with from ten to twelve movable spines, intermingled with a fringe of ciliated hairs, and on the under side with six rigid teeth interspersed with a fringe of long and ciliated hairs. Dorsal surface of carapace carinated to the posterior extremity of the gastric region.

Pleon dorsally smooth to the posterior portion of the third somite, where it narrows and is produced posteriorly to a small sharp tooth, which is repeated on the next somite, but to a less degree; the sixth somite is twice as long as the fifth, greatly compressed laterally and produced posteriorly on each side to a sharp point.

Ophthalmopoda (fig. 1a) supporting a large reniform ophthalmus, the inner side of which is flattened and furnished with an ocellus connected by a process with the ophthalmus.

First pair of antennæ (fig. 1b) having a short, pointed, flattened stylocerite of great tenuity on the outer side of the first joint, which is deeply excavate to receive the eye; second and third joints short and terminating in two flagella, the upper and more robust of which is the shorter, the lower being slender and a little longer than the rostrum.

Second pair of antennæ carrying a scaphocerite that reaches to about two-thirds the length of the rostrum, and a flagellum that is fully once and a half as long as the animal.

Three posterior pairs of pereopoda furnished with a row of movable spines; the carpos and dactylos are long, the latter being styliiform.

		Female.	Male.
Length, entire, . . .	63	mm. (2.4 in.).	59 mm. (2.3 in.).
„ of carapace, . . .	16	„	16 „
„ of rostrum, . . .	25	„	18 „
„ of pleon, . . .	47	„	43 „
„ of third somite of pleon, .	8	„	8 „
„ of sixth somite of pleon, .	14.5	„	11 „
„ of telson, . . .	12	„	10 „

*Habitat*.—Station 166, June 23, 1874; lat. 38° 50' S., long. 169° 20' E.; near New Zealand; depth, 275 fathoms; bottom, Globigerina ooze; bottom temperature, 50°.8. Nine specimens; six males and three females. Trawled. Associated with *Nephrops thomsoni*.

Station 167, June 24, 1874; lat. 39° 32' S., long. 171° 48' E.; off the west coast of

New Zealand; depth, 150 fathoms; bottom, blue mud. Fourteen specimens; five males and nine females. Trawled. Length of largest female, 45 mm.; of largest male, 33 mm.

*Observations.*—A considerable number of specimens were taken, some with and some without ova. With them were several specimens of a very decided variety, in which the rostrum is longer, straighter, and armed with twelve spines on the upper side for half the distance between the orbit and the apex of the rostrum, and on the under surface with fifteen or sixteen teeth continued from the base to the apex. The flagella of the first pair of antennæ do not reach to the extremity of the rostrum, and the scaphocerite of the second is not half the length of the rostrum, while the flagellum is longer than the animal. In all other respects this form corresponds with the type, almost hair for hair and spine for spine. The eyes are of the same size and relative proportion.

The specimens taken at Station 167 were all smaller and many were gravid with ova, but I could detect no variation to warrant their specific separation. They were trawled 140 miles nearer shore.

*Pandalus falcipes*, n. sp. (Pl. CXV. fig. 2).

Anteriorly produced to a rostrum horizontal with the dorsal surface, and about once and a half as long as the carapace; armed on the upper surface with ten small spines, the posterior of which is on the gastric region and the anterior distant from the apex of the rostrum, which is broken off, and on the under surface with eight teeth, of which those near the apex are smaller than those near the base, which are long; posterior to the last the rostrum is excavate on the lower margin; the frontal margin carries a sharp, but not large, antennal tooth, and the fronto-lateral angle is produced to a small point.

Pleon smooth, having the third somite arcuate and dorsally compressed, but not produced to a point; the three posterior somites are laterally produced to a point.

Telson (fig. 2z) scarcely longer than the sixth somite, dorsally flat and laterally depressed, and armed on each side on the dorso-lateral surface with from six to eight solitary spinules, and tipped with others.

Ophthalmopoda (fig. 2a) short, thick and pyriform, supported on a small pedicle and furnished with an ocellus that is in contact with the ophthalmus.

First pair of antennæ (fig. 2b) subequal with the rostrum, having the peduncle less than half the length of the latter; first joint excavate and furnished with a short, obtusely pointed stylocerite.

Second pair of antennæ about half the length of the animal, carrying a scaphocerite that reaches to more than half the length of the rostrum.

First pair of gnathopoda having the distal joint reflexed, and carrying a long ecphysis.

Second pair five-jointed, long and straight; basal joint carrying a small, thread-like ecpysis, and the extremity terminating in two or three spinules and no dactylos.

First pair of pereiopoda six-jointed; ischium distally produced at the lower angle and articulating with the meros obliquely; penultimate joint long, and the terminal one styliform, the dactylos probably being wanting. It supports no branchia, but carries a short, rudimentary mastigobranchial plate. Second pair having the right appendage not very long; carpos multiarticulate and terminating in a small chela. The mastigobranchia is a rudimentary curved plate, terminating in a sharp point; that on the fifth side is wanting. Terminal three pairs of pereiopoda moderately long and robust, carrying a long, slightly curved, style-like dactylos, and furnished on the ischium and meros with sharp, spine-like teeth.

First pair of pleopoda having the rami unequal; the others subequal and foliaceous. The terminal pair, which helps to form the rhipidura, is subequal in length with the telson; the outer ramus possesses a diæresis that is armed with a movable spinule on the outer margin.

Length, entire,	.	.	.	.	.	53 mm. (2 in.).
„ of carapace,	.	.	.	.	.	13 „
„ of rostrum,	.	.	.	.	.	18 „
„ of pleon,	.	.	.	.	.	40 „
„ of third somite of pleon,	.	.	.	.	.	10 „
„ of sixth somite of pleon,	.	.	.	.	.	9 „

*Habitat*.—Station 49, May 20, 1873; lat. 43° 3' N., long. 63° 39' W.; south of Halifax, Nova Scotia; depth, 85 fathoms; bottom, gravel, stones; bottom temperature, 35°·0. Two specimens; male and female. Dredged.

This species may be identical with *Pandalus levigatus*, Stimpson,<sup>1</sup> which was dredged off the Island of Grand Manan, Bay of Fundy, on rocky bottoms in the Laminarian zone, but that species is very imperfectly described. Stimpson says that it differs from *Pandalus borealis*, Kröyer, in the want of dorsal spines on the third and fourth somites of the pleon, and in having only eleven superior spines or serrations on the rostrum, which are situated only on the posterior two-thirds of its length. Its colour is usually a very pale yellow, with narrow blue lines on the back.

Our type specimen has ten spinules on the dorsal surface of the rostrum, and in this respect it corresponds with the specimen before me, as well as with Leach's figure, of the European type of the genus, *Pandalus annulicornis*, to which it bears a close affinity. It may be readily distinguished by its long, sickle-shaped dactylos, from which the specific name is chosen.

The rostrum is produced more horizontally in a line with the dorsal surface of the

<sup>1</sup> Synopsis of the Marine Invertebrata of Grand Manan, p. 58.

carapace and does not curve upwards as in *Pandalus annulicornis*; it is, moreover, not so deep at the base in front of the ophthalmic excavation, and it carries longer teeth. The third somite of the pleon is less arcuate and not so much produced on the dorsal surface, and the telson is adorned with more spines on the dorso-lateral surface.

The smaller of the two specimens taken is more slender, but undoubtedly the same species; it is 28 mm. long., and the rostrum 9 mm.

*Pandalus modestus*, n. sp. (Pl. CXIV. fig. 4).

Carapace smooth, anteriorly produced to a rostrum about half the length of the carapace; fronto-dorsal region armed with spines that are continuous to the apex of the rostrum, which is furnished with teeth on the lower margin.

Pleon smooth; third somite arcuate, sixth a little longer than the fifth.

Telson as long as the sixth somite.

Ophthalmopoda large, orbicular.

First antennæ having the peduncle subequal with the rostrum.

Second antennæ as long as the animal.

First pair of pereopoda slender, terminating in a long, straight dactylos. Second pair of pereopoda unequal. Posterior three pairs having the ischium and meros armed with small spinules.

Posterior pair of pleopoda as long as the telson.

Length, entire, . . . . .	17	mm. (0.6 in.).
„ of carapace, . . . . .	5	„
„ of rostrum, . . . . .	2.7	„
„ of pleon, . . . . .	12	„
„ of third somite of pleon, . . . . .	3	„
„ of sixth somite of pleon, . . . . .	3	„
„ of telson, . . . . .	2.5	„

*Habitat*.—Station 142, December 18, 1873; lat. 35° 4' S., long. 18° 37' E.; at the Agulhas Bank, off the Cape of Good Hope; depth, 150 fathoms; bottom, green sand; bottom temperature, 47°. Three specimens. Dredged.

The carapace is anteriorly armed on the frontal region with four or five spinules, and there are four or five on the upper margin of the rostrum and three or four teeth on the lower; the frontal margin beyond the orbit has no well-defined teeth and the general surface is smooth.

The dorsal surface of the pleon is smooth; the third somite is dorsally rounded and somewhat elevated but not posteriorly produced to a cusp or tooth. The sixth somite is a little longer than the preceding, and the telson is quite as long.

The ophthalmopoda are short and globular.

The first pair of antennæ (fig. 4*b*) has the peduncle subequal in length to the rostrum, the first joint corresponds with the length of the ophthalmopod and supports a short and round-pointed stylocerite; the second joint is short, and the third still shorter and cylindrical; it terminates in two flagella subequally long and but little longer than the peduncle, the outer being robust and the inner very slender.

The second pair of antennæ carries a scaphocerite that reaches beyond the extremity of the rostrum and a flagellum that is as long as the animal.

The oral appendages have not been examined.

The second pair of gnathopoda is tolerably robust and reaches as far as the extremity of the rostrum.

The first pair of pereopoda (fig. 4*k*) is slender and terminates in a long, straight and styliform extremity tipped with a few hairs, planted at right angles to the surface of the joint. The second pair of pereopoda (figs. 4*l*, 4*l'*) is unequally long and slender. The posterior three pairs are moderately long and terminate in a long, sharp-pointed, curved dactylos, armed on the inner surface with two teeth (fig. 4*m*); the propodos is long, cylindrical, and armed on the flexor surface with two long and several short spines; the carpos distally overlaps the base of the propodos, and is armed with two small spines on the posterior and flexor margin; the meros is long, slender, cylindrical, and armed on the posterior margin with several small spines.

The first pair of pleopoda is single, the four succeeding are double-branched, and the posterior pair is subequal in length with the telson.

*Pandalopsis*, n. gen. (A. Milne-Edwards *in litt.*).

Resembles *Pandalus*, but has the flagella of the first pair of antennæ slender, and both branches longer than the carapace.

The single species of this genus in the Challenger collection is the only one that I have had an opportunity of examining. Beside the relatively greater length of the flagella of the first pair of antennæ, it differs from *Pandalus* in having the second pair of gnathopoda more robust, the meros having the inner margin longitudinally developed into a squamiform process fringed with long hairs, in having a broad squamiform process anteriorly projecting on the under side of the ischium, and in having a pleurobranchia above the second pair of gnathopoda and no mastigobranchia posterior to the first pair of pereopoda.

*Pandalopsis amplus*, n. sp. (Pl. CXV. fig. 3).

Carapace smooth and polished; fronto-lateral margin armed with an antennal and a fronto-lateral tooth, compressed anteriorly in the dorsal median line, elevated to a crest over



the frontal and gastric region, and produced to a long and slender rostrum which is armed superiorly with thirteen movable spines interspersed with short hairs. Rostrum longer than the carapace, smooth on the anterior half of the upper margin, directed slightly upwards and armed on the lower surface with thirteen or fourteen rigid teeth interspersed with short hairs.

The pleon is smooth and polished; the third somite is slightly compressed dorsally, and slightly arcuate, the posterior margin being mesially produced posteriorly, and overlapping the fourth somite; the sixth somite is nearly twice the length of the fifth. The telson is long, narrow, dorsally flat and laterally compressed, each dorso-lateral surface being longitudinally armed with seven small movable spines, of which the posterior stands at the distal angle, while the extremity is furnished with three small spines and a few hairs.

The ophthalmopoda (fig. 3a) are pyriform, in consequence of the smallness of the stalk on which they stand. The ophthalmus is quite or nearly hemispherical, the posterior margin of the pigment extending at one point to form a rudimentary ocellus.

The first pair of antennæ (fig. 3b) has the first joint deeply excavate for the reception of the ophthalmopod, and carries on the outer side a stylocerite that is not at all style-like, being a smooth, round disc, produced anteriorly. In this it resembles *Pandalus annulicornis* and *Pandalus falcipes*. The second and third joints are cylindrical, extending to nearly half the length of the rostrum, and distally supporting two flagella, of which the outer is the larger and somewhat the longer, equalling in length the entire animal. This character furnishes a ready diagnosis of this species from *Pandalus*, the flagella of which do not reach beyond the extremity of the rostrum, and are about the length of the carapace.

The second pair of antennæ offer nothing very remarkable excepting that the scaphocerite is long, being nearly the length of the carapace. The margins are subparallel, the outer being rigid and terminating in a sharp tooth near the apex.

The mandibles have the molar process long, with the grinding surface ovate; the psalidoma is narrow and bidentate. The first joint of the synalipod is broader than the two succeeding, which terminate in a rounded extremity.

The oral appendages possess a strong resemblance to the typical species, as do also the two pairs of gnathopoda, the second pair having no ecphysis, which is present in its near ally, *Nothocaris*.

The first pair of pereopoda (fig. 3k) is a little more slender than the second pair of gnathopoda, and has the terminal joints less hirsute. It is remarkable also for the large squamiform development of the ischial joint, the lower margin of which is fringed on the inner side with a row of hairs. The second pair is like that in *Pandalus annulicornis*, but more uniform in length and strength on each side. The three posterior pairs have only one spine on the ischium and six on the meros, subequally distant, and three on the carpos.

The mastigobranchiæ are reduced to a useless or rudimentary condition, the extremity of each falling short and not penetrating behind the branchial plumes. They all possess this character, and are fringed with hairs on the lower margin and terminate in a sharp point supplemented with two others that reversely meet at their points to form a small uniarticulate claw.

The first pair of pleopoda in the male has the branches unequal; the inner is short, foliaceous, and subapically furnished with a stylamblys. The rest have the branches equal, but the second carries two compressed stylamblydes and all the others one. The last pair, which helps to form the rhipidura, has a well-marked diæresis on the outer branch, the outer limit of which is armed with two small teeth.

	Female.	Male.
Length, entire, . . . . .	62 mm. (2·4 in.).	105 mm. (4·1 in.).
„ of carapace, . . . . .	15 „	28 „
„ of rostrum, . . . . .	25 „	38 „
„ of pleon, . . . . .	47 „	77 „
„ of third somite of pleon, . . . . .	7 „	16 „
„ of sixth somite of pleon, . . . . .	13 „	15 „
„ of telson, . . . . .	12 „	22 „

*Habitat*.—Station 320, February 14, 1876; lat. 37° 17' S., long. 53° 52' W.; off Monte Video; depth, 600 fathoms; bottom, green sand; bottom temperature, 37°·2. Six specimens; five males and one female. Trawled.

*Observations*.—Three of the specimens differ from the typical form in having the rostrum more curved towards the apex, but since I cannot detect any other difference I believe them to be a variety that may not be uncommon.

The species resembles in general form *Pandalus propinquus*, Sars, from which it differs in generic characters only, viz., in the length of the first pair of antennæ, in the form of the second pair of gnathopoda and first pair of pereopoda, in having the rostrum less curved upwards at the extremity and the teeth on the lower margins smaller and more numerous.

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

*Chlorotocus*, A. Milne-Edwards, Rapport Commiss. pour la faune sous-marine, p. 18, 1882;  
Recueil de Fig. de Crust., 1883.

Animal smooth and even, not carinate, nor denticulate, excepting on the rostrum. No orbital or hepatic tooth, and only a small first antennal one on the frontal margin.

Ophthalmopoda moderately large, pyriform, and furnished with an independent ocellus.

First pair of antennæ biflagellate, short, and furnished with a sharp-pointed stylocerite.

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

Mandibles having the psalistoma distinct from the molar process, and furnished with a biarticulate synhipod.

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

First pair of pereopoda six-jointed and simple. Second pair feebly chelate, and having the carpos biarticulate.

*Geographical Distribution*.—Professor A. Milne-Edwards took his specimen of *Chlorotocus gracilipes* during the expedition of the "Travailleur" on July 27, 1881, at a depth of 332 to 370 metres, in the Gulf of Gascony.

Its length was about 50 mm.

*Chlorotocus incertus*, n. sp. (Pl. CXVI. figs. 1, 2).

Animal smooth. Carapace anteriorly produced to a slender rostrum, armed with teeth above, extending as far posteriorly as the dorsal crest, and also on the under surface.

The ophthalmopoda are short and pyriform.

The first pair of antennæ is short.

The second pair of antennæ is long and slender.

The mandible carries a psalistoma and a two-jointed synhipod besides the molar process.

The first pair of pereopoda is simple. The second is slender, chelate, and has the carpos biarticulate. The three posterior pairs of pereopoda are slender, and terminate in a long dactylos.

The telson is broad at the base and tapering.

Length, entire,	.	.	.	.	.	39 mm. (1.5 in.).
" of carapace,	.	.	.	.	.	13 "
" of rostrum,	.	.	.	.	.	19 "
" of pleon,	.	.	.	.	.	26 "
" of third somite of pleon,	.	.	.	.	.	5 "
" of sixth somite of pleon,	.	.	.	.	.	3 "
" of telson,	.	.	.	.	.	5 "

*Habitat*.—Station 142, December 18, 1873; lat. 35° 4' S., long. 18° 37' E.; Agulhas Bank, off the Cape of Good Hope; depth, 150 fathoms; bottom, green sand; bottom temperature, 47°. One specimen. Dredged.

The carapace is dorsally rounded and smooth, excepting on the frontal crest and rostrum, the former of which is armed with four teeth, and the latter on the upper surface with other four, so far as known; the lower surface is armed with two teeth, at which point the rostrum is broken off. The frontal margin has the orbit but feebly indicated, and the first antennal tooth tolerably developed, whence it gradually slopes to the lateral margin.

The pleon is smooth, and terminates in a telson that rapidly tapers to a point.

The ophthalmopoda (fig. 1*a*) are pyriform, having the ophthalmus nearly half the depth of the whole; it is furnished with a large independent ocellus, and at the base of the ophthalmopod there are a few slightly ciliated hairs.

The first pair of antennæ (fig. 1*b*) has the peduncle shorter than the rostrum; the first joint is excavate on the upper surface, fringed with ciliated hairs on the inner margin, and furnished on the outer with a triangular stylocerite, the inner margin of which is fringed with five long simple hairs. The second and third joints are cylindrical, and tipped with fasciculi of long simple hairs, and terminate in two unequal flagella, the outer being robust, the inner slender and thread-like.

The second pair of antennæ (fig. 1*c*) is about as long as the animal, and carries a scaphocerite that is a little longer than the peduncle of the first pair of antennæ, and is probably subequal with the length of the rostrum.

The mandibles (fig. 1*d*) are narrow, and have the psalistoma distinct from the molar process, and support a moderately long two-jointed synnhipod.

The first pair of siagnopoda (fig. 1*e*) is three-branched; the outer branch is distally square, supporting a stiff ciliated hair at each angle; the middle branch is ovate and furnished with a mat of hairs on the inner surface, and the inner branch is short and fringed with hairs and stiff spines.

The second pair of siagnopoda (fig. 1*f*) consists of three branches and a large mastigobranchial plate; the first branch is short, broad, and fringed with hairs; the second is bifid, each lobe being broad and ciliated; the third branch is cylindrical, tapering, and tipped with hairs. The mastigobranchia is broad, projects anteriorly as far as it does posteriorly, and is fringed with a series of centrifugally directed hairs.

The third pair of siagnopoda (fig. 1*g*) is three-branched; the first branch is bilobed, the basal lobe being small and the distal large, ovate, and fringed with hairs; the second is cylindrical, biarticulate and flagelliform, and is sparsely fringed with hairs; at the base stands a bilobed mastigobranchia.

The first pair of gnathopoda (fig. 1*h*) is short, broad, seven-jointed, and distally reflexed; it is furnished with a long, slender, flagelliform basecephysis, and the coxa carries a short, triangular, mastigobranchial plate; the several joints are fringed with hairs, those on the inner distal margin increasing in character to fringed spines.

The second pair of gnathopoda (fig. 1*i*) is four-jointed, long, slender, and fringed with