

The first pair of antennæ is scarcely as long as the ophthalmopod, and terminates in two subequal flagella, the outer of which is slightly larger than the inner. The peduncle which supports them is about half the length of the ophthalmopod; the first joint is very long and the other two are short.

The second pair of antennæ has a scaphocerite that is a little shorter than the peduncle of the first pair, rounded at the extremity, and has the inner margin fringed with hairs; the flagellum is longer than the scaphocerite.

The mandible has no synnhipod; the psalidoma is long and distally serrate, and the molar tubercle is robust. The supplementary oral appendages have not been accurately determined.

The first pair of gnathopoda is short and subpediform, but all the other appendages of the pereion with their ephyses are broken off, but the remaining joints of the posterior pair indicate a larger organ than those anterior to it.

The pleopoda, except the first, which is single, are developed as short biramous appendages; the posterior pair is about once and a half as long as the telson.

Eretmocaris stylostris, n. sp. (Pl. CXLV. fig. 3).

Carapace one-fourth the length of the animal, dorsally armed on the frontal region with a sharply pointed tooth, and anteriorly produced to a smooth rostrum that is about one-third the length of the carapace.

Pleon dorsally smooth; sixth somite twice the length of the fifth.

Telson two-thirds the length of the sixth somite.

Ophthalmopoda once and a half as long as the carapace.

First pair of antennæ about half the length of the animal.

Second pair of antennæ having the scaphocerite subequal with the length of the peduncle of the first pair.

Appendages of the pereion long and cylindrical; each being furnished with long basecephyses.

Length, entire,	4 mm. (0.2 in.).
„ of carapace,	1 „
„ of pleon,	3 „
„ of ophthalmopod,	1.5 „
„ of first antenna,	2.2 „
„ of scaphocerite,	1.4 „
„ of sixth somite of pleon,	1.4 „
„ of telson,	0.7 „

Habitat.—April 26, 1876; off Cape Verde Islands; taken at the surface.

The carapace is about one-fourth the length of the animal, armed on the dorso-frontal region with a strong horizontally directed tooth, and anteriorly produced to a long and

slender styliiform rostrum; the frontal margin does not appear to be armed with a supraorbital or other tooth, and the fronto-lateral angle does not project beyond a right angle.

The pleon has the anterior five somites subequal in length, the third is slightly the longest, and overlaps the fourth on the dorsal surface, but it is not projected to a tooth; the sixth somite is as long as the preceding two, and the telson is about half the length of the sixth somite.

The ophthalmopoda are longer than the carapace, and at the base between them is a large orbicular lobe that is furnished at the posterior portion with a distinct ocellus; they are biarticulate, the first joint is a long and slender cylindrical stalk, supporting at its extremity an equally long and pear-shaped segment, at the extremity of which is the rounded faceted ophthalmus.

The first pair of antennæ is more than half the length of the animal, and terminates in two unequal flagella; the outer is the more robust, and is furnished with numerous sensory cilia, the inner being slender and longer; the peduncle is longer than the ophthalmopod, and slightly curves towards the distal extremity, the first joint is very long, the second is short, and the third still shorter, all being cylindrical.

The second pair of antennæ supports a scaphocerite that is nearly as long as the ophthalmopod; it is distally rounded, and the inner margin is fringed with hairs.

The mandibles do not carry a synaphipod, but are furnished with a serrate psalistoma and a strong molar prominence; this organ lies closely impacted between the anterior and posterior labia.

The supplementary oral appendages are small, and have not been closely examined as the specimen is unique.

The first pair of gnathopoda is short, pediform, and tolerably robust, but I could not be certain that it carries a basecephysis.

The second pair is long, slender, and six-jointed, and terminates in a short sharp-pointed dactylos, and the basis carries a long ecephysis.

The pereopoda are formed on the same type as the second pair of gnathopoda. They are all six-jointed and cylindrical; the basis is comparatively long, and the ischium and meros appear to be united; the carpos is shorter, but proportionately longer than usual, the propodos is short, and the dactylos is short, pointed, and terminates in a small bristle. They are all furnished with a basecephysis, which is slender and subequal in length with the respective pereopod, excepting the penultimate pair, in which it is not more than one-third its length. The fifth or ultimate pair of pereopoda in this species, as in all the specimens of the other species, is broken off at the basal joint, which from its large size (although in this species it is not so large as in some others) indicates that this appendage is of some peculiar significance in relation to the animal.

The pleopoda are not yet present, but traces of their development appear at the

margins of the fourth and fifth somites, while the anterior show no evidence of their presence, but the ventral surface in the median line of each somite is inferiorly lobed, and a mass of neural substance appears to be lodged in each. The sixth pair of pleopoda is unequally biramose, and extends beyond the telson for half its length.

Eretmocaris corniger, n. sp. (Pl. CXLV. fig. 4).

Carapace one-fourth the length of the animal, dorsally armed with a strong tooth on the gastric region, anteriorly produced to a rostrum, which is broken short off in this the only specimen obtained.

Pleon having a horn-like tooth on the dorsal surface of the third somite, curving anteriorly.

Telson as long as the sixth joint.

Ophthalmopoda as long as the carapace.

Scaphocerite longer than the ophthalmopod.

Appendages of the pereion having the basephyses subequal with the pereiopoda.

Length, entire,	.	.	.	.	.	7 mm. (3 in.).
„ of carapace,	.	.	.	.	.	1.5 „
„ of rostrum (broken),	.	.	.	.	.	2 „
„ of pleon,	.	.	.	.	.	5.5 „
„ of third somite of pleon,	.	.	.	.	.	0.8 „
„ of sixth somite of pleon,	.	.	.	.	.	1.5 „
„ of telson,	.	.	.	.	.	1.5 „

Habitat.—Cape Verde, April 26, 1876.

The carapace is scarcely more than one-fifth the length of the animal; it is dorsally armed with a strong tooth in the median line of the gastric region, and anteriorly produced to a rostrum which is broken off in our specimen, so that its length cannot be determined. Near the middle of the orbit stands a large sharp tooth directed forwards, and the antennal angle is rounded off, as is also the fronto-lateral angle, behind which and within the margin stands a sharp tooth.

The anterior two somites of the pleon are subequal; the third is longer, and is armed with an anteriorly curved vertical tooth on the dorsal surface near the posterior margin; the fourth and fifth somites are shorter and subequal, the sixth is longer than the preceding two, and the telson is equal to the sixth somite.

The ophthalmopoda are biarticulate and subequal in length with the carapace; the basal joint being a long and slender stalk that is equal in length to the pyriform distal mass, which corresponds with the usual organ, the rounded extremity of which represents the reticulated ophthalmus.

The first pair of antennæ is longer than the ophthalmopod and terminates in two

unequal flagella, the peduncle of which does not reach to the distal extremity of the ophthalmus.

The second pair of antennæ supports a scaphocerite that is a little longer than the ophthalmopod, rounded at the distal extremity, which is fringed with hairs, and has the outer angle armed with a strong tooth; the flagellum is one-third shorter than the scaphocerite.

Amphion, Milne-Edwards.

Amphion, Milne-Edwards, Ann. Soc. Entom. France, tom. i. p. 336; Hist. Nat. Crust., tom. ii. p. 486.

In 1832, Professor Milne-Edwards, at a meeting of the Entomological Society of Paris, described a pelagic Crustacean of small size, and extremely pellucid, to which he gave the name of *Amphion*, and placed it as a new genus along with another that appeared to correspond much with it, to which Leach had given the name of *Phyllosoma*, in a family to which Milne-Edwards gave the name of Bicurassés, and placed it among the Stomapoda.

The genus *Phyllosoma* has since been demonstrated to be the young and immature form of Crustacea belonging to the families of Palinuridæ and Scyllaridæ, but the position of *Amphion* is still uncertain, its true relation to the adult form not having been hitherto determined.

Although it possesses some general resemblance to *Phyllosoma*, it differs most importantly in structural characters, and belongs to a separate division of the order. The general outline of form is very different. In *Phyllosoma* the carapace is as broad as long and circular in form, and does not cover the pereion, which exists as a second somewhat circular disc posterior to it, whence Milne-Edwards derived the general name for the family.

In *Amphion* the carapace is long and narrow, and covers the pereion from the earliest to the latest stage of its known development.

Phyllosoma is known to leave the ovum with five pairs of appendages attached to the pereion, namely, two pairs of gnathopoda and three pairs of pereiopoda; but although *Amphion* has never been procured from the ovum, yet there are specimens in this collection in which the only appendages present besides the ophthalmopoda, antennæ, and oral organs, are the two pairs of gnathopoda, and they are only distinguishable from the Zœa of the Phyllobranchiate prawns by the presence of the sixth pair of pleopoda in an incipient condition. But even here these pleopods are not present as distinct organs, but are in an early state of gemmation, suggesting a progressive development which shows the animal to have existed for some time in a different condition prior to its previous moult. Our youngest specimen is about 5 mm. in length, and it is highly probable that the brephalos appears in the Zœa stage, whereas in *Phyllosoma* the pleon is in an

immature condition in the brephalos, which approaches the Megalopa stage and as yet no signs of the sixth pair of pleopoda are apparent, nor until after the animal has all the pereopoda in an advanced condition. In fact, a continuous advance in the development to this point has not been observed in the *Phyllosoma* of the Palinuridæ.

The earliest form of *Amphion* in the collection (Pl. CXLVI. fig. 1) was taken in the Pacific, and is 5 mm. (0.2 in.) in length. It is slender, and much resembles the *Zoca* of other Macrura, excepting that the eye is pedunculated.

The carapace is about 2 mm. long, and covers the entire pereon; it is narrow, being only a little broader than the anterior somites of the pleon, and is anteriorly produced at the fronto-lateral angles to a small tooth, but there is no rostral point visible.

The pleon is 3 mm. long, and is composed of six somites; the five anterior are subequal, the first being furnished with a small anteriorly directed tubercle on each side, which I take to represent the pleocleis of the adult; the sixth somite is equal in length to all the preceding. It gradually narrows and terminates in a gradually widening, broad, ovate, foliaceous, and spatuliform plate, posteriorly fringed with hairs, one on each side of the median line being small, and six exterior to these long.

The first or cephalic somite is anteriorly produced in the median line, and furnished with a small, round ocellus; on the upper surface on each side originate the ophthalmopoda, of which the peduncle is short and the ophthalmus long-ovate, somewhat pyriform in shape, and about 1 mm. long, or about half the length of the carapace.

The first pair of antennæ is about 1 mm. long, and two-jointed; the first joint, which is extremely long, appears to represent the peduncle; the second, which is short, represents the flagellum.

The second pair of antennæ is a little longer than the first, and consists of a basal joint that supports two branches, the inner one represents the flagellum, which is unarticulate, and reaches a little beyond the distal extremity of the first pair, and the outer is the scaphocerite, which is a little shorter than the flagellum, it is narrow at the base, and gradually enlarges distally; the extremity as well as the inner and outer distal margins are fringed with seven or eight long, slender hairs.

The oral appendages are at a considerable distance from the frontal margin of the cephalon, and implanted posteriorly to a semicircular epistoma.

The mandibles, which are immediately posterior to the epistoma, and on each side of the oral aperture, are sharply pointed, and do not carry a synnhipod.

The three pairs of siagnopoda, as far as can be determined by a general examination without dissecting them out, appear to resemble those that will be more fully described in a later stage.

At about the same distance posteriorly as the mouth is from the anterior margin of the cephalon, the first pair of gnathopoda is situated; it consists of a short coxa and a long basis, the extremity of which carries the four succeeding joints of the true leg

already distinguishable, the last of which is sharp and styliform; from the outer distal extremity of the basis proceed an ephysis that consists of two joints, the basal one being very long and cylindrical, and the distal very short, cylindrical, rounded at the extremity, and tipped with three or four hairs.

The second pair of gnathopoda is somewhat larger than the first, is situated close behind, and resembles it in general form but is a little more robust.

None of the pereopoda are yet visible even in a budding condition.

The pleon has as yet no appendages present, and no evidence of their future development is visible, except in an apparent gathering of granules in the position where the sixth pair of pleopoda are formed.

Two other specimens were captured, one (fig. 73), which is 6 mm. long, to the north of New Guinea, in February 1875, and the other, which is 5.1 mm. long, in the Pacific.

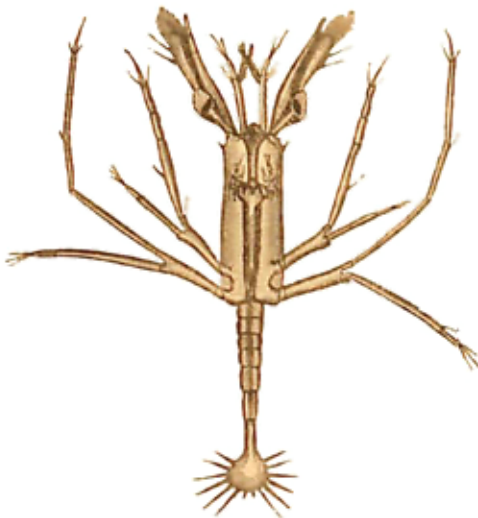


FIG. 73.—Zoea of *Amphion*. Dorsal surface. From a drawing by Dr. von Willemoes Suhm. Reduced one-half.



FIG. 74.—"Youngest larva taken by myself, following Dohrn's larva. Nat. size 8 mm., H. $\frac{1}{4} \times 12$. Ventral aspect." From a drawing by Dr. von Willemoes Suhm. Reduced one-half.

Neither of these differs materially from that which has been described. The latter has at the extremity of the peduncle of the first pair of antennæ a long cilia or hair attached to the extremity of both the inner and outer angle, and others at the apex of the single-jointed flagellum; and the posterior somite of the pleon exhibits the outline of the branches of the sixth pair of pleopoda, on which the marginal hairs are present within the outer tissue (Pl. CXLVI. fig. 2z) which are a little more defined in the specimen from New Guinea. These changes are probably consequent upon the internal growth that precedes another moult.

The next specimen (Pl. CXLVI. fig. 3) is also recorded from the Pacific; it is 8 mm.

(0.3 in.) in length, and has advanced in development as well as in size. It has three pairs of appendages attached to the pereion, or one pair more than is present in the preceding stage (fig. 74).

The carapace of this specimen is furnished with a small tooth or rostrum in the middle of the frontal margin, and the evidence of its future persistence exists in the presence of a tooth attached to the new or underlying tissue of the next succeeding moult. On the outer angle of the frontal margin a small tooth projects, corresponding with the outer canthus of the orbit, while the tooth previously noticed as standing at the fronto-lateral angle exists in a position further distant from the base of the second antennæ, as if some portion of the increase in length attained by the animal was due to growth anterior to this tooth. The somites of the pleon are nearly in the same relative condition as in fig. 1.

The appendages appear to have advanced a little, but rather in form than in importance.

The ophthalmopoda are longer in proportion, and the diameter is greater near the distal extremity.

The first pair of antennæ has developed two small spicules, one on each side of the peduncle, as if marking the position of a future articulation, and another at the distal extremity of the peduncle represents the inner flagellum.

The second pair of antennæ has the distal extremity of the scaphocerite furnished with more hairs, and a small tooth exists on the outer margin, defining the limit where cilia cease; the flagellum has increased in length, but to what extent is not determinable since it is broken in our specimen, in which it is subequal in length with half the carapace, and the peduncle is furnished at the base with a distinct phymacerite.

The two pairs of gnathopoda correspond with those of the previously described specimen, but differ in being armed with a sharp tooth on the inner distant angle of the basis, and another on the inner margin of the shaft, halfway between the coxal and basal articulations; the presence of these teeth may be due to specific distinction rather than to progressive development, as well as the circumstance that the ephysis and ischial joint each articulate at the extremity of an independent protuberance.

In this specimen the first pair of pereopoda is present; it corresponds in form with the gnathopoda, but is not quite so large, and differs also in having no tooth on the inner margin near the middle of the basal joint, while that at the inner distal angle exists; the absence of the former is suggestive of the relation of the teeth to the stage of development.

There is no evidence of the presence of the pleopoda in this stage, excepting the posterior or sixth pair, which helps to form part of the rhipidura. It consists of a short basal joint supporting two unequal foliaceous rami, the inner of which is the smaller, being scarcely more than half the length of the outer; it is lanceolate in form and fringed with hairs; the outer is broader, armed on the outer margin with a strong tooth, and on the inner and distal margin with hairs.

Another specimen (Pl. CXLVI. fig. 4) was taken north of New Guinea. It is about the same size as the last, 8 mm., but differs from it in having the first pair of pereiopoda with a long and sharp tooth on the middle of the basal joint, and in having the fourth pair of appendages—the second pair of pereiopoda—present in an incipient condition.

This new pair is not, like the preceding one, a free appendage, but is enclosed within the dermal tissue each in the form of a long, narrow, and slightly constricted sac, compressed against the ventral surface of the pereion and directed forwards between the preceding pairs.

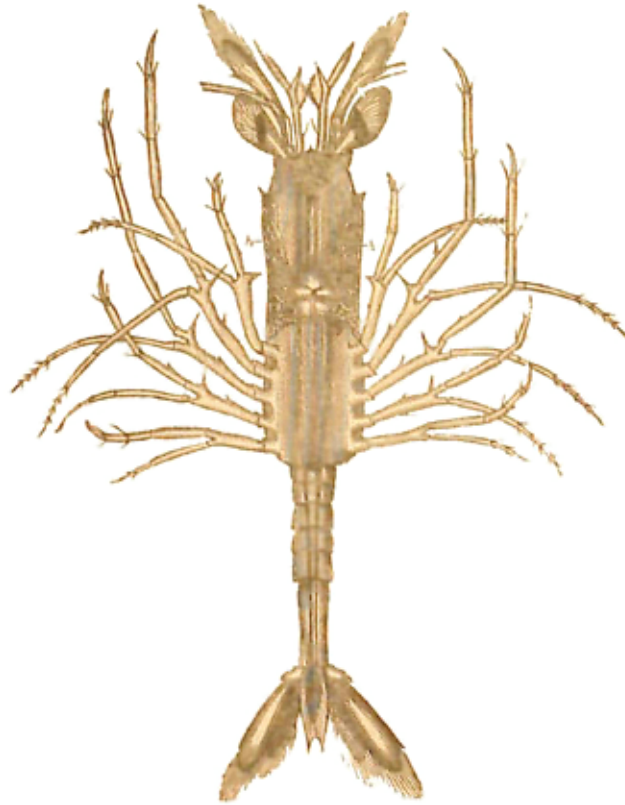


FIG. 75.—“From the north coast of New Guinea, Feb. 1875. Five-legged larva stage. Maxillipeds omitted; A, A, liver first visible; ventral aspect. Nat. size 12 mm. H. $\frac{1}{2}$.” From a drawing by Dr. von Willemoes Suhm. Reduced one-half.

Another specimen (Pl. CXLVI. fig. 5), which was taken at the surface in the Atlantic, off St. Vincent, Cape Verde Islands, on April 6, 1873, is 9 mm. long, and corresponds very closely with that of fig. 4, but the second pair of pereiopoda exists as a free pendulous organ, although in a saccular condition, in the form of a stalk with two branches, which lie inwards and are directed forwards.

In this Atlantic specimen the small rostral point at the anterior extremity of the carapace, that is common to all the Pacific specimens, is wanting; it probably therefore is the young of *Amphion provocatoris*.

It may be noticed that this specimen also differs in having no tooth on the outer

margin of the scaphocerite, as there is in fig. 3, but corresponds in this part more nearly with that shown in the younger form of figs. 1 and 4.

In fig. 4 a tooth is shown as standing on the basis of the third appendage; it ought however to be mentioned that this tooth is absent from the leg upon the opposite side of the animal in the same pair.

The next specimen that marks an advance in development is one from the Pacific, in which four pairs of appendages—two gnathopoda and two pereopoda—are well developed. It is 10.5 mm. (0.4 in.) in length, and, as in all the Pacific specimens, the small rostral tooth is visible in the centre of the frontal margin. The rest of the animal corresponds in most of its details with the forms described later, excepting that the telson has lost its foliaceous character and become more robust, it tapers to the extremity, and terminates in two small points as shown in Pl. CXLVII. fig. 1z.

In the month of February 1875, between the Philippine Islands and New Guinea, a specimen (fig. 75) was taken which has five pairs of appendages attached. It is 11 mm. (0.4 in.) long. The appendages are all developed on the same typical plan as in the preceding specimen; the small rostral tooth is present, and the only change beyond the addition of a pair of pereopoda is that the telson has sent out at each point at its extremity two long and slender teeth.

Amphion reynaudii, Milne-Edwards (Pl. CXLVII. figs. 1, 2).

Amphion Reynaudii, Milne-Edwards, Ann. Soc. Entom. France, tom. i. p. 336, pl. xii. figs. 1-10, 1832.

„ *Reynaudii*, Milne-Edwards, Hist. Nat. Crust., tom. ii. p. 489, pl. xviii. figs. 8, 9, 1837.

This species was founded upon a specimen taken by M. Reynaud at the surface (*en haute mer*) of the Indian Ocean, and described and figured by Professor Milne-Edwards in the works above quoted. It was about one inch in length, and corresponds closely with the Challenger specimens, which approach it in size, and in the number of the pereopoda, but it appears to be a little more advanced in development, more especially in the condition of the pleopoda, which are present in the form of biramose hairless buds.

The Challenger specimens have six well-developed pairs of appendages attached to the pereion, and like all the specimens taken in the Pacific, have a small rostral tooth attached to the frontal margin of the carapace, but which is hidden in the figure by the projection of the metope. In Milne-Edwards' figures this rostral tooth is not shown, probably owing to its concealment by the metope, or perhaps from the specimen having been examined with only a low power.

In our specimens the frontal margin of the carapace is slightly waved in a line across from side to side, with a minute rostral tooth in the median line; it is continued on each

side to a small, sharp, anteriorly directed tooth that stands upon the outside of the second pair of antennæ, whence the margin recedes obliquely backwards and outwards until it reaches a sharp anteriorly directed tooth of larger proportions, that corresponds with half the distance between the frontal margin and the oral apparatus; from the outer lateral tooth the carapace continues posteriorly to the extremity of the pereion, to which it gradually narrows.

The pleon consists of six somites and the telson. The pleopoda in our best-preserved specimen are visible only as incipient buds, with the exception of the posterior pair, which exists in a well-advanced condition and takes its character as part of the rhipidura of the adult animal.

The telson is long, tapering, and terminates in two small teeth, which converge distally.

Length, entire,	15 mm. (0.6 in.).
.. of carapace,	8 "
.. of pleon,	7 "
.. of third somite of pleon,	0.5 "
.. of sixth somite of pleon.	2 "
.. of telson,	1.5 "

Habitat.—Pacific Ocean.

The ophthalmopoda are large, pyriform, and projected on a slender cylindrical pedicle, and pass on each side considerably beyond the lateral margin of the carapace. The ophthalmus is equal in diameter to twice the broadest part of the pedicle, which originates, one on each side of the great cephalic neural mass, in the centre of which on the dorsal surface is a small black pigmented eye.

The first pair of antennæ consists of a peduncle and two short flagella; the peduncle is only single-jointed, but at a short distance from the extremity there is a notch and a small hair, and beyond it another small hair, each suggesting the point at which the future articulations will occur. The flagella are subequal in length and very nearly equal in diameter; they are both smooth and free from hair, but the outer supports two short spines situated close together near the apex.

The second pair of antennæ has the two basal joints of the peduncle broad, the second distally supporting a long scaphocerite that is narrow at the base, distally broad, rounded at the extremity, the margin of which is fringed with long cilia, and the outer margin is armed with a long and slender tooth. Beyond the second joint I can recognise but a single robust joint that supports the slender flagellum, which appears to be long but is broken off at about the length of the scaphocerite. In Milne-Edwards' figure it is represented as entire and about half the length of the carapace.

About one-third of the distance between the frontal margin and the first pair of gnathopoda stands the epistoma, and posterior to it on each side are the mandibles, and

behind them near together stand the three pairs of siagnopoda. These are all distinctly visible in Dr. von Willemoes Suhm's mounted specimens, but finding in the collection one preserved in spirits, that was taken in the Pacific near Fiji, I took advantage of the circumstance to dissect out separately each oral member, and have figured them in the plate (*d, e, f, g*).

The mandibles (fig. 1*d*) are simple, having an apophysis, but neither molar process nor synnhipod; the psalistoma is sharp-pointed and serrate.

The first pair of siagnopoda (fig. 1*e*) is three-jointed; the first two joints are broad and foliaceous, and tipped with hairs on the inner margin; the third is cylindrical, short, and tipped with three or four hairs. Milne-Edwards says that the first pair is nearly rudimentary and appears to consist of a small horny scale bordered with cilia. It appears to me, on looking at the figures given by Milne-Edwards, that in his dissection he has broken the appendage in two, and that his figures 6 and 7 put together will, when combined, correspond with my figure (fig. 1*e*), which agrees with the representation of the same appendage given by Anton Dohrn.¹

The second pair of siagnopoda (fig. 1*f*) is three-jointed; the central joint is bilobed, and each is fringed with a cilium on the inner surface; on the outer side is a broad, oval, foliaceous plate that is fringed with hairs radiating centrifugally round the margin, and is the homotype of the mastigobranchial plate of the higher groups of Macrura. This corresponds with Milne-Edwards' third pair, and with the second maxillæ in Anton Dohrn's description. Claus² figures this appendage, representing the three internal lobes much as they are given in my figure (fig. 1*f*), but he represents the outer foliaceous plate as being comparatively small and sparsely fringed with distant cilia; it should be remembered, however, that Claus drew his figure from an older specimen, since he represents it with a seventh pair of pereionic appendages in a rudimentary form.

The third pair of siagnopoda (fig. 1*g*) consists on the inner side of a four-jointed appendage, of which the first or basal joint is broad, foliaceous, and fringed with hairs; the second, third, and fourth joints are narrow, cylindrical, and distally carry a single hair on the inner margin; at the base of the first joint on the outer side is a long and slender biarticulate rod, furnished with cilia at the distal extremity; at the base of this rod there is a large ovate plate, the margin of which is fringed with distant cilia, and near its base stands also a short membranous plate. The inner four-jointed branch I believe to be the representative of as many joints of the typical leg, the outer rod being the basephysis, while the two foliaceous plates represent the mastigobranchia and the rudiment of a branchial appendage in its saccular form. Milne-Edwards' figure corresponds with mine in part only, omitting the two outer plates, which also correspond

¹ Untersuchungen über Bau und Entwicklung der Arthropoden, taf. xv. fig. 3, Leipzig, 1870.

² Crustaceen-Systeme, p. 48, taf. viii. fig. 9, 1876.

with the figures given by Anton Dohrn¹ and also that figured by Claus,² but each of these authors shows that the external rod is only a branch of the basal joint, which is I presume the second or basal joint, and neither gives the outer foliaceous branch, although Anton Dohrn shows the rudiment of such, unless it be the fragment of a ruptured appendage, and he moreover figures what I believe to be a basephysis with four small terminal articulations. Claus represents the same organ as being multiarticulate for two-thirds of the entire length, whereas Milne-Edwards figures it as being uniarticulate, which corresponds more nearly with my own observation, since, although I saw indications of there being three, the articulations appear not to have been fully formed, but only defined by the presence of marginal cilia.

The six pairs of pereionic appendages represent the two pairs of gnathopoda and four pairs of pereiopoda; these all correspond in general form, but differ a little in size and ornamentation, they are all six-jointed and have a long basal joint, which carries a long multiarticulate ephysis attached to the distal extremity. All, excepting the first gnathopod and the posterior pereiopod, are furnished with a strong tooth near the middle of the basal joint, as well as with one on the anterior distal angle of all except the posterior pair, and with three or four others on the next succeeding joint (ischium) in all except the first and last pairs of appendages. Now, these tooth-like prominences are too numerous and conspicuous to be overlooked, and since they are not shown by Milne-Edwards on the basis in either of his figures, while he shows them on the ischial joints of all excepting the first and last pairs in his figure in the first-quoted work, and as Claus represents his species as having the appendages smooth throughout, excepting the second pair of gnathopoda, which is armed with a strong tooth on the anterior distal angle of the basis and one on the anterior margin of the ischium of the same pair, I am inclined to believe that it is possible there may be a greater amount of specific separation between the several specimens observed than has generally been supposed, although the instances of variation in what I believe to be specimens of the same species induce me to hesitate until further opportunity may decide.

The branchiæ (fig. 1br) are now beginning to make their appearance in the form of small plumes within sacs attached to the coxa of the second pair of gnathopoda and the first pair of pereiopoda.

The pleopoda are also becoming visible as incipient buds; there is a pair at the postero-lateral angles of each somite excepting the first; that on the sixth somite being already in a well-advanced condition and taking its character as a permanent part of the rhipidura of the adult animal.

In the Western Pacific, north of New Guinea, three other specimens were obtained that are 25 mm. in length. One of these was labelled by Dr. von Willemoes Suhm

¹ *Loc. cit.*, pl. xv. fig. 5.

² *Loc. cit.*, pl. viii. fig. 10.

“Amphion Adult”; but this can scarcely be an adult seeing that it has only six pairs of appendages attached to the pereion; in these the branchiæ are present in a more or less advanced condition, existing as a single plume corresponding with each pair of appendages excepting the first gnathopoda; the plumes are attached near the middle to the pleural surface of the pereion, and taper gradually to each extremity.

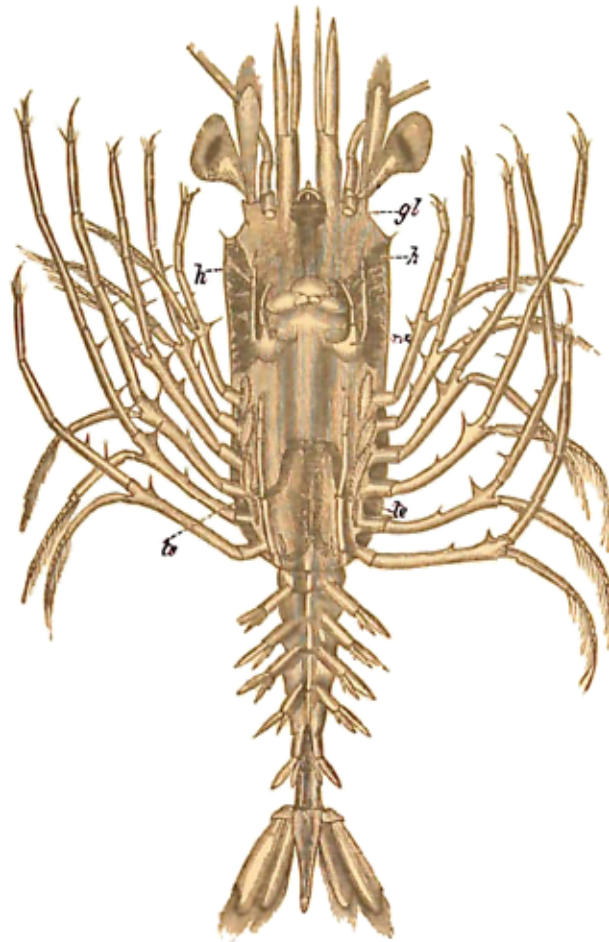


FIG. 76.—*Amphion* with seven legs, and five pairs of branchiæ; *gl*, gland; *h*, *h*, liver; *mx*, maxilla; *te*, *te*, testes.
Reduced a half from Suhm's drawing.

Their structure (fig. 2*br*) is that of a series of thin foliaceous plates resembling those of the Phyllobranchiata, forming one broad plate on either side of a central stalk.

The next specimen (fig. 76) is the most advanced that has yet been observed; it was taken with the preceding on the northern side of New Guinea, and was drawn while yet in a fresh state by Willemoes Suhm, but whether it be the same as that which is given on Pl. CXLVII. fig. 2, I am not certain, but I believe that it is, and if so the posterior pair of pereiopoda is represented much too long by Suhm.

He supposed it to be a male, but he figures the anterior pair of pleopoda as biramose, which does not correspond with my observation as to the permanent character of this appendage in the male.

Length, entire,	25 mm. (1 in.).
„ of carapace,	16 „
„ of pleon,	9 „
„ of third somite of pleon,	1.5 „
„ of sixth somite of pleon,	2 „
„ of telson,	2.5 „

This specimen retains all the features described in previous specimens, but it has in addition a seventh pair of pereionie appendages, that only differs from Suhm's figure in being shorter, but it is considerably longer and in a more developed condition than that represented in Claus' figure of a similar stage. These appendages, as seen in fig. 20—the fifth pair of pereiopoda,—differ from all the preceding in being smaller, and in not having an ephysis attached to the basal joint; moreover, they appear to be seven-jointed, whereas all the preceding legs consist of six joints only. It has a branchial plume similar to those belonging to the other pereiopoda, but smaller, and like them attached to the lateral walls of the pereion rather than to the coxal joint, they are therefore pleurobranchiæ, and may be tabulated as follows:—

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

The pleopoda now appear as biramose appendages, of which both stalk and branches are short and flat, but as yet they are not fringed with hairs, the inner ramus has a stylamblys attached to each successive pair, excepting the posterior, which forms the lateral plates of the rhipidura and is fringed with long hairs.

The telson is tapering and terminates in two small teeth that approach each other at their apices.

The ophthalmopoda are less elongated, and the first pair of antennæ has the flagella a little more tapering, but the peduncle is not more distinctly articulated, while the second pair is apparently not advanced from those seen in fig. 2.

The nervous system appears to be more concentrated, the central ganglia being in a firmer condition, each group consisting of two ganglia, separate from each other from the second gnathopod to the fourth and probably the fifth pair of pereiopoda.

The oral appendages, closely packed together and well developed, stand halfway between the frontal margin and the first pair of gnathopoda.

On each side of the œsophagus is a series of arborescent hepatic vesicles.

On each side of the central neural cord is a series of saccular bodies (*te*) that I take to be the testes, these increase in size but suddenly disappear about the level of the second pair of gnathopoda. Corresponding with the first pair of pereopoda Suhm has figured two symmetrical convoluted tubes that he considers and labels testes (fig. 76, *te*), and figures them as passing to the coxal joint of the posterior pair of pereopoda.

It is probable that when Suhm examined the animal it was in a state better adapted for observation than it is at present, after having been preserved in Canada balsam for some time. The remains of these tube-like vessels still exist, but they are disrupted and not symmetrically continuous in the specimen from which I have taken my drawing, one side being more perfect than the other, but neither of them was continuous to the posterior pair of pereopoda, as shown in Suhm's figure. Assuming that they are portions of the tubular structure figured by Suhm, I am inclined to think that they are the spermatic ducts that, when perfect, are continuous with the testes shown at the anterior portion of the percion.

The nervous system is fairly shown in several specimens in the collection, and especially in Pl. CXLVII. fig. 2. The cephalic ganglion, or rather mass of ganglia, appears to be of a more concentrated and solid character than in other younger specimens, and the ocellus is reduced to a small point situated above the anterior portion; from this mass neural threads are seen to pass to the ophthalmopoda and the first and second antennæ; from the posterior margin two cords arise, one on each side of the median line, and pass round and meet behind the œsophagus, where there are three or four ganglia¹ situated in close succession and connected by short double cords and surrounded by a mass of neural tissue sending off nerve threads to the mandibles and siagnopoda; from the posterior of these ganglia, the two cords proceed, lying close together so as to appear but one, until between the first pair of gnathopoda, where they appear to swell out in the form of an elongated ganglion, and on each side, as in the preceding, nerve threads are sent off to the lateral appendages; in this as in the others these threads do not spring from the central ganglion but from a surrounding mass of neural cell tissue. From the ganglion between the first pair of gnathopoda the central nerve-cords pass as one in the median line between the second pair of gnathopoda, where there are two distinct ganglia surrounded by a mass of neural cells, that supply nerve branches to the lateral appendages; from these ganglia the central cord proceeds as two separate threads to two ganglia situated between the first, second, third, and fourth pairs of pereopoda, beyond which I was not able to determine them, although traces of other ganglia are apparent between the posterior pair of appendages.

¹ These ganglia I ought to have drawn a little further forward.

Amphion provocatoris, n. sp. (Pl. CXLVIII.).

On the 7th of May 1876, in the Atlantic, south of the Azores, the largest and apparently most mature specimen in the collection was taken. It differs from all the larger specimens that were taken in the Pacific, by having no rostral tooth on the frontal margin of the carapace, by having the fronto-lateral angles anteriorly produced to large dimensions, and in having a tooth on the dorsal surface corresponding with the gastric region.

The carapace is long, narrow, and decreases slightly towards the posterior extremity, it is half as long again as the pleon, including the telson, which equals the length of the sixth somite.

Length, entire,	27 mm. (1.1 in.).
„ of carapace,	15 „
„ of pleon,	12 „
„ of third somite of pleon,	1 „
„ of sixth somite of pleon,	2 „
„ of telson,	3 „

The dorsal surface of the carapace has the frontal margin nearly straight, and shows a minute ocellus in the median line, behind which, halfway between the epistoma and the frontal margin, stands a laterally compressed, dorsally erect and anteriorly pointed, well-developed tooth. On the outer angle of the frontal margin stands an anteriorly directed tooth that forms the inner canthus of the orbit, which exists on the outer side in the form of a small emargination, the outer angle of which is rounded, beyond which the margin slopes gradually to the fronto-lateral angle, which is defined by a strong tooth, from which point the dorso-lateral margin, with a slight curve gradually narrows to the posterior extremity of the pereion. The infero-lateral margin from the latero-frontal tooth curves inwards and downwards just behind the oral appendages, and then recedes upwards and backwards in a line corresponding with the dorso-lateral margin of the carapace.

The pleon is narrow and gradually tapers to the extremity of the telson, which under a high power is seen to divide into two small points, but which in the typical specimen appears to be considerably worn down. The five anterior somites of the pleon are short, while the sixth is as long as the preceding two, and the telson is subequal with the sixth.

The ophthalmopoda are short and do not reach beyond the lateral margins of the carapace; they are pyriform and supported on a slender but short pedicle that appears to articulate with its own wide somite just beneath the frontal margin of the carapace. The ophthalmus is long-ovate.

The first pair of antennæ has the peduncle broader at the base than at the distal extremity and appears to be uniarticulate; it carries at its extremity two flagella, the

inner of which appears to be a little more robust than the outer, which however is slightly longer and furnished with one or two hairs near the distal extremity.

The second pair of antennæ has the first two joints short and robust, the first joint being implanted beneath the carapace considerably posterior to the frontal margin, and in which Suhm observed the green gland to be present; the second joint at the outer angle supports a large scaphocerite that is slender at the base and broad at the distal extremity, which is rounded, fringed with hairs, and armed on the outer margin with a strong tooth. On the inner angle of the second joint stands the third and terminal joint of the peduncle, at the extremity of which there is a slender multiarticulate flagellum, which is broken off at about half the length of the carapace; each articulus being armed with a small point.

The oral appendages I have not dissected out, but *in situ* they appear under careful observation to correspond generically with those already described.

The first pair of gnathopoda is situated posteriorly to the oral appendages, subequally with the distance of the latter from the frontal margin; it resembles the other appendages but has the shaft of the basis smooth and is not quite so large.

The second pair of gnathopoda, as well as all the pereopoda, is armed with a sharp and long tooth near the middle of the basal shaft and another at the anterior extremity of its distal angle; there are several on the ischium of all the pereopoda. The posterior pair is rather smaller and less armed with teeth. The seventh appendage or the fifth pair of pereopoda is not present, nor can I see any trace of it, although in other respects the animal appears as far advanced as the specimens of *Amphion reynaudii*.

The first pair of pleopoda (*p*) is developed as a long cylindrical, slightly curved, uniaarticulate rod, the extremity of which is rounded.

The second (*q*) and following pairs resemble each other; these are short and consist of a peduncle that is broad and supports two branches which are subequal in length with the basal joint, the inner is a little shorter than the outer and supports a small and in this stage rudimentary stylamblys.

The posterior pair of pleopoda forms part of the rhipidura; the outer plate is broader and longer than the inner, the distal and inner margins are fringed with long hairs and the outer margin is slightly serrate near the distal extremity, where it is also armed with a strong tooth.

The telson is long, slender, and tapers to a point, the extremity of which appears to be minutely forked, the points of which in our specimen being worn.

The internal structure is not so well preserved or so plainly marked as in some of the other specimens, but a mass of cellular tissue corresponds with that which in *Amphion reynaudii* I have thought to be the testes, but which in this specimen vary somewhat in appearance, which I believe may be attributed to the manner of its preservation.

The brephalos of *Amphion* has not yet been observed, and the form hitherto known

as the earliest is that which was described and figured by Anton Dohrn in his memoir on *Amphion reynaudi*.¹ This he calls the Zoca form, and specimens which he procured from the Hamburg Museum were 7 mm. in length.

The specimen that I have figured (Pl. CXLVI. fig. 1) I believe to have been the same as that which is given in fig. 73 (p. 903), from a drawing by Willemoes Suhm, and examined by him while in a fresh condition. It was only 5 mm. long, and we may assume it to be a younger animal than that which Dohrn has described.

In this stage, the earliest yet known, the cephalic appendages are all in a forward condition, the oral appendages in a mature form, and the two pairs of gnathopoda fully developed as far as they are yet known to be. The pleon consists of only six somites, and the caudal extremity is a simple spoon-like foliaceous plate, fringed with a few hairs.

Fig. 2z in the same plate represents the caudal extremity of another specimen that has attained the length of 6 mm., in which no degree of progressive growth is observable, excepting that the sixth pair of pereopoda is seen to be taking form within the integumental structure, but is not yet developed as a free appendage. Dohrn's specimen is 7 mm. long, and at this stage as shown by him,² the first pair of pereopoda or third pair of appendages are in the course of development in the form of a pair of curved saccular appendages, and the caudal extremity has undergone a great change in the development of the sixth pair of pleopoda as the lateral appendages of the rhipidura, while the telson still retains the broad and foliaceous condition of the earlier known Zoca stage.

Fig. 3 in Pl. CXLVI. represents a specimen that has progressed a little further, and shows the third pair of appendages or first pair of pereopoda developed; the rhipidura is more advanced by the telson being produced in a narrow and tapering form instead of being broad and foliaceous as in Dohrn's specimen.

On Pl. CXLVI. fig. 4, one is seen to have the second pair of pereopoda (*l*) or fourth pair of appendages in an early stage of development, in the saccular stage, while in fig. 5 on the same plate the same pair of appendages is shown in a still more advanced form, being biramose and saccular. The rhipidura is increasing in the adult characters, but as yet the telson though broad is reduced to a tapering and foliaceous condition.

One specimen, 11 mm. long, was taken in the Western Pacific, in which the four pairs of legs are fully developed, but I have not thought it necessary to figure it because it so closely resembled fig. 1 on Pl. CXLVII., except for the presence in the latter of two more pairs of legs.

One specimen with five well-developed pairs of legs was taken in the West Pacific

¹ *Loc. cit.*, pl. xvi. fig. 11.

² *Loc. cit.*, p. 174, pl. xvi. fig. 10.

in February 1875; it is 11 mm. long, and corresponds so closely with *Amphion reynaudii* as shown on Pl. CXLVII. fig. 1, with the exception that it has only five pairs of legs, that I thought it unnecessary to figure it beyond showing the frontal margin of the carapace with the cephalic appendages (Pl. CXLVI. fig. 6), which viewed from the dorsal surface are more distinctly shown than in any of the previous specimens.

A specimen in this collection, which is given on Pl. CXLVII. fig. 2, corresponds so closely with *Amphion reynaudii* of Milne-Edwards, that I have so named it; I have figured it with the greatest care, but the internal viscera are not in a well-preserved state, the structure having been injured probably by being mounted in Canada balsam. The cephalic and oral appendages are visible, as well as the hepatic organs and two pairs of branchiæ in an immature condition, corresponding with the pleura above the second pair of gnathopoda and first pair of pereopoda. This form is so little advanced towards maturity that with the exception of the sixth pair of pleopoda, which forms part of the rhipidura, no appendage of the pleon has advanced beyond the most incipient stage of budding.

The first somite of the pleon showing no trace of an appendage appears to me evidence of its being a female, an idea that is supported by the presence of nucleated hexagonal cells, a mass of which in a broken condition is retained on one side of the median line, between the first and second pairs of pereopoda; this specimen is only 15 mm. long, whereas the two others show evidences of the male character, and these are 25 mm. long.

Two others with six pairs of legs were taken in the Atlantic on the homeward voyage; one in March, the other in May, 1876. Of them I have taken the latter as the type of a new species, the chief characteristics of which are a tooth on the dorsal surface of the carapace and the form of the frontal margin of the carapace, which is without a tooth in the median line, and has an excavation corresponding with the orbit, and in this specimen the first pair of pleopoda is developed into a cylindrical uniaarticulate rod, a feature that I believe to be characteristic of the male animal rather than a specific character, for with a slightly different formation it exists in a specimen found in the West Pacific Ocean, and which in several respects corresponds with this species from the Atlantic, among which I think may be seen a prominence like a tooth rubbed down, on the dorsal surface of the carapace between the gastric region and the frontal margin.

Among those taken in the West Pacific Ocean, north of New Guinea, there was a specimen that I have represented in fig. 2 on Pl. CXLVII. Willemoes Suhm has figured this same specimen I believe in fig. 76. This animal is well advanced towards maturity and is fully described at page 910. In Suhm's drawing, the

posterior pair of pereopoda is sufficiently long to be able to reach as far as the first pair of gnathopoda, in mine it does not quite reach to the base of the second pair of pereopoda, and is feeble and very slender. Claus¹ figures this stage, but represents the ultimate pair of legs as being still more feeble than those in the Challenger specimen. And Anton Dohrn² figures the percion with an indication of the position of the second appendage in relation to the nervous system, and shows that the posterior pair is of scarcely less importance than the penultimate or fourth pair of pereopoda, and is connected with an independent ganglion subequal in size with that of any of the preceding pairs.

This appears to me to demonstrate that the developmental process is of a more constant growth than is the case in other forms of Macrura.

Among all the specimens that have been obtained there is not one that can yet with certainty be pronounced to be adult. Yet it is difficult to suppose that from the numbers of animals that have been traced through a consecutive series of stages, from those with two pair of legs up to those with seven—the normal number that exists in the Decapod Crustacea—that any very decided external change can take place at the putting on of the adult features, which appear to consist in having only the several appendages of the pleon fringed with hairs.

To Anton Dohrn is due the credit of showing the true relations of the Zœa forms to the adult *Amphion*, and we cannot but admire the candour of Claus, who, after carefully investigating Anton Dohrn's observations and arriving at a distinctly different conclusion, has wound up his Crustacean-System by the following "Supplementary Remarks."

"After the printing of this work was completed I became acquainted with the communication concerning the development of some Palæozoic Decapoda by R. v. Willemoes Suhm in the February number of the Annals and Magazine of Natural History.

"This contains some interesting notes about the genera *Amphion*, *Sergestes*, and *Leucifer*, which, had I been acquainted with them earlier, would have induced me to have taken a rather different view in the chapter on *Amphion*.

"It is true that my criticism of Dohrn's interpretation of *Amphion* as an adult animal is in nowise thereby invalidated, and what I have said of the insufficiency of the rudimentary branchiæ, of the absence of a fringe of hair to the pleopoda, as well as of the termination of the supposed ovaries on the posterior pair of pereopoda (concerning the size and form of which we have heard nothing from Dohrn) as proofs of the sexual maturity of *Amphion* remains unimpeached, as does also the larval nature of the Crustacean described by M. Milne-Edwards under the name of *Amphion* and characterised by six pairs of divided feet.

"Willemoes Suhm has expressly stated that he had found among three full-grown *Amphions* two male individuals, but probably it was in consequence of the

¹ *Loc. cit.*, pl. viii. fig. 8, Fs.

² *Loc. cit.* pl. xv. fig. 2. xii.

development of the seventh pair of appendages without much change in the form of the animal that he was induced to believe in its adult condition.

“The form of the antennæ, and of the seventh pair of legs, the structure of the branchiæ, of the appendages of the pleon, and of the sexual apparatus must be more fully known before the question of the adult condition of the animal can be looked upon as decided. Under all the circumstances I was justified in considering as larval forms the largest specimens with which I was acquainted, and which possess the seventh pair of appendages in a rudimentary condition, rudimentary branchiæ, and the pleopoda without hairs, in accordance with Dohrn's description, and also in protesting against interpreting as an ovary the mass of cells with its opening, on the basis of the description and figure of the last-mentioned author.¹ If *Amphion* in an unchanged form really becomes an adult animal, we have in it a new and interesting form of Schizopod, in which the maxillæ and gnathopoda (vorderen Kieferfüsse)—as is also the case in *Petalophthalmus* and *Chalaraspis*—indicate a transition to the Decapoda, and in which the carapace already overlaps all the pereionic somites.”

The view that these several forms of *Amphion* suggest, is that from the brephalos to the adult animal the development is regular with the growth of parts, but that as yet we have not obtained the earliest nor reached the latest stage of growth. What the latter stage may be can only be surmised, but I believe it cannot be very distinct in its external characteristics from that of the oldest known specimen of *Amphion*. The form and nature of the branchial plumes demonstrate that it belongs to a family of the Phyllobranchiata that is parallel with the Synaxidea in its relation to the Trichobranchiata, and which it approaches in the form and character of its appendages, with the exception of its having a scaphocerite attached by the second pair of antennæ, which the Synaxidea have not.

¹ Dohrn, *loc. cit.*, pl. xv. figs. 1, 2.

APPENDIX A.

DESCRIPTION of SYLON CHALLENGERI, n. sp., a Parasitic Cirriped. By Dr. P. P. C. HOEK, Member of the Royal Academy of Sciences of the Netherlands.

IN May 1886 Mr. C. Spence Bate sent me a specimen that looked like a *Sacculina*, the only one that he ever saw of the kind attached to a Macrurous Crustacean.

The Macruran to which it was attached was a specimen of *Spirontocaris spinus* (Sowerby), var ϵ . It was taken during the voyage of the Challenger at Station 49, off Halifax. It is figured on Pl. CVI. fig. 5 ϵ , of Mr. Spence Bate's Report, being shown *in situ*; in fig. 10 of the same plate it is shown isolated. In the explanation of this plate it is referred to as a saccular parasite.

At the suggestion of Mr. Spence Bate, Mr. John Murray, Director of the Challenger Commission, asked me to describe the specimen in order to have a description of it embodied in Mr. Spence Bate's Report, a request which I gladly accepted.

The reason Mr. Bate proposed to send the parasite in question to me, was that he believed it to be a parasitical Cirriped. After careful examination, I am able to confirm Mr. Spence Bate's provisional determination; for I found that it belonged to a genus of the Rhizocephala, or parasitical Cirripedia, *Sylon*, a genus well known to the Norwegian zoologists, but no specimens of it had been previously taken in the Atlantic south of lat. 60° N.

Before proceeding to describe the specimen, it will be well to say something concerning the literature of the genus.

In 1855 H. Krøyer¹ published a short note on a very insufficiently known group of Crustaceans, *Pachybdella* and its congeners. This note is remarkable from a historical point of view, since for the first time a third genus of these lower Crustaceans, which afterwards were shown to form the group of the Rhizocephala, was spoken of. The two previously known genera are *Pachybdella*, Diesing (*Sacculina*, Thompson), and *Peltogaster*, Rathke. Of *Pachybdella*, the species of which inhabit Crabs, Krøyer mentions two species, and of *Peltogaster*, which occurs on the abdomen of *Pagurus*, five different

¹ H. Krøyer, Bemaerkninger om en meget ufuldstaendigt bekjendt Gruppe af Krebsdyr *Pachybdella* o.a.v., *Overrigt o. d. K. D. Vid. Selok. Forhandl. Kjøbenhavn*, pp. 127-131, 1855.

species were known to him. Of the third genus, *Sylon*, Krøyer proposed only one species, though the different specimens show considerable variation in shape and size. It seems to occur on the genus *Hippolyte* only. No description of the genus *Sylon* is given in this note; and Krøyer's death in 1870 occurred before the paper, in which he intended to give a full description of the different species and genera, was published. With regard to *Sylon* the only things we learn from his note of 1855 are that its metamorphosis is much like that of *Pachybdella* and *Peltogaster*, and that he believes it to be the only genus of the group in which a kind of vascular system occurs.

In 1870 G. O. Sars published¹ the second part of his father's *Bidrag til Kundskab om Christianiafjordens Fauna*, with the aid of the manuscript left by his father, Dr. Michael Sars, who died in 1869. The same memoir was also published separately.²

In this paper a description is for the first time given (pp. 41-48) of the genus *Sylon*, Krøyer, and of two species belonging to it. The one is *Sylon hippolytes* (Krøyer), most probably the same species that Krøyer observed; it was found on the under side of the abdomen of *Hippolyte securifrons*, Norman, which was taken at a depth of 40 to 60 fathoms in Storemedet, and at a depth of 100 to 120 fathoms in the Rødtangdybet. M. Sars points out that the same species occurs attached to a specimen of *Hippolyte polaris*, Sabine, which Daniellsen obtained in Hardangarfjorden at a depth of 250 fathoms. The other species described is *Sylon pandali*, M. Sars, a parasite of *Pandalus brevirostris*, which lives at a depth of 25 to 60 fathoms "in freto Drøbachiensi." Both species are figured and a fairly full description is given, the only one hitherto published.

The diagnosis which M. Sars proposes for the genus *Sylon* is as follows:—

"Corpus sacciforme, ovatum, subteres, cute (pallio) pellucida sed firma vestitum. Os vel apertura suctoria in organo adfigendi acetabuliformi, annulo corneo cincto, in latere inferiore corporis situm, ubi in posteriore parte aperturae (genitales) binæ parvæ circulares beantes, symetrice positæ, cavitatem intrapallialem aperientes, adsunt. Genitalia bisexualia: ovarium ramosum, in sacco magno maximam partem cavitatis interpallialis explente inclusum; testiculus parvus ovatus, in posteriore parte ventrali hujus cavitatis situs."

At the end of his description of the two species, Sars points out the differences existing between *Sylon* and the other known members of the family Peltogastridæ, established by Lilljeborg. *Sylon* differs from *Peltogaster* in not having an aperture at the anterior extremity of the body, and also in having only a single testis; from *Apeltes* it differs both by the absence of the anterior aperture and of the short tube at the hindermost extremity of the body, and by the presence of a well-developed organ for its attachment to the host, with a mouth in the centre. *Sylon* also differs from both by the shorter form of the body, in which respect it rather resembles *Clistosaccus* of

¹ *Nyt Mag. f. Naturvid.*, vol. xv.

² Christiania, Johan Dahl, 1870.

the Sacculinidæ, and especially by the presence of two symmetrically situated apertures (genital pores) at the ventral side, in the hindermost part of the body.

In consequence perhaps of its being in the Norwegian language, this paper of M. Sars has not become known so widely as it merited. Neither Kossmann¹ nor Delage,² both of whom give an extensive bibliography in their papers on the Rhizocephala, mentions the above paper of M. Sars.

In his second paper on the fauna of the Arctic fjords published in 1884, J. Sparre Schneider of Tromsø³ gave an enumeration of the Crustaceans and Pycnogonids he collected in 1881 in the Kvænangsfjord. In this fjord *Hippolyte pusiola* is common at a depth of 5 to 10 fathoms, at the place where it communicates with the Sørfjord. Schneider says⁴ that this species is to a considerable degree infested with parasites, viz., a species of *Sylon* peculiar to *Hippolyte pusiola*, a couple of them being often observed on the same individual.

In the same year Max Weber⁵ published the results of his researches on the Isopods collected during the cruises of the "Willem Barents." Speaking of *Phryxus abdominalis* (Krøyer), Weber says⁶ that along with the Isopoda of the Barents collection, a specimen of *Hippolyte incerta*, Buchholz, was handed to him, which was infested on the ventral surface by a parasite, that on superficial investigation might be taken for a Bopyrid. On closer examination this idea was given up, and on comparing the parasite in question with specimens of *Sylon* attached to *Hippolyte pusiola*, which he collected himself near Tromsø, he saw at once that the parasite of *Hippolyte incerta*, Buchholz, also belonged to the genus *Sylon*. Through the kindness of Professor Max Weber of Amsterdam University, I was enabled to investigate two specimens of this species of *Sylon*, attached to *Hippolyte pusiola*, Krøyer, and to compare them with the Challenger specimen obtained off Halifax. This comparison brought out the great resemblance between them. They may be different species, but they clearly both belong to the genus *Sylon*. Whether in every case two specimens of *Sylon* living on different hosts should be regarded as different species, I do not venture to decide. From the analogy of similar cases of parasitical Isopoda, great prudence is certainly necessary in coming to a conclusion.

¹ Kossmann (Beiträge zur Anatomie der schmarotzenden Rankenfüssler, p. 5, 1874), says with regard to *Sylon*:—"Der Genusname *Sylon*, welchen zu characterisiren Krøyer durch den Tod gehindert wurde, kann füglich aus unserer Literatur wieder verschwinden, zumal K. seine Exemplare, wie er selbst angibt, sämmtlich verarbeitet hat."

² Delage (Evolution de la Sacculine, *Archives d. Zool. expér.* (2), tom. ii. p. 424, 1884), in regard to *Sylon* is also very decided:—"La même année (1855) Krøyer ajoute aux deux genres déjà connus le genre *Sylon*. Mais il omet de le caractériser et de conserver un exemplaire. Personne depuis n'a pu retrouver le *Sylon*, en sorte que c'est là un genre, que sauf Krøyer, personne n'a vu, et dont personne ne connaît les caractères. Le retrouvera-t-on?"

³ J. Sparre Schneider, *Undersøgelser af dyrelivet i de Arktiske fjorde*, II. Crustacea og Pycnogonida indsamlede i Kvænangsfjorden, 1881, *Tromsø Museums Aarshefter*, vii., 1884.

⁴ *Loc. cit.*, p. 52.

⁵ Max Weber, Die Isopoden gesammelt während der Fahrten des "Willem Barents" in das Nördliche Eismeer in den Jahren 1880 und 1881, *Bijdragen tot de Dierkunde*, 1884.

⁶ *Loc. cit.*, p. 34.

The following list gives the different cases in which species of *Sylon* have hitherto been observed :—

PARASITE.	NAME OF HOST.	OBSERVER.
<i>Sylon hippolytes</i> (Kröyer),	<i>Hippolyte securifrons</i> , Norman, .	M. Sars.
„ „	„ <i>polaris</i> , Sabine, . .	„
„ <i>pandali</i> , . . .	<i>Pandalus brevirostris</i> , Rathke, .	„
„ <i>schneideri</i> , n. sp., .	<i>Hippolyte pusiola</i> , Kröyer, .	Sparro Schneider, Max Weber, Hoek.
„ sp., . . .	„ <i>incerta</i> , Buchholz, .	Max Weber.
„ <i>challengeri</i> , n. sp., .	<i>Spirontocaris spinus</i> (Sowerby), .	Hoek.

The specimen of *Spirontocaris spinus* on which the parasite was found had a length of 37 mm. It was attached to the third segment of the abdomen. According to M. Sars, *Sylon hippolytes* is also attached to the third, and *Sylon pandali* to the first abdominal segment of its host. According to my own observations, *Hippolyte pusiola* likewise bears its *Sylon* on the third segment of the abdomen.

In the case of *Spirontocaris spinus*, as shown in Pl. CXLIX. fig. 1, the parasite is attached by a considerable part of its surface, the attached part being circular and having a diameter about half as long as the longest axis of the parasite. The body-wall of the shrimp and of the *Sylon* almost imperceptibly pass into one another; when separating the parasite its chitinous covering was found to have a yellow-coloured thickening, of the shape of a ring, round the place of attachment.

The shape of the parasite is oval,¹ its long axis running nearly but not quite parallel with that of the Shrimp. If we apply the term poles to the extremities of the longest axis, then the anterior pole is situated at a somewhat greater distance from the ring of attachment than the posterior pole. In the species of *Sylon* found upon *Hippolyte pusiola*, and which I will call *Sylon schneideri*, not only is the greater part of the body of the parasite situated in front of the base of attachment, but the anterior pole is at a considerably greater distance from the surface of the host than the posterior pole. The greatest diameter of *Sylon challengeri* measured about 4 mm., and the two other axes only measured 3·16 and 2·6 mm. Taking the plane of the two other axes as perpendicular to the direction of the longest axis, the one second in length (3·16 mm.) is perpendicular, or nearly so, to the surface of the Shrimp; the shortest of the three is the one that runs from the right to the left side of the body of the parasite.

¹ The figures of the parasite on Pl. CVI. figs. 5, 10, represent it as spherical; but this is not quite exact. Fig. 10 also shows the parasite as being attached by means of a short but distinct peduncle, but this is not the case.

Sylon hippolytes, M. Sars, is 10 mm. in length and 7 in breadth; *Sylon schneideri* had a very different size in the specimens I was able to investigate; in one the dimensions were about 3.1 by 2.1 mm., in another the length and the greatest breadth measured 6 and 4.1 mm. respectively. I have also seen a specimen of *Hippolyte pusiola* with two small specimens of *Sylon schneideri* attached to it; the one about 1.5, and the other 2 mm. in length.

The specimen of *Sylon challengeri* which was sent me was not quite uninjured. As is shown in figs. 1 and 3, Pl. CXLIX., the outer wall of the body was torn open in front, and this damage, caused perhaps by the desire of the artist to see as much as possible of the animal without detaching it from the *Spirontocaris*, at first caused some difficulty in the determination of the animal. In *Sylon* the outer surface of the body is quite smooth and bears no appendages or trace of segmentation; the large and very distinct opening found in the other *Rhizocephala*, which Delage calls the cloaca, is wanting in this genus. For the communication of the mantle-cavity with the exterior two rather small round holes alone are present, which were accurately observed and figured by M. Sars. From analogy I am of opinion that they were situated just within the limits of the damaged part of the body of *Sylon challengeri*; and a comparison with the figure of *Sylon schneideri* attached to *Hippolyte pusiola* (Pl. CXLIX. figs. 4, 5) will readily convince any one of the probability of this supposition. In fig. 5 a lateral view is given, and in fig. 4 a front view; in both figures the circular openings exist at *a*, and they are about 0.3 mm. in diameter. In young specimens these openings seem to be closed; at all events I observed them in this condition in a small specimen of *Sylon schneideri*, a transverse section of which is represented on Pl. CL. fig. 2. Like other *Rhizocephala*, *Sylon* carries its developing ova within the mantle-cavity; Kröyer's observations on the larvæ of this genus, and his comparison of these larvæ with those of *Sacculina*, admitting, I think, of no doubt on this point. Most probably the Nauplii, when ripe, leave the cavity by means of the above-mentioned openings. Running from between the two openings towards the place of attachment, a narrow stripe is visible through the transparent outer wall on both sides, limited by a distinct clear line (Pl. CXLIX. fig. 4). Here the body of the *Sylon* seems to be attached to the interior of the mantle, and probably this stripe is comparable to the "mésentère" of Delage.

When I commenced my investigations I did not know the nature of the parasite, and I therefore decided upon studying it by means of transverse sections. I was obliged to detach it from its rather bulky host, taking away along with the parasite an annular part of the body of the Shrimp. Fig. 2, Pl. CXLIX. was made after the animal had been thus loosened, and represents it from below. The round smooth part (*e*) afterwards proved to be the very dense mass of ovarian tubes. The outer covering was so loosely connected with the interior, that I was obliged before embedding it in paraffin to take it quite away; and in so doing I neglected to investigate microscopically the mode in which

the parasite was attached to its host. In the case of *Sylon schneideri*, however, I observed that the connection takes place in much the same way as Delage has described it in *Sacculina*. From a well-developed and rather voluminous basis (the "membrane basilaire" of Delage) numerous roots pass into the interior of the host, and in order to investigate this attachment it is necessary to make transverse sections of the host with the parasite attached to it. A part of the abdomen (the dorsal half having been removed) of a small specimen of *Hippolyte pusiola* with the *Sylon* attached, was embedded in paraffin in the usual way, and sections cut with the aid of the microtome.

Some of the sections so made are shown in Pl. CL. figs. 4-6. As it is not my intention to publish here an elaborate anatomical and histological description of *Sylon*—since both in regard to quantity and quality the material at my disposal was not sufficient—but only to give a preliminary orientation with regard to these little-known animals, a few words must suffice to describe this basilar membrane. It forms a circular disc equal in area to about one-fifth of the whole surface of the *Sylon*, and is not very thick, in the preparation shown in Pl. CL. fig. 4 measuring only about 0.2 mm.; it is composed of connective tissue, the nuclei being very small and numerous. The roots are not very abundant, but rather elongate and much ramified. In one respect there seems to exist an interesting difference between *Sylon* and *Sacculina*—in the latter genus the roots penetrate within the body of the Crab until they reach the wall of the intestine, but in *Sylon*, on the contrary, they as a rule do not reach so far. In *Carcinus mænas*, at the place where *Sacculina* is attached, the distance between the basilar membrane and the wall of the intestine is inconsiderable; in *Sylon* the same membrane is separated from the wall of the intestine by a dense mass of muscles (Pl. CL. fig. 4, *m*). Most of the roots (Pl. CL. figs. 4, 5, *r*) terminate on the ventral aspect of this mass of muscles, and only one root could be followed running close to the lateral surface of the abdomen of *Hippolyte* and directed to the dorsal part of the body. Most probably therefore *Sylon* lives, at least partly, on the blood of its host, and only to a limited extent draws its nourishment from the intestinal contents. Branches of these roots surround the central nervous system, passing through the abdomen in a very curious way (Pl. CL. figs. 4, 5, *n*).

According to Delage the basilar membrane and the roots belong to the internal part of the Rhizocephalid, the external part consisting of the visceral mass and of the mantle. The name "visceral mass" is perhaps not quite exact, as there is no trace of viscera, in the ordinary sense of the word (*intestine, &c.*), the contents being made up almost exclusively of one organ, namely, the very bulky ovary. After soaking in absolute alcohol, the ovary forms a very compact and hard body, which cannot easily be stained, is very brittle, and causes great trouble when cutting sections. It consists of extremely numerous more or less unripe eggs; in the specimens I investigated almost nothing could be observed of the true ovarian tubes, the ova being closely packed together in almost every direction. The latter are all nearly in the same condition of ripeness; each con-

tains a granular plasma and numerous clear vesicles scattered through its substance. As a rule a small nucleus is visible close to the wall of the ovum, which is distinctly coloured by alum carmine. The size of the eggs is much the same throughout the whole ovary; in *Sylon challengerii* (Pl. CL. fig. 1) they are nearly spherical, with a diameter of 0.06 mm., in *Sylon schneideri* (fig. 7) they are oval and slightly larger, the dimensions being 0.08 by 0.06 mm. Here and there between the ovarian eggs, especially in *Sylon challengerii*, stripes of connective tissue with rather large oval nuclei are visible.

The visceral mass is inclosed by an epithelium which is truly chitinogenous, and has a chitinous outer wall at its surface. This chitinous membrane—at all events when the animal carries no eggs in the mantle cavity—is pressed against a similar membrane, which forms the inner surface of the mantle. The latter organ consists of two layers of epithelial cells, separated from one another by connective tissue and muscular fibres; at the outer surface a rather thick and very resistant chitinous membrane is secreted by the epithelial cells, whereas the inner coating of chitin is thin and in not quite full-grown specimens is fused with the exterior chitinous membrane of the visceral mass. At the places where later on the openings of the mantle are formed, a thick, lenticular, chitinous disc (Pl. CL. fig. 2) is observed. The chitinous membrane at the surface of the mantle in the same preparation is distinctly double, but when the process of exuviation takes place the outer layer probably carries away the lentiform disc also, and so opens the genital pores. Between the two chitinous membranes of mantle and visceral mass the mantle cavity is formed by a simple parting of the two membranes.

In the series of preparations of *Sylon challengerii*, the gland, whose secretion serves probably for gluing the eggs together, is seen to be distinctly developed; but I observed only one gland, and not two as is the case in *Sacculina*. One of the sections of the gland is shown on Pl. CL. fig. 1, which fairly well corresponds to the description of it given by Delage in the case of *Sacculina*. He calls it the cement-gland, a name, which, as Giard pointed out,¹ is inexact, for it has quite the function of an "Eikittdrüse," or "glande collétérique." It is a tubular gland, much ramified, and very irregularly convoluted, and a kind of chitinous membrane is seen everywhere within the interior of the different parts. The gland as a whole, with the connective tissue between its convolutions, forms a lentiform mass. In *Sylon challengerii* the opening of the female genital apparatus does not take place, as is the case with *Sacculina*, by means of a vestibule (the atrium of Delage) situated in the centre of the mass of the gland; for I did not find a trace of such an atrium in any one of an uninterrupted series of preparations, all the sections being perpendicular to the surface of the lentiform glandular mass. At one side of the gland, however, the epithelium of the surface of the visceral mass forms a distinct invagination (Pl. CL. fig. 1, *d*), and perhaps the opening of

¹ A. Giard, Sur l'orientation de *Sacculina carcini*, *Comptes rendus*, March 10, 1886.

the female genital apparatus is to be sought here; in that case the tubular gland ought to have its opening in the neighbourhood of this invagination also.

Only in one of the specimens of *Sylon schneideri* did I observe anything that could be considered to be a testis, and this structure formed an oval compact gland, in connection at one extremity with the wall of the visceral mass, the other extremity lying free between the ovarian cæca. The organ which M. Sars observed and regarded as a testis is probably the same. In one respect, however, I do not agree with him, for he believes that he observed a small pore at the surface of the mantle, and considers it to be the male genital pore, while I, on the contrary, believe that the testis communicates by means of an opening with the mantle cavity. In Pl. CL. figs. 5, 6, sections of the testis are represented, figs. 4, 5, and 6 being from the same series; the preparations follow one another in sequence, from behind forwards, but numerous sections between them are not figured. Continuing the series of preparations in the same direction, soon after the one figured in fig. 6, one follows in which the openings of the mantle cavity are visible.

The nervous system was observed in *Sylon schneideri*. The only part of it which I found was an almost spherical body, composed of small cells with distinct and well-stained nuclei, and situated at the surface of the visceral mass, enclosed in a mass of connective tissue (Pl. CL. fig. 2, *n*). Its diameter is about 0.08 mm. In all the sections passing through it there is represented a clear central mass, probably consisting of granular substance, which is characteristic of the nerve-centres of the Arthropoda. In fig. 3 a part of another section, not far in front of that shown in fig. 2, and belonging to the same series, is represented. Here the connective tissue surrounding the nerve centre in fig. 2 is seen to be still more distinctly developed, and encloses a mass of granular substance, which in fig. 2 is just beginning to appear (figs. 2, 3, *l*). I do not know its nature; probably it is blood-serum.

The structure of the Rhizocephalida, so far as regards *Sacculina*, is now well known. Of *Peltogaster* our knowledge is rather insufficient; of *Clistosaccus* and *Sylon* almost nothing was known hitherto, and though for the latter genus at least some information is given in this note, much more data are wanted before it will be possible to discuss the affinities, not only of *Sacculina* and *Peltogaster*, but of all the members of the interesting family Rhizocephalida.

APPENDIX B.

PONTONIIDÆ (p. 705).

First pair of antennæ having the outer flagellum bifid. Mandible without a synaphipod. First pair of pereopoda subequal, slender, chelate. Second pair unequal, one being extremely large, possibly in the male only.

CARICYPHIDÆ (p. 712).

Body slender, carapace anteriorly produced to a slender sharp-pointed rostrum. Third somite of pleon dorsally frequently elevated and compressed. First antennæ having two short flagella; second pair having the scaphocerite long and narrow. First and second pairs of pereopoda chelate, subequal. Telson long and slender.

ACANTHEPHYRIDÆ (p. 723).

Animal smooth, laterally compressed, and dorsally carinated. First pair of antennæ having two long flagella; second pair furnished with a sharp and rigid scaphocerite. Mandibles furnished with a synaphipod. First two pairs of pereopoda slender, subequal. Telson long, narrow, and tapering to a truncated point.

PALÆMONIDÆ (p. 711). Transfer to p. 778.

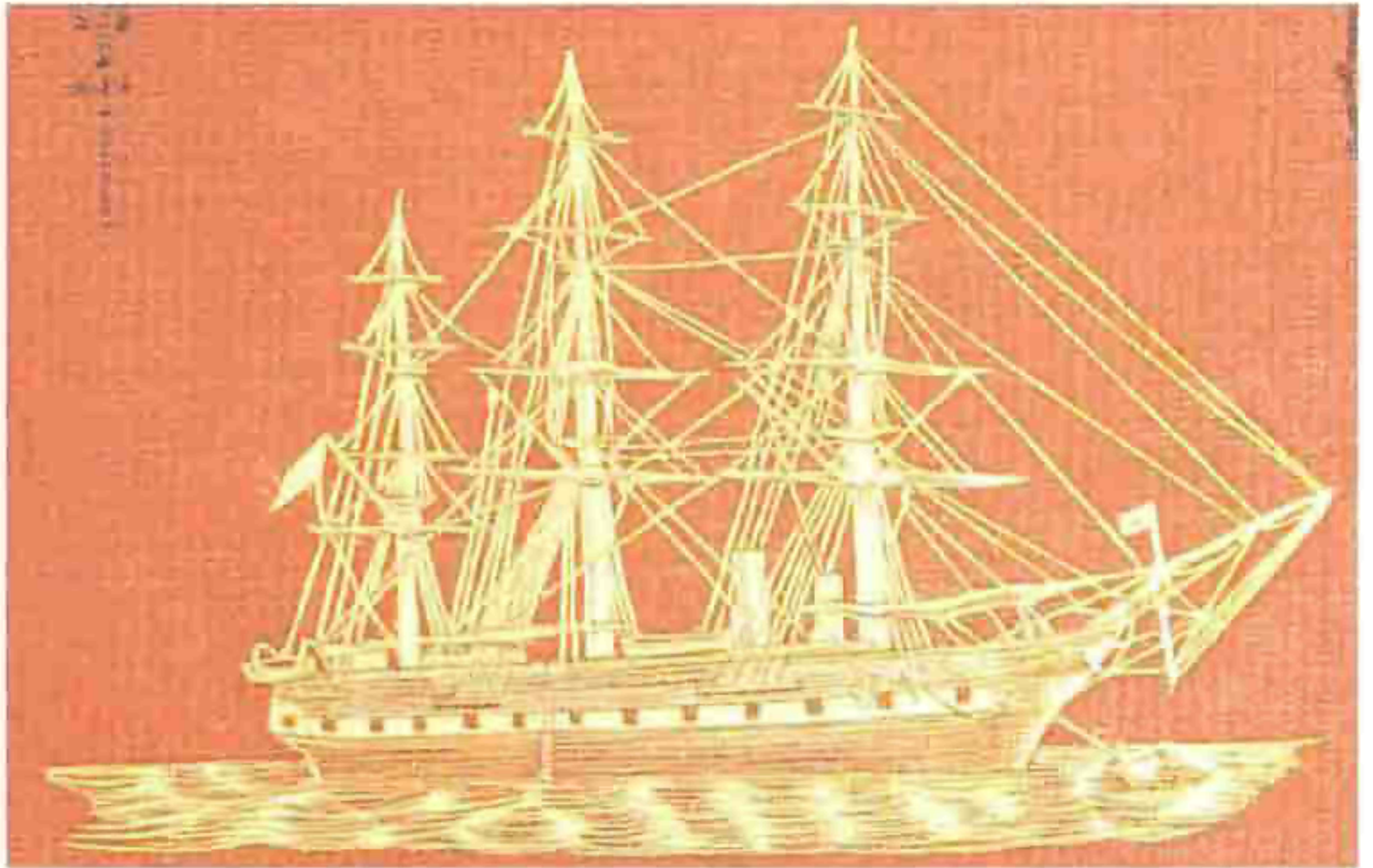
NEMATOCARCINIDÆ (p. 800).

Animal smooth and slender. First pair of antennæ having two long slender flagella. Second antennæ having a long and narrow scaphocerite, and a long and slender flagellum. Mandibles having a synaphipod. Pereopoda having the carpos much longer than the propodos. First two pairs chelate, small, slender. Telson slender and tapering.

TROPIOCARIDÆ (p. 824).

Carapace not laterally but dorsally compressed. Frontal regions anteriorly projecting above the ophthalmopoda, and produced to a short pointed rostrum. First antennæ having two flagella. Second with a long and narrow scaphocerite. First two pairs of pereopoda subequal, slender, and chelate. Telson long and tapering.

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H.M.S. CHALLENGER

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REPORT
ON THE
SCIENTIFIC RESULTS
OF THE
VOYAGE OF H.M.S. CHALLENGER
DURING THE YEARS 1873-76



UNDER THE COMMAND OF
CAPTAIN GEORGE S. NARES, R.N., F.R.S.
AND THE LATE
CAPTAIN FRANK TOURLE THOMSON, R.N.

PREPARED UNDER THE SUPERINTENDENCE OF
THE LATE
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AND NOW OF
JOHN MURRAY
ONE OF THE NATURALISTS OF THE EXPEDITION

ZOOLOGY—VOL. XXIV.
PLATES

Published by Order of Her Majesty's Government

PRINTED FOR HER MAJESTY'S STATIONERY OFFICE
AND SOLD BY
LONDON:—EYRE & SPOTTISWOODE, EAST HARDING STREET, FETTER LANE
EDINBURGH:—ADAM & CHARLES BLACK
DUBLIN:—HODGES, FIGGIS, & CO.

1888

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C O N T E N T S.

REPORT on the CRUSTACEA MACRURA dredged by H.M.S. CHALLENGER during the
years 1873-1876.

By C. SPENCE BATE, F.R.S., &c.

Cheiroplatea cenobita (p. 12).

- Fig. 1♀. Lateral view; enlarged twice.
,, 1a. Ophthalmopod or eye.
,, 1b. First antenna.
,, 1c. Second antenna.
,, 1d. Siagon or mandible.
,, 1e. First siagnopod or maxilla.
,, 1f. Second siagnopod or maxilla.
,, 1g. Third siagnopod or maxilla (injured?).
,, 1h. First gnathopod.
,, 1i. Second gnathopod.
,, 1k. First pair of pereopoda, chelæ.
,, 1n. Fourth pereopod; terminal joints.
,, 1o. Fifth pereopod; terminal joints.
,, 1br. Branchial plume.
,, 1r. String of ova.
,, 1vzv. Rhipidura; z, telson; v,v, posterior pair of pleopoda.

Cheramus orientalis (p. 30).

- ,, 2. Lateral view; enlarged four times.
,, 2c. Cephalon and carapace (dorsal view).
,, 2a. Ophthalmopod or eye.
,, 2b. First antenna. Flagella.
,, 2i. Second gnathopod.
,, 2o. Fifth pereopod; terminal joints.
,, 2q. Second pleopod.
,, 2r. Third pleopod.
,, 2s. Fourth pleopod; ms, stylamblys, cincinnuli, and hair; magnified.
,, 2br. Branchial plume.
,, 2br. Section of branchia.
,, 2v. Posterior pleopoda, margin; magnified.
,, 2z. Telson.

PLATE II.

Cheramus occidentalis (p. 32).

- Fig. 1. Lateral view ; enlarged two and a half times.
,, 1c. Cephalon, lateral view of carapace, with ophthalmopod, first antenna, and peduncle of second.
,, 1z. Telson ; *v*, sixth pair of pleopoda.

Callianassa occidentalis (p. 29).

- ,, 2k. First pereopod ; natural size.

Scallasis amboinæ (p. 34).

- ,, 3. Lateral view ; enlarged four times.
,, 3a,a. Ophthalmopoda.
,, 3b. First antenna.
,, 3i. Second pair of gnathopoda (attached).
,, 3o. Fifth pereopod.
,, 3r. Third pleopod.
,, 3r.ms. Stylamblys ; magnified.
,, 3br. Branchial plume.
,, 3vzv. Rhipidura ; *z*, telson ; *v,v*, posterior pair of pleopoda.
,, 4. Ventral aspect ; enlarged six times. Posterior somites of pleon and rhipidura reversed.

PLATE III.

Thalassina scorpionoides, nat. size (p. 19).

- c. Peduncle of first antenna; *c''*, coxal joint seen in section, showing the acoustic apparatus; *c'''*, arrangement of hairs within the chamber; *c''''*, one of the hairs magnified.
- d. Siagon or mandible.
- e. First siagnopod.
- f. Second siagnopod, with one of the hairs of the mastigobranchial lash magnified in sections.

PLATE IV.

Thalassina scorpionoides, branchiæ (p. 19).

Fig. 1. Pereion, showing the form and arrangement of the branchiæ; lateral wall of the carapace removed.

- „ *h*. First gnathopod with rudimentary mastigobranchia, with podobranchia and arthrobranchia attached; *h*'', arthrobranchial plume (detached); enlarged.
- „ *i*. Second gnathopod with rudimentary mastigobranchia, with podobranchia attached; *i*'', arthrobranchial plume detached, showing the under side; enlarged.
- „ *k*. Coxa of first pereiopod with rudimentary mastigobranchial lash, with the podobranchial plume attached; *k*'', anterior arthrobranchia detached, showing under side; *k*'', posterior arthrobranchia, showing upper surface; *k*'', under surface of the base of the same; enlarged.

Paraxius alius (p. 31).

- Fig. 1. Lateral view; enlarged three times.
,, 1. Rostrum, upper surface.
,, 1d. Siagon or mandible.
,, 1g. Third siagnopod.
,, 1h. First gnathopod.
,, 1i. Second gnathopod (with podobranchia and mastigobranchia detached)
,, 1k. First pereopod.
,, 1l. Second pereopod.
,, 1o. Fifth pereopod (extremity).
,, 1q. Second pleopod (part).
,, 1vzv. Rhipidura; z, telson; r,r, pleopoda.
,, 1br. Branchial plumes.

Eiconaxius acutifrons (p. 40).

- ,, 2♀. Lateral view; enlarged three and a half times.
,, 2♀. Upper surface of rostrum, female.
,, 2♂. Rostrum, male.
,, 2d. Siagon or mandible.
,, 2g. Third siagnopod.
,, 2h. First gnathopod.
,, 2i. Second gnathopod.
,, 2k.l. First pereopod; from the left side.
,, 2q. Third pleopod, with stylamblys and a cincinnulus detached and magnified.

Eiconaxius kermadeci, female (p. 43).

- ,, 3♀. Lateral view of a female specimen; enlarged twice.
,, 3kl. First pereopod; from the left side.
,, 3kr. First pereopod; from the right side.
,, 3l. Second pereopod.

Eiconaxius parvus (p. 44).

- ,, 4. Lateral view of a female specimen; enlarged four times.
,, 5. Brephalos extracted from the ovum, seen from the ventral surface; magnified about thirty times.

PLATE VI.

Thaumastocheles zaleuca, nat. size (p. 47).

- c. Ventral aspect of the cephalon.
- c'. Frontal aspect of the same.
- b. First antenna.
- c. Second antenna.
- h. First gnathopod.
- i. Second gnathopod.
- k'. First pereopod, showing the propodos.
- k''. First pereopod, showing the articulation of the dactylos.
- k'''. First pereopod, showing the articulation of the ischium with the basis.
- n. Fourth pereopod; terminal joints.
- o. Fifth pereopod; terminal joints.
- p. First pleopod.
- q. Second pleopod.

PLATE VII.

Thaumastocheles zaleuca (p. 47).

- Fig. 1. Pereion ; lateral view, with part of carapace removed to show the arrangement of the branchiæ.
- „ 1br. Diagram of the vertical arrangement of a section of the branchial apparatus.
- „ 1e. First siagnopod.
- „ 1f. Second siagnopod.
- „ 1g. Third siagnopod.
- „ 1h. First gnathopod.

Ibaccus verdi (p. 58).

- „ 2. Dorsal aspect of the pereion with the carapace removed to show the branchiæ; left side with the branchiæ intact, right shown in section.
- „ 2d. Siagones or mandibles ; *ff*, shows the position of the extremities of the second pair of siagnopoda.
- „ 2e. First pair of siagnopoda.
- „ 2f. Second pair of siagnopoda.
- „ 2g. Third pair of siagnopoda.
- „ 2k. First pereiopod ; showing the coxa with mastigobranchia and podobranchia attached.
- „ *plc'*. Upper surface of the pyloric apparatus.
- „ *plc''*. Under surface of the pyloric apparatus.

PLATE VIII.

Ibaccus verdi, nat. size (p. 58).

- ♂ . Male, showing ventral aspect.
- ♀ . Female, showing dorsal aspect.
- c. Cephalon ; dorsal aspect ; *b*, first antennæ ; *c*, second antennæ.
- o* ♂ . Fifth pereopod of the male.
- o* ♀ . Fifth pereopod of the female.
- p* ♂ . First pleopod of the male.
- p* ♀ . First pleopod of the female.
- q* ♂ . Second pleopod of the male.
- q* ♀ . Second pleopod of the female.

PLATE IX.

Ibaccus brevipes. (p. 62).

- Fig. 1. Dorsal aspect of the animal, male; nat. size.
,, 1*q*. Second somite of pleon.
,, 1*q*. Second pleopod.

Ibaccus alticrenatus (p. 63).

- ,, 2*♀*. Dorsal view of a female; nat. size.

Arctus sordidus (p. 66).

- ,, 3. Dorsal view of a female; nat. size.
,, 3''. One side of the ventral aspect of pereion; enlarged.
,, 3*q* ♂. Second pleopod of the male.
,, 3*q* ♀. Second pleopod of the female.
,, 3*r* ♂. Third pleopod of the male.
,, 3*r* ♀. Third pleopod of the female.

Arctus orientalis (p. 68).

- ,, 4. Dorsal view of the female; nat. size.
,, 4''. One side of the ventral aspect of pereion; enlarged.
,, 4*o* ♂. Extremity of posterior pereopod of the male.
,, 4*o* ♀. Extremity of posterior pereopod of the female.

PLATE X.

Arctus tuberculatus (p. 70).

- Fig. 1. Lateral view ; natural size.
,, 2. Dorsal view ; enlarged three times.
,, 1♂. Fifth pair of pereopoda of the male.
,, 1♀. Fifth pair of pereopoda of the female.

Arctus immaturus (p. 71).

- ,, 3. Dorsal aspect of a specimen ; enlarged four times.
,, 3''. Ventral aspect of pereion.

Arctus pygmæus (p. 73).

- ,, 4♀. Dorsal aspect of a female; enlarged four and a half times.
,, 4c. Second antenna.
,, 4q. Third pleopod and stylamblys; the latter detached and magnified.
,, 4v. Brephalos; extracted from the ovum.

PLATE XA.

Panulirus guttatus, var., nat. size (p. 78).

c. Part of second antenna, showing the stridulating organ.

PLATE XI.

Palinostus lalandii (p. 86).

(*Palinurus lalandii* on Plate.)

Fig 1. A young specimen ; twice the natural size.

„ 1*q*. Second pleopod.

Panulirus angulatus (p. 81).

„ 2. Ventral aspect of a young and imperfect specimen ; enlarged two and a half times.

„ 2*q*. Second pleopod.

„ 3. Dorsal aspect.

„ 4. Lateral aspect.

PLATE XIa.

Palinostus lalandii, nat. size (p. 86).

PLATE XII.

Palinostus lalandii (p. 86).

(*Palinurus lalandii* on Plate.)

- fig. 1. Lateral view, with part of the carapace removed to show the arrangement of the branchiæ.
- „ 1*h*. First gnathopod.
- „ 1*i*. Second gnathopod.

Panulirus penicillatus (p. 82).

- „ 2. Lateral view of pereion, with part of the carapace removed to show the arrangement of the branchiæ ; slightly enlarged.
- „ 2*h*. First gnathopod.
- „ 2*i*. Second gnathopod.

PLATE XIIA.

PALINURIDÆ—Development.

- Fig. 1. Brephalos of *Palinurus vulgaris*, extracted from the ovum; magnified twenty-five times (p. 89).
- „ 2. Brephalos of a *Palinurus* (?), taken off Samboangan; magnified twenty-eight times (p. 90).
- „ 3. Phyllosoma of a *Panulirus* (?), taken off the Celebes Islands; magnified nine times (p. 91).
- „ 4. Cephalon of fig. 2; *a, a*, bases of ophthalmopoda; *b, b*, bases of first pair of antennæ; *c, c*, bases of second pair of antennæ.

PLATE XIIb.

PALINURIDÆ—Development (p. 89).

- Fig. 1. Phyllosoma of a *Panulirus* (?), taken off the Fiji Islands; magnified seven times (p. 91).
- „ 2. Pleon of the same; *v*, posterior pleopod.
- „ 3. Nervous system of a Phyllosoma of *Panulirus* (?) (p. 91).
- a, a*. Ophthalmopoda.
 - b, b*. First antennæ.
 - c, c*. Second antennæ.
 - c'*. The phymacerite.
 - g, g*. Green gland (*3gg*, shows structure enlarged).
 - d*. Mandibles.
 - e*. First pair of siagnopoda.
 - Hp*. Hepatic ducts.
 - F-H*. Ganglia of thorax.
 - K-O*. Ganglia of pereion.
 - o, o*. Posterior pair of pereiopoda.
 - P-T*. Ganglia of pleon.
 - v*. Sixth somite of pleon.
 - z, v*. Rhipidura.

SCYLLARIDÆ—Development (p. 95).

- „ *4b*. Second antenna of a Phyllosoma of one of the Scyllaridæ (p. 96).
- „ *4e*. First siagnopod.
- „ *4f*. Second siagnopod.
- „ *4g*. First gnathopod (?).
- „ *4h*. Second gnathopod (?).
- „ *4q*. Podobranchia and mastigobranchia of pereiopod; not yet escaped from the embryonic sac.

PLATE XIIc.

PALINURIDÆ and SCYLLARIDÆ—Development (p. 95).

Fig. 1. Phyllosoma of *Panulirus* (?), from the West Indies; enlarged three times (pp. 94, 97).

„ 2. Phyllosoma of one of the Scyllaridæ; enlarged eight times (p. 96).

PLATE XIIb.

SCYLLARIDÆ—Development.

- Fig. 1. *Phyllosoma furcicaudatum*. Young of one of the Scyllaridæ; enlarged fifteen times (p. 98).
- „ 2f. Second siagnopod of *Phyllosoma verdense*; enlarged (p. 98).
- „ 2z. Telson of the same.
- „ 3p. Pleon of *Phyllosoma philippinense*; z, telson; m, posterior pair of pereopoda (p. 99).

PLATE XIIE.

Eryoneicus cæcus (p. 122).

Fig. 1. Dorsal aspect ; enlarged five and a half times.

„ 2. Ventral aspect ; enlarged seven times.

b. First antenna.

c. Second antenna.

k. First pereiopod.

l. Second pereiopod.

m. Third pereiopod.

n. Fourth pereiopod.

o. Fifth pereiopod.

p. Pleon.

p. First pleopod.

z. Telson.

br. Branchial plume.

PLATE XIII.

Polycheles crucifera (p. 127).

Fig. 1. Dorsal aspect ; enlarged two and a half times.

- c. Anterior portion of the dorsal surface of the cephalon ; considerably enlarged, showing both pairs of antennæ (*b*, *c*), and the ophthalmopoda.
- p. Pleon ; lateral view.
- α. Ophthalmopod seen from the front when the antennæ, *b* and *c*, are removed.
- b. First antenna, the peduncle, viewed laterally.
- i. Second gnathopod.
- o. Terminal joints of the posterior pair of pereopoda.
- p. First pleopod of male.
- q. Second pleopod with two stylamblydes of male.

PLATE XIV.

Polycheles baccata (p. 131).

- Fig. 1. Dorsal view of male; enlarged one-fourth.
- „ 1 α . Anterior portion of cephalon, showing α , ocular notch; b , first antenna; c , second antenna.
 - „ 1 β . Pleon; lateral view.
 - „ 1 α , ♀. Posterior pereopod of female.
 - „ 1 β , ♂. Posterior pair of pereopoda of male; pp , first pair of pleopoda of same.
 - „ 1 p , ♀. First pleopod of female.
 - „ 1 q , ♂. Second pleopod of male, with two stylamblydes.
 - „ 1 q , ♀. Second pleopod of female, with one stylamblys.

Polycheles helleri (p. 138).

- „ 2. Dorsal view; enlarged three times.
- „ 2 α . Anterior portion of cephalon, showing α , ocular notch; b , first antenna; c , second antenna.
- „ 2 β . Pleon; lateral view.
- „ 2 α , ♂. Posterior pereopod of male.
- „ 2 p , ♂. First pleopod of male.

PLATE XV.

Polycheles helleri (p. 138).

(*Pentacheles helleri* on Plate.)

- Fig. 1. Anterior portion of the dorsal surface of the cephalon, showing the ophthalmopoda and both pairs of antennæ (*b*, *c*).

Pentacheles obscura (p. 143).

- „ 2, ♀. Dorsal aspect of the female; enlarged twice.
„ 2P. Pleon; lateral view.
„ 2o, ♀. Posterior pereopod, chelate in female.

Stereomastis suhmi (p. 154).

(*Pentacheles suhmi* on Plate.)

- „ 3c. Dorsal view of the animal, male; enlarged twice.
„ 3c. Lateral half of the anterior dorsal portion of cephalon, showing ocular notch, ophthalmopod (*a*), and first antenna (*b*).
„ 3c. First antenna.
„ 3o, ♂. Posterior pereopod of male, showing elongation of the vas deferens.
„ 4. Lateral view of the same animal.

Pentacheles lævis (p. 144).

- „ 4c. Anterior portion of cephalon; dorsal surface, showing ocular notch with ophthalmopod.
„ 5 ♀. Dorsal view of female; enlarged twice.
„ 5P. Pleon; lateral view.
„ 5o, ♀. Posterior pair of pleopoda in female.

PLATE XVI.

Pentacheles gracilis (p. 146).

Fig. 1, ♀. Dorsal view of the female; enlarged one and three-quarter times.

- „ 1c. Part of the anterior portion of the cephalon; enlarged, showing the ocular notch (α), with the position of the ophthalmopod traced beneath; first antenna (b); second antenna (c).
- „ 1o. Posterior pair of pereopoda of female.
- „ 2. Lateral view of the same animal.

Stereomastis auriculata (p. 159).

(*Pentacheles auriculata* on Plate.)

- „ 3, ♀. Dorsal view of the female.
- „ 3c. Anterior portion of the dorsal surface of the cephalon, showing the ocular notch with the ophthalmopod (α).
- „ 3c''. Anterior portion of the cephalon, showing the lateral and under view, ophthalmopod (α), and second antenna (c).
- „ 3o. Chela of posterior pereopod; female.
- „ 3q. Second pair of pleopoda.
- „ 4. Lateral view of the same animal.

PLATE XVII.

Pentacheles euthrix, female; enlarged one and three-quarter times (p. 149).

(*Pentacheles euthrix* on Plate).

- c. Cephalon, showing ophthalmopoda (α, α); first pair of antennæ (b, b); second pair of antennæ (c, c).
- c'. Cephalon, one side of frontal aspect; α , ophthalmopoda; b, c , antennæ removed.
- c''. Cephalon, under surface, showing ophthalmopod (α); first antenna (b); second antenna (c); phymacerite (op).
 - c. Second antenna; op , phymacerite.
 - c'. Fifth pereopod, under surface of terminal chela.
 - c''. Fifth pereopod, upper surface of terminal chela.
 - p. Pleon; lateral view.
 - p, ♀. First pleopod.
 - q. Second pleopod.

PLATE XVIII.

Willemasia leptodactyla; enlarged one and a half times (p. 163).

- p. Pleon; lateral view.
- d. Siagon or mandible; from the inside.
- e. First siagnopod or first maxilla.
- f. Second siagnopod or second maxilla.
- g. Third siagnopod or maxilliped.
- h. First gnathopod.
- i. Second gnathopod.
- k. Coxa and basis of first pereopod, showing mastigobranchial lash and podobranchial plume.
- k". Chela of first pereopod.
- k"". Podobranchia; enlarged.
- k"". Series of small plates on the inner margins of pollex and dactylos.

PLATE XIX.

Willemæsia leptodactyla (p. 163).

- c. Cephalon, dorsal aspect. Large variety; enlarged (p. 169).
- c''. Cephalon, dorsal aspect. Type specimen.
- c'''. Inferior aspect of the anterior extremity of cephalon, showing first and second pairs of antennæ, siagon, third pair of siagnopoda, and first pair of gnathopoda, all in position.
- c'''. Metope or facial region, showing ophthalmopoda (*a,a*), position of first pair of antennæ (*b,b*), position of second pair of antennæ (*c,c*).
- b. Coxa of first antenna with ophthalmopod (*a*), in position.
- b. The same enlarged, having upper surface partially removed to show the internal structure of the auditory apparatus (*ac*).
- c. Second antenna; view from the upper surface, showing the reversed position of the extremity of the phymacerite (*ot*).
- o. Posterior pair of pereopoda of male, showing the foramen in the coxa for the passage of the vas deferens.
- p, ♂. First pleopod of male, in relative position.
- q, ♂. Second pleopod of male, showing two stylamblydes.
- q, ♀. Second pleopod in female, showing one stylamblys.
- p. Pleon; lateral view.
- plc. Internal dental apparatus at the pyloric extremity of stomach.

PLATE XX.

Willemæsia leptodactyla (p. 163).

Fig. 1. Pereion, with lateral wall of the carapace removed to show the position and arrangement of the branchiæ.

c. Metope or facial region, showing on one side the relative positions of the ophthalmopod (*a*), and first (*b*) and second antennæ (*c*), from within.

d, d. Siagones or mandibles (the synaphipod should have only two joints).

d'', d''. Metastomata.

ma. Cheiloglossa, as seen between the mandibles.

m. Third pair of pereiopoda with mastigobranchial lash and podobranchial plume.

m'''. One of the hairs and spines from the mastigobranchia; enlarged.

m''. Section of a podobranchial plume.

„ 2. Ovum enlarged, showing advanced condition of the embryo.

PLATE XXI.

Phoberus tenuimanus, nat. size (p. 171).

(*Acanthacaris tenuimana* on Plate.)

- a, a.* Ophthalmopoda.
- c.* Cephalon ; *b*, first antenna, left side ; *c*, second antenna, right side.
- c.* Peduncle of second antenna, seen on the lower side.
- k.* Chela of first pereopod, left side.
- k'.* Mastigobranchial leaf of same with podobranchial plume attached.
- k''.* Section of branchial plume.
- o.* Chela of posterior pereopod.
- p.* First pleopod.
- q.* Second pleopod.
- v, z, v.* Rhipidura ; *z*, telson ; *vv*, posterior pair of pleopoda.

PLATE XXII.

Phoberus tenuimanus (p. 171).

(*Acanthocaris tenuimana* on Plate.)

Pereion, with the lateral wall of the carapace removed to show the natural position and arrangement of the branchiæ; *i*, second gnathopod; *k-o*, pereiopoda.

Section of a set of branchial plumes and mastigobranchiæ; *mb*, mastigobranchiæ; *pdb*, podobranchia; *arb*, *arth*, anterior and posterior arthrobranchiæ; *plbr*, pleurobranchia. Above this figure are seen portions of the anterior and posterior arthrobranchia, showing their approximation, *in situ*.

- d*. Siagon (or mandible); from the inside.
- e*. First siagnopod.
- f*. Second siagnopod.
- g*. Third siagnopod.
- h*. First gnathopod, with basecphysis, mastigobranchial plate and podobranchial plume.
- i*. Second gnathopod, with basecphysis, mastigobranchial plate, and podobranchial plume.

PLATE XXIII.

Nephropsis rosea (p. 178).

- Fig. 1. Lateral view of a specimen ; enlarged one and a half times.
„ 2. Dorsal view.
„ 1e. First siagnopod.
„ 1f. Second siagnopod.
„ 1g. Third siagnopod.
„ 1h. First gnathopod ; one of the apical spines enlarged.
„ 1i. Second gnathopod.

Nephropsis suhmi (p. 181).

- „ 3. Lateral view of the specimen ; enlarged one and a half times.
„ 3e. First siagnopod.

PLATE XXIV.

Nephropsis rosea (p. 178).

Fig. 1. Ventral view ; enlarged.

- b.* First antenna.
- c.* Peduncle of the second antenna, showing the phymacerite and diagram of its extremity.
- d.* Siagon or mandible ; seen from within.
- m.* Coxa of the third pereopod, having the mastigobranchia with the podobranchial plume attached.
- p.* First pleopod, probably of male.
- q.* Second pleopod, with stylamblys.
- v.z.v.* Rhipidura ; *z*, telson ; *v,v*, posterior pair of pleopoda.

Nephropsis suhmi (p. 181).

„ *2v.z.v.* Rhipidura ; *z*, telson ; *v,v*, posterior pair of pleopoda.

PLATE XXV.

Nephrops thomsoni, nat. size (p. 185).

Fig. 1, ♂. Dorso-lateral view of the male.

„ 2, ♀. Dorso-lateral view of the female.

„ 3, *v.z.v.* Rhipidura; *w*, sixth pair of pleopoda; *z*, telson.

PLATE XXVI.

Nephrops thomsoni (p. 185).

Fig. 1. Carapace, with the lateral wall removed to show the branchiæ.

- d.* Siagon.
- e.* First siagnopod (basal plate probably wanting).
- f.* Second siagnopod.
- g.* Third siagnopod.
- h.* First gnathopod.
- i.* Second gnathopod.
- i''.* Mastigobranchia with podobranchial plume of same.
- i'''.* Section of the plume.
- o''.* Apex of the posterior pleurobranchial plume.
- p, ♂.* First pleopod of male, exhibiting *cincinnuli*.
- q.* Second pleopod with stylamblys.

PLATE XXVII.

Astacopsis paramattensis (p. 202).

- Fig. 1. Dorso-lateral view, natural size.
- „ 1e. First siagnopod; 1, 2, 3, 4, homologues of the four respective joints of the typical limb—coxa, basis, ischium, and meros; spines and hairs enlarged.
- „ 1f. Second siagnopod, figures as before.
- „ 1g. Third siagnopod, figures as before; *ec*, basecephysis.
- „ 1h. First gnathopod, figures as above; 5 carpos, 6 propodos, 7 dactylos; *pb*, podobranchial plume; *arb*, arthrobranchial plume; *ec*, ecphysis.
- „ 1i. Second gnathopod, figures as before; *pb*, podobranchia; *arb*, arthrobranchia.
- „ 1m''. Podobranchia of third pereopod attached to the mastigobranchial plate.
- „ 1m'''. Section of the mastigobranchial plate and podobranchia of third pereopod, with hairs from the surface of the former; magnified.

Astacopsis sydneyensis (p. 204).

- „ 2. Dorsal view of the specimen; enlarged twice.

PLATE XXVIII.

Astacopsis spinifer (p. 194).

The lateral wall of the carapace has been removed to show the branchial arrangement ; podobranchiæ removed to show the plan of the branchiæ beneath ; arthrobranchiæ removed from the first two pairs of pereopoda to show their position and that of the pleurobranchiæ.

- k.* First pair of pereopoda.
 - pdb.* Podobranchiæ.
 - arb.* Arthrobranchiæ.
 - plb.* Pleurobranchiæ.
 - mt.* Movable appendages, probably the rudiments of the foliaceous appendages that form the ventral incubatory pouch in certain genera.
 - d.* Siagon or mandible ; 1 coxa, 2 basis, 3 terminal joint.
 - e.* First siagnopod ; 1 coxa, 2 basis, 3 ischium, 4 terminal joint.
 - f.* Second siagnopod ; 1 coxa, which carries the mastigobranchial plate ; other numerals as before.
 - g.* Third siagnopod ; numerals as before ; *ec*, a multiarticulate ephysis of the basis.
 - h.* First gnathopod ; 1, 2, 3, as before ; 4 meros, 5 carpos, 6 propodos.
 - i.* Second gnathopod ; numerals as before ; *ec*, ephysis ; *pdb*, podobranchia.
 - pdbr.* Podobranchia.
 - arb.a.* Anterior arthrobranchia.
 - arb.p.* Posterior arthrobranchia.
 - plbr.* Pleurobranchia.
- } Arranged in a diagrammatic section.

PLATE XXIX.

Spongicola venusta (p. 213).

- Fig. 1, ♀. Lateral view (length, 25 mm.); enlarged four times.
- „ 2*v*. Brepalos, in Zoea form (p. 216).
- „ 3*c*. Cephalon. The lateral wall of carapace removed to show branchiæ in position.
- „ *e*. First siagnopod.
- „ *f*. Second siagnopod.
- „ *g*. Third siagnopod.
- „ *h*. First gnathopod.
- „ *i*. Second gnathopod.
- „ *i*''. Coxa, basis, and part of ischium of the same enlarged; *ec*, rudimentary basec-
physis; *mb*, rudimentary mastigobranchia; *arthb*, arthrobranchia.
- „ *i*. Branchiæ of same; *mb*, mastigobranchiæ; *a,p*, anterior and posterior arthro-
branchiæ; *pl*, pleurobranchia; *pdb*, podobranchia.
- „ *k*. Branchiæ of first pereopod, letters as before.
- „ *l*. Branchiæ of second pereopod, letters as before.
- „ *m*. Branchiæ of third pereopod, letters as before.
- „ *n*. Branchiæ of fourth pereopod, letters as before.
- „ *o, pl*. Pleurobranchia of the fifth pereopod.
- „ *v, z, v*. Rhipidura; *v,v*, sixth pair of pleopoda; *z*, telson.

PLATE XXX.

Stenopus hispidus, female (length, 45 mm.); enlarged twice (p. 211).

- e* First siagnopod.
- f.* Second siagnopod.
- g.* Third siagnopod.
- h.* First gnathopod.
- i.* Basal part of second gnathopod; enlarged, showing basecephysis, mastigobranchia, and arthrobranchial plume.
- p.* First pleopod.
- q.* Second pleopod.
- h-o.* Diagrammatic plan of the branchial arrangement and proportions.

PLATE XXXI.

Penæus canaliculatus, var. *japonicus* (p. 245).

- a. Ophthalmopod.
- b. First antenna.
- c. Second antenna.
- d. Mandible or siagon.
- e. First siagnopod or first maxilla.
- f. Second siagnopod or second maxilla.
- g. Third siagnopod or first maxillipede.
- h. First gnathopod.
- i. Second gnathopod.
- i, ec. Section of the basecephysis of same.

PLATE XXXII.

Penæus canaliculatus (p. 243).

- Fig. 1, ♂. Male specimen; lateral view, enlarged twice.
,, 1'', ♂. Ventral surface, showing first pair of pleopoda, with petasma.
,, 2, ♀. Female specimen; lateral view.
,, 2'', ♀. Ventral surface of female, showing thelycum.

Penæus canaliculatus, var. *australiensis* (p. 248).

- ,, 3, ♀. Female specimen.
,, 3'', ♀. Ventral surface of female.

Penæus canaliculatus, var. *japonicus* (p. 247).

- ,, 4, ♀. Ventral surface of female, showing thelycum.

PLATE XXXIII.

Penæus velutinus (p. 253).

- Fig. 1. Lateral view, enlarged twice.
„ 1". Ventral aspect of male; *p, p*, first pair of pleopoda, with petasma attached.
„ 1"". Ventral aspect of female; *p, p*, first pair of pleopoda.
„ 1z. Telson.

Penæus indicus (p. 248).

- „ 2. Lateral view of male.
„ 2, *p, p*. First pair of pleopoda detached, with petasma connected.
„ 2*v, z, v*. Rhipidura; *z*, telson; *v, v*, sixth pair of pleopoda.

PLATE XXXIV.

Penæus monodon (p. 250).

Fig. 1. Lateral view.

„ 1'', ♂. Ventral surface of male, showing petasma.

„ 1''', ♀. Ventral surface of female, showing thelycum.

Penæus incisipes (p. 257).

„ 2, ♂. Lateral view of male.

„ 2'', ♂. Ventral surface of male, showing petasma.

„ 2''', ♀. Ventral surface of female, showing thelycum.

PLATE XXXV.

Penæus anchoralis (p. 258).

Fig. 1. Lateral view, enlarged twice.

- „ 1". Ventral aspect of male, with the first pair of pleopoda and petasma attached.
- „ 1"". Ventral aspect of female, showing thelycum.
- „ 1z. Telson.

Penæus philippinensis (p. 261).

- „ 2. Female specimen.
- „ 2". Ventral aspect of female, with first pair of pleopoda thrown back.
- „ 3. Male specimen.
- „ 3". Ventral aspect of male, with first pair of pleopoda and petasma attached.

PLATE XXXVI.

Penæus fissurus (p. 263).

- Fig. 1. Female specimen.
„ 1". Ventral aspect of female, showing thelycum.
„ 1*p.* First pleopod, detached.
„ 1*z.* Telson.

Penæus rectacutus (p. 266).

- „ 2. Female specimen.
„ 2". Ventral aspect of female, showing thelycum.
„ 2*p.* First pleopod, detached.
„ 2*z,v.* Rhipidura, seen laterally ; *z*, telson ; *v*, sixth pleopod.

PLATE XXXVII.

Penæus serratus (p. 268).

- Fig. 1. Lateral view.
- „ 1a. Ophthalmopod.
- „ 1b. First antenna.
- „ 1'', ♂. Ventral aspect of male, with first and second pairs of pleopoda attached and thrown back, with petasma attached to former.
- „ 1g. Part of second pair of pleopoda, detached.
- „ 1''', ♀. Ventral aspect of female.
- „ 1z. Telson.
- „ 1br. Branch of branchial plume, and secondary branch; detached.

Penæus canaliculatus, var. *japonicus* (p. 245).

- „ 2br. Branch of branchial plume, and secondary branch; detached.

Hemipenæus speciosus (p. 303).

- „ 3br. Branch of branchial plume, and secondary branch; detached.

PLATE XXXVIII.

Philonicus pectinatus, male (p. 279).

Fig. *o, o*. Posterior pair of pereopoda ; basal portion ; *p, p.*, first pair of pleopoda, with petasma expanded and united in the median line.

z. Telson.

br. Branchial plume ; seen in section.

br''. Secondary branch of same ; taken from the base.

br'''. Secondary branch of same ; taken from the apex.

mb. Mastigobranchia.

PLATE XXXIX.

Philonicus mülleri (p. 275).

Fig. 1. Female specimen.

„ 1". Ventral aspect of female ; *p, p*, first pair of pleopoda.

„ 2. Male specimen.

„ 2". First pair of pleopoda of male, with petasma folded and attached.

br. Primary branch of branchial plume.

br'. Secondary branch of branchial plume.

PLATE XL.

Artemesia longinaris (p. 281).

Fig. 1. Lateral view.

„ 2, ♀. Ventral aspect of female.

d. Mandible or siagon.

e. First maxilla or first siagnopod.

f. Second maxilla or second siagnopod.

g. First maxillipede or third siagnopod.

h. First gnathopod.

i. Second gnathopod.

p, p. First pair of pleopoda of male, with petasma attached.

br. Branchial plume.

PLATE XLI.

Haliporus equalis (p. 285).

Fig. 1. Lateral view.

- „ 1'', ♂. Ventral aspect of male. First pair of pleopoda, with petasma attached and thrown back.
- „ 1''', ♀. Ventral aspect of female, showing thelycum.
- br.* Branchiæ, seen in position.
- br''.* Last three somites of the pleon; the arthrobranchiæ of the third and fourth pairs of pereopoda removed, to show the peculiar ducts that connect the pleurobranchiæ with their somites; *mb*, mastigobranchia of the third and fourth somites.

Haliporus obliquirostris (p. 286).

- „ 2. Lateral aspect.
- „ 2'', ♀. Ventral aspect of female.

PLATE XLII.

Haliporus curvirostris (p. 288).

Fig. 1. Lateral view.

Haliporus lævis (p. 289).

„ 2. Lateral view.

Haliporus neptunus (p. 291).

„ 3. Lateral view.

„ 3'' ♂. Ventral aspect of male. First pair of pleopoda with petasma, thrown forwards; second pair, directed backwards.

„ 3''' ♀. Ventral surface of pereion of female, showing thelycum.

Philonicus lucasii (p. 277).

„ 4. Lateral aspect.

PLATE XLIII.

Sicyonia sculpta (p. 294).

- Fig. 1. Lateral view of female ; enlarged two and a half times.
„ 1". Rostrum.
„ 1z. Telson.

Sicyonia carinata (p. 294).

- „ 2. Lateral view of male ; enlarged twice.
„ 3. Dorsal view of same ; enlarged twice.
„ 3b. First antenna.
„ 3c'. Second antenna, base of scaphocerite ; under surface.
„ 3c''. Second antenna, base of scaphocerite ; upper surface.
„ 3c'''. Second antenna ; margin of scaphocerite.
„ 3br. Branchiæ ; extremity of plumes, showing structure.
„ 3q. Second pleopod.

Sicyonia lancifer (p. 297).

- „ 4. Lateral view of female ; enlarged two and a quarter times.
„ 4", ♀. Ventral aspect of pereion of female, showing thelycum.
„ 4z. Telson.

Sicyonia lævis (p. 298).

- „ 5. Lateral view of female ; enlarged two and a half times.

PLATE XLIV.

Hemipenæus spinidorsalis (p. 301).

Fig. 1. Lateral view; one-half enlarged.

„ 1". Branchiæ, seen in position.

„ 1"". Mastigobranchia, with podobranchial plume attached.

Hemipenæus gracilis (p. 302).

„ 2. Lateral view; one-half enlarged.

Hemipenæus speciosus (p. 303).

„ 3. Lateral view.

Hemipenæus virilis (p. 303).

„ 4. Lateral view.

PLATE XLV.

Aristeus armatus (p. 312).

Fig. 1. Lateral aspect of male.

„ 2. Ventral aspect of another specimen.

p. First pleopod.

q. Second pleopod.

r. Third pleopod.

PLATE XLVI.

Aristeus armatus (p. 312).

- d.* Mandible or siagon.
- ma.* Metastomata.
- e.* First maxilla or first siagnopod.
- f.* Second maxilla or second siagnopod.
- g.* Maxillipede or third siagnopod.
- br.* Branchial plume, seen in section.
- br''.* Secondary branch of branchial plume.

Fig. 1. *Aristeus?* (young) (p. 240).

PLATE XLVII.

PENÆIDÆ (Development).

- Fig. 1. *Aristeus* (?), in Megalopa stage (p. 241).
,, 1*k*. First pair of pereopoda.
,, 2. *Aristeus* (?), younger Megalopa stage (p. 239).
,, 2*v*. Fifth somite and rhipidura.
,, 3. *Aristeus* (?), older Megalopa stage (p. 238).
,, 3*b*. First antenna.
,, 3*d*. Mandible, showing attachment of muscles.
,, 3*k*. First pereopod.

PLATE XLIX.

Hemipenæus semidentatus (p. 305).

- Fig. 1. Lateral view of female.
,, 1br. Branch of branchial plume.

Hemipenæus tomentosus (p. 307).

- ,, 2, ♀. Ventral aspect of female, showing hollow between pereopoda.
,, 3, ♀. The same hollow part, containing a gelatinous mass; from another specimen.
,, 3". Section of the inferior portion of the wall of the carapace overlying the branchial chamber.

PLATE XLIX.

Hemipenæus semidentatus (p. 305).

Lateral view of female.

br. Branch of branchial plume.

Hemipenæus tomentosus (p. 307).

♀. Ventral aspect of female, showing hollow between pereopoda.

♀. The same hollow part, containing a gelatinous mass; from another specimen.

' . Section of the inferior portion of the wall of the carapace overlying the branchial chamber.

PLATE L.

Hemipenæus tomentosus (p. 307).

Lateral view of female.

c. Second antenna with scaphocerite (under side); *phc*, phymacerite.

br. Branchial plume in section.

PLATE LI.

Aristeus rostridentatus (p. 317).

Fig. 1. Lateral view of female.

„ 1". Ventral aspect; *p, p*, first pair of pleopoda.

d. Siagon or mandible.

br. Branchial plume in section.

k^s. Spine from the carpos of the first pair of pereopoda.

PLATE LII.

Hepomadus glacialis (p. 321).

Fig. 1. Lateral view of female.

„ 1". Ventral aspect of pereion, showing the thelycum.

ea. Epistoma.

d. Siagon or mandible.

ma. Metastomata.

g. Third siagnopod or first maxillipede.

br. Branchial plume in section.

PLATE LIII.

Peteinura gubernata (p. 324).

Lateral view ; enlarged eight times.

- b. First antenna.
- i. Second gnathopod.
- k. First pereopod.
- l. Second pereopod.

PLATE LIV.

Benthesicymus crenatus (p. 329).

Lateral view.

- a.* Ophthalmopod.
- b.* First antenna ; upper surface.
- b''.* First antenna ; under surface.
- c.* Second antenna.
- c''.* Second antenna ; second joint of peduncle showing the ancecerite and base of the scaphocerite.
- d.* Siagon or mandible, with metastoma, *d''*, in position.
- e.* First siagnopod.
- f.* Second siagnopod.
- g.* Third siagnopod.
- h.* First gnathopod.
- i.* Second gnathopod.

PLATE LV.

Benthescymus crenatus (branchiæ) (p. 329).

- Fig. 1. Pereion, with side of the carapace removed to show the arrangement and position of the branchiæ.
- „ 2. Branchial plume.
- „ 3. Branch of the same ; attached to the central stalk.

PLATE LVI.

Benthesicymus iridescens (p. 335).

Fig. 1. Outer branch of sixth pleopod ; arterial vessels, red ; venous, blue ; nerve-filaments, yellow ; muscles, brown.

„ 2. Ventral nerve-cord of same.

Eucopia australis.

„ 3. Ventral nerve-cord.

Sergestes atlanticus.

„ 4. Arrangement of muscles in the sixth somite of the pleon.

PLATE LVII.

Benthesicymus brasiliensis (p. 332).

Fig. 1. Lateral view.

„ 1br. Section of a branchial plume.

Benthesicymus pleocanthus (p. 334).

„ 2. Lateral view.

„ 2br. Section of branchial plume.

Benthesicymus iridescens (p. 335).

„ 3. Lateral view.

„ 3a. Ophthalmopod.

„ 3a'': Diagrammatic section of eye.

„ 3br. Branch of a branchial plume.

PLATE LVIII.

Benthesicymus altus (p. 336).

- Fig. 1. Lateral view.
,, 1a. Ophthalmopod.
,, 1z. Telson.
,, 1br. Section of branchial plume.

Benthesicymus mollis (p. 339).

- ,, 2. Lateral view.
,, 2z. Telson.
,, 2br. Section of branchial plume.

Gennadas intermedius (p. 343).

- ,, 3. Lateral aspect.
,, 3z. Telson.
,, 3br. Section of branchial plume.

PLATE LIX.

Gennadas parvus, male (p. 340).

- Fig. 1. Lateral view.
- „ 2. Another specimen containing a parasitic (?) worm.
- i.* Second gnathopod ; with dactylos enlarged.
- k.* First pereopod.
- m.* Third pereopod ; with chela enlarged.
- p.p.* Basal joint of first pair of pleopoda showing the petasmata hooked together in the middle by small cincinnuli.
- p''.* Cincinnulus.
- q.* Appendages attached to the second pleopod.
- zv.* Telson and sixth pleopod.
- br.* Section of a branchial plume.

PLATE LX.

Petalidium foliaceum (p. 349).

Fig. 1. Lateral view; enlarged twice.

- „ 2. Oral apparatus; *d,d*, distal joints of the synnhipod of the mandibles; *d'*, epistoma; *d'',d''*, metastoma; *e,e*, first pair of siagnopoda.
 - d*. Siagon or mandible.
 - e*. First siagnopod; detached.
 - f*. Second siagnopod; detached.
 - g*. Third siagnopod; detached.
- „ 3. Branchiæ, shown in position.
- „ 4. A foliaceous branchial plate.

PLATE LXI.

Sergestes—Development.

Elaphocaris Zoea (p. 355).

Fig. 1. Dorsal view ; enlarged thirty-two times.

„ 2z. Telson.

„ 3. Rostrum of another specimen.

Elaphocaris crassus (p. 362).

„ 4. Dorsal view ; enlarged fifty times.

„ 4b. First antenna.

„ 4c. Second antenna.

PLATE LXII.

Sergestes—Development.

Elaphocaris dohrni (pp. 357-360).

Dorsal view ; enlarged fifty-three times.

b. First antenna.

c. Second antenna.

g. Third siagnopod or first maxillipede.

h. First gnathopod.

PLATE LXIII.

Sergestes (?)—Development.

Platysacus crenatus (p. 363).

- Fig. 1. Dorsal view ; enlarged seventy times.
,, 2. Rostrum of carapace and of epistoma.
,, *b*. First antenna.
,, *c*. Second antenna.
,, *i*. Second gnathopod.

PLATE LXIV.

Sergestes—Development.

Acanthosoma brevitelsonis (p. 367).

Fig. 1. Dorsal view; enlarged thirty-five times.

Acanthosoma tynitelsonis (p. 369).

„ 2. Latero-dorsal view; enlarged twenty times.

Acanthosoma longitelsonis (p. 371).

„ 3. Latero-dorsal view; enlarged forty times.

PLATE LXV.

Sergestes—Development.

Acanthosoma dorsispinalis (370).

Fig. 1. Lateral view; enlarged twenty-five times.

*Acanthosoma lævirostratis*¹ (p. 374).

„ 2. Lateral view; enlarged twenty-eight times.

Mastigopus dorsispinalis (p. 375).

„ 3. Lateral view; enlarged twenty times.

„ *i.k.l.* Branchiæ attached to the second gnathopod, and first and second pereopoda.

Mastigopus tenuis (p. 428).

„ 4. Lateral view; enlarged twenty times.

„ 4*b.* Base of peduncle of first antenna, with otolith.

„ 4*c.* Second antenna.

„ 4*l.* Third pereopod; extremity.

¹ *Habitat*.—North of Admiralty Islands, between Stations 221 and 222. Associated with *Acanthosoma dorsispinalis* and *Mastigopus dorsispinalis*. Length, 3 mm. (0.12 in.).

PLATE LXVI.

Sergestes—Development.

Acanthosoma macrotelsonis (p. 373).

Fig. 1. Dorsal view; enlarged forty times.

Mastigopus suhmi (p. 378).

„ 2. Dorsal view; enlarged twenty-five times.

Sergestes semiarmis (p. 423).

- Fig. 1. Lateral view ; enlarged eight times.
,, 1i. Second gnathopod ; distal extremity.
,, 1l. Second pereopod ; chela.
,, 1m. Third pereopod ; chela.

Sergestes semiarmis, var. (p. 424).

- ,, 2c. Second antenna ; scaphocerite.
,, 2k. First pereopod ; distal extremity.
,, 2l. Second pereopod ; chela.
,, 2n, o. Fourth and fifth pereopoda.
,, 2z. Telson.

Sergestes laeviventralis (p. 425).

- ,, 3. Lateral view ; enlarged thirteen times.
,, 3l. Second pereopod ; chela.
,, 3n, o. Fourth and fifth pereopoda.

Mastigopus spiniventralis (p. 379).

- ,, 4. Lateral view ; enlarged twelve times.
,, 4z. Telson.

Sergestes spiniventralis (p. 426).

- ,, 5a. Ophthalmopod and rostrum.
,, 5l. Second pereopod ; chela.
,, 5v. Sixth pleopod ; outer branch.

Sergestes spiniventralis,¹ var.

- ,, 6a. Ophthalmopod ; b, first antenna ; c, second antenna.
,, 6n, o. Fourth and fifth pereopoda.

¹ *Habitat*.—West Pacific.

PLATE LXVIII.

Sergestes atlanticus, male (p. 389).

Lateral view; enlarged twice.

b ♂. First antenna of male.

b ♀. First antenna of female; flagella.

c. Second antenna; scaphocerite and terminal joints of peduncle.

d. Mandible.

e. First siagnopod.

f. Second siagnopod

g. Third siagnopod.

PLATE LXIX.

Sergestes atlanticus (p. 393).

- p,p.* First pair of pleopoda of male, with petasmata united in the median line.
- q ♂.* Second pleopod ; appendages attached to the base of the flagella.
- q ♀.* Second pleopod ; appendage attached to the base of the flagella.
- v.* Sixth pleopod.
- z.* Telson.

PLATE LXX.

Sergestes japonicus (p. 387).

Fig. 1. Lateral view ; enlarged twice.

- „ 1*a*, *a*. Ophthalmopoda, and *b*, *b*, first pair of antennæ ; *c*, *c*, scaphocerites in position; dorsal view.
- „ 1*b*. First antenna.
- „ 1*h*. Second gnathopod.
- „ 2. Branchiæ ; seen in natural position.

Sergestes kröyeri (p. 388).

- „ 3. Lateral view ; enlarged twice.
- „ 3*a*. Ophthalmopod in position, with first antenna.
- „ 4. Branchiæ ; in natural position.

PLATE LXXI.

Sergestes prehensilis (p. 385).

Fig. 1. Lateral view ; enlarged twice.

a. Ophthalmopod

b. First antenna.

d. Mandible or siagon.

e. First siagnopod.

f. Second siagnopod.

g. Third siagnopod.

k. First pereopod ; showing the prehensile character of the ultimate articulation.

P. Pereion detached, with gnathopoda *h, i*, and pereopoda *k, l, m, n, o*, connected, the larger branchial plumes removed to show the position of their attachment to the somite and the rudimentary form of the pleurobranchia.

PLATE LXXII.

Sergestes dorsispinalis (p. 394).

- Fig. 1. Lateral view ; enlarged fifteen times.
,, 1c. Second antenna ; otolith.

Sergestes nasidentatus (p. 398).

- ,, 2. Lateral aspect ; enlarged twelve times.
,, 2k. First pereopod ; ultimate articulation.
,, 2l. Second pereopod ; chela.

Sergestes diapontius (p. 399).

- ,, 3. Lateral view ; enlarged six times.
,, 3i. Second gnathopod ; ultimate joints.
,, 3k. First pereopod ; ultimate articulation.
,, 3l. Second pereopod ; chela.

PLATE LXXIII.

Sergestes armatus (p. 401).

Fig. 1. Lateral aspect ; enlarged nine times.

„ 1*b*. First antenna.

„ 1*z*. Telson.

Sergestes edwardsii (p. 403).

„ 2. Lateral view ; enlarged twelve times

„ 2*c*. Second antenna ; scaphocerite.

„ 2*k*. First pereopod.

„ 2*br*. Branchial plume.

„ 2*br'*. Branch of branchial plume.

Sergestes rinki (p. 404).

„ 3. Lateral view ; enlarged twelve times.

„ 3*z*. Telson.

PLATE LXXIV.

Sergestes oculatus (p. 406).

- Fig. 1. Lateral view ; enlarged twenty times.
,, 1b. First antenna.
,, 1c. Second antenna ; scaphocerite.
,, 1c''. Extremity of scaphocerite.

Sergestes ovatoculus (p. 408).

- ,, 2. Lateral view ; enlarged ten times.
,, 2z. Telson ; extremity.

Sergestes parvidens(p. 409).

- ,, 3. Lateral aspect ; enlarged fifteen times.
,, 3b. First antenna ; flagella.
,, 3c. Second antenna ; extremity of scaphocerite.
,, 3k. First pereiopod ; ultimate articulation.

PLATE LXXV.

Sergestes corniculum (p. 410).

Fig. 1. Lateral view ; enlarged nine times.

„ 1z. Telson.

Sergestes ancylops (p. 413).

„ 2. Lateral view ; enlarged thirty times.

Sergestes longirostris (p. 415).

„ 3. Lateral view ; enlarged fifteen times.

„ 3z. Telson.

PLATE LXXVI.

Sergestes junceus (p. 416).

Fig. 1. Lateral view ; enlarged twenty times.

Sergestes longispinus (p. 417).

- „ 2. Lateral view ; enlarged sixteen times.
- „ 2b. First antenna ; outer flagellum.
- „ 2c. Second antenna ; extremity of scaphocerite.
- „ 2k. First pereopod ; distal joints.

Sergestes penerinkii (p. 418).

- „ 3. Enlarged sixteen times.

Sergestes fermerinkii (p. 419).

- „ 4. Enlarged twenty-three times.

PLATE LXXVII.

Sergestes longicollus (p. 421).

Fig. 1. Lateral view; enlarged ten times.

Sergestes præcollus (p. 423).

„ 2. Lateral aspect; enlarged ten times.

„ 2*m*. Third pereopod; chela.

PLATE LXXVIII.

Sciacaris telsonis (p. 438).

- Fig. 1. Ventro-lateral aspect ; enlarged twenty times.
- „ 1*m*. Third pereopod ; chela.
 - „ 1*p*. First pleopod ; appendage at base of flagellum.
 - „ 1*z*. Telson ; dorsal view.
 - „ 2. Mastigopus stage of same ; enlarged eighteen times (p. 439).
 - „ 2*c*. Second antenna ; extremity of scaphocerite.
 - „ 2*z*. Telson ; dorsal view.
 - „ 3. Acanthosoma stage of same ; enlarged twenty-one times (p. 441).
 - „ 3*z*. Telson ; side view.

PLATE LXXIX.

Development and Structure of *Lucifer* (p. 452).

Fig. 1. Zoea of *Lucifer*; enlarged sixty times.

b. First antenna.

c. Second antenna; *c''*, scaphocerite and one hair magnified.

e. First siagnopod or first maxilla.

f. Second siagnopod or second maxilla.

g. Third siagnopod or maxillipede.

h. First gnathopod.

i. Second gnathopod.

k. First pereopod.

l. Second pereopod.

m. Third pereopod; *m''*, chela of same.

PLATE LXXX.

Lucifer—Structure of male.

Fig. 1. Lateral view, showing vas deferens on left side, containing ripe spermatophore.

„ 2. Lateral view, showing vas deferens on right side.

ptm. Petasma.

c. Cephalon, anterior portion ; showing the convolution of the green gland.

d. Mandible.

m. Third pereopod ; chela.

q. Second pleopod.

PLATE LXXXI.

Organs of generation of *Lucifer* (p. 444).

- Fig. 1 ♀ . Female, showing ovaries with spermatophore inserted into the oviduct; also neural cord and muscular arrangement.
- .. 2 ♀ . Female with ovum approaching extrusion, with spermatophore inserted.
- .. 3 ♂ . Male, showing spermatophore ready for expulsion. Testes in outline.
- .. 4 ♂ . Male, showing testes in position, with spermatophore in outline. Another in the process of formation.

PLATE LXXXII.

Lucifer—Development of male (p. 463).

Figs. 1-4. Males of different ages.

PLATE LXXXIII.

Lucifer typus.

- Fig. 1. Lateral view of male (p. 464). Enlarged twenty-two times.
- „ 2. Lateral view of female (p. 466). Enlarged twenty-two times.
- „ 3. Cephalon, showing ophthalmopod and antennæ; the second pair with the long scaphocerite and styliform phymacerite.
- m.* Terminal extremity or minute chela of the third pair of pereopoda.

PLATE LXXXIV.

Lucifer reynaudii.

- Fig. 1. Lateral view of male (p. 466). Enlarged twenty-two times.
- „ 2. Lateral view of female (p. 467). Enlarged twenty-two times.
- „ 3. Cephalon, showing the cerebral ganglion and the neural branch leading to the second pair of antennæ.
- „ 4. Cephalon, showing the cerebral ganglion and neural cord, also the green gland and its long winding duct connecting it with the second pair of antennæ.
- „ 5. Male, posterior portion of the sixth somite of the pleon, sixth pair of pleopoda and telson, showing the arrangement of the muscles and position of the sixth pleonic gland.
- m.* Chela of the third pair of pereopoda.

PLATE LXXXV.

Acetes indicus (p. 442).

Fig. 1. Lateral view ; enlarged twice.

Lucifer (young) (p. 457).

„ 2. Lateral view.

Zoontocaris galatheæ (p. 474).

„ 3. Dorsal view ; enlarged thirty times.

Zoontocaris approximus (p. 475).

„ 4. Dorsal view ; enlarged twenty-four times.

Sestertius duplicidentis (p. 477).

„ 5. Lateral view ; enlarged eighteen times.

„ 5c. Second antenna.

„ 5g. Third siagnopod.

„ 5h. First gnathopod.

„ 5i. Second gnathopod.

„ 5k-5o. Pereiopoda.

„ 5z. Telson.

PLATE LXXXVI.

Crangon affinis (p. 484).

Fig. 1. Carapace, dorsal view; enlarged twice.

„ 1*b*. First antenna.

„ 1*d*. Mandible; *e*, first siagnopod; *f*, second siagnopod; shown in their natural position.

„ 2. Branchiæ, in natural position.

„ 3. Rhipidura.

Crangon vulgaris (p. 483).

„ 4. Brephalos, lateral view.

„ 4*z*. Telson of same.

Pontocaris propensalata (p. 496).

„ 5. Branchiæ, in natural position.

PLATE LXXXVII.

Pontophilus gracilis (p. 487).

- Fig. 1. Ventral aspect ; enlarged four times.
„ 2. Dorsal view ; enlarged four times.
„ 3. Branchiæ, in natural position ; *br*, section of plume.
p ♂ . First pleopod of male.
p ♀ . First pleopod of female.
q ♂ . Second pleopod of male.
q ♀ . Second pleopod of female.

PLATE LXXXVIII.

Pontophilus profundus (p. 490).

- Fig. 1. Lateral view; enlarged four times.
- „ 1a. Section of the ophthalmus, showing the form of the ocular facets.
- „ 1i. Second gnathopod.
- „ 1k. First pereopod; chela.
- „ 1l. Second pereopod; chela.
- „ 1p ♂. First pleopod of male.
- „ 1z. Telson.

Pontophilus junceus (p. 491).

- „ 2. Lateral view; enlarged twice.
- „ 3. Dorsal view of carapace.
- „ 4. Rhipidura.

Crangon vulgaris (p. 483).

Fig. 1. Structure of the pereionic viscera of the brephalos; *a*, ophthalmus; *b*, first joint of first antenna; *c*, first joint of second antenna; *d*, mandible; *e*, first siagnopod; *f*, second siagnopod; *g*, third siagnopod; *h*, first gnathopod; *i*, second gnathopod; *k*, *l*, *m*, *n*, buds of four successive pereiopoda; *gc*, stomach, the outer double line showing its area when dilated, the inner or convoluted double line showing its contour in rhythmical contraction; *cl*, heart.

„ 1*a*''. Lenses of the ophthalmus, showing the numerical increase during development.

Sabinea septemcarinata (p. 493).

„ 2. Dorsal view; enlarged twice.

Parathanas decorticus (p. 530).

„ 3. Lateral view; enlarged twelve times.

„ 3*c*. Second antenna; scaphocerite as seen within its exuvium.

„ 3*k*-3*n*. First four pairs of pereiopoda within their exuvium.

„ 3*v*. Fifth pleopod; portion of outer branch within its exuvium.

„ 3*v*''. Fifth pleopod; one of the hairs enlarged.

Alpheus (Brephalos) (p. 538).

„ 4. Lateral view. From a specimen of *Alpheus* hatched by Dr. Power.

„ 4*b*. First antenna.

„ 4*c*. Second antenna.

„ 4*z*. Telson.

Latreutes planus (p. 584).

„ 5. Lateral view; enlarged twelve times.

Latreutes unidentatus (p. 586).

„ 6. Lateral view; enlarged twelve times.

PLATE XC.

Sabinea septemcarinata (p. 493).

- Fig. 1. Ventral surface of pereion.
,, 1a. Ophthalmopoda ; *b*, first pair of antennæ.
,, 1l. Second pereiopod.
,, 1p ♂ . First pleopod of male.
,, 1p ♀ . First pleopod of female.
,, 1z. Telson ; *v*, sixth pleopod.

Pontocaris propensalata (p. 496).

- ,, 2. Dorsal view ; enlarged twice.
,, 2b. First antenna.
,, 2c. Second antenna ; part of flagellum enlarged.
,, 2i. Second gnathopod.
,, 2k. First pereiopod.
,, 2k'' . First pereiopod ; chela, enlarged.
,, 2p. First pleopod.
,, 2q. Second pleopod.
,, 3. Ventral surface of pereion ; *k, l, m, n, o*, first to fifth pairs of pereiopoda.

PLATE XCI.

Pontocaris pennata (p. 499).

Fig. 1. Dorsal view; enlarged twice.

„ 2. Ventral aspect; enlarged four times.

d. Mandible; *d'*, upper surface of molar process; *d''*, lower surface of molar process.

g. Third siagnopod.

h. First gnathopod.

i. Second gnathopod.

k. First pereopod; *k''*, anterior margin of the palm.

l. Second pereopod.

m. Third pereopod.

p. First pleopod.

q. Second pleopod.

PLATE XCII.

Glyphocrangon granulosis (p. 507).

- Fig. 1. Dorsal aspect.
„ 2. Lateral view.
„ 3. Oral apparatus.
b ♂ . First antenna of male.
b ♀ . First antenna of female; *b''* ♀, first joint of same showing the acoustic aperture.
c ♀ . Second antenna of female.
d. Mandible.
e. First siagnopod.
f. Second siagnopod.
g. Third siagnopod.
h. First gnathopod.
i. Second gnathopod.
k. First pereopod.
l. Second pereopod.
p ♂ . First pleopod of male; *p''*, margin of inner ramus.
p ♀ . First pleopod of female.
q ♂ . Second pleopod of male.
q ♀ . Second pleopod of female.
„ 4. Brepalos (p. 506).

PLATE XCIII.

Glyphocrangon granulosis (p. 507).

Fig. 1. Branchiæ, in natural position (p. 506).

„ 1br. Section of branchial plume.

Glyphocrangon podager (p. 516).

„ 2. Dorso-lateral view.

„ 2m. Third pereopod ; dactylos.

„ 2o. Fifth pereopod ; dactylos.

Glyphocrangon regalis (p. 517).

„ 3. Dorso-lateral view.

„ 3m. Third pereopod ; dactylos.

„ 3o. Fifth pereopod ; dactylos.

„ 4. Dorso-lateral view of a smooth variety.

„ 4m. Third pereopod ; dactylos.

„ 4o. Fifth pereopod ; dactylos.

Glyphocrangon hastacauda (p. 519).

„ 5. Dorso-lateral view.

„ 5m. Third pereopod ; dactylos.

„ 5o. Fifth pereopod ; dactylos.

PLATE XCIV. ▾

Glyphocrangon aculeata (p. 521).

- Fig. 1. Dorsal view.
,, 1*m*. Third pereopod ; dactylos.
,, 1*o*. Fifth pereopod ; dactylos.
,, 1*gc*. Gastric spines ; *gc'*, one of the spines isolated.

Glyphocrangon acuminata (p. 522).

- ,, 2 ♂ . Lateral view of male.
,, 2*m*. Third pereopod ; dactylos.
,, 2*o*. Fifth pereopod ; dactylos.
,, 3 ♀ . Lateral view of female.
,, 3*m*. Third pereopod ; dactylos.
,, 3*o*. Fifth pereopod ; dactylos.
,, 3*p* ♂ . First pleopod of male.
,, 3*p* ♀ . First pleopod of female ; ova attached.

Glyphocrangon rimapes (p. 523).

- ,, 4. Dorso-lateral view.
,, 4*m*. Third pereopod ; dactylos.
,, 4*o*. Fifth pereopod ; dactylos.

PLATE XCV.

Nika processa (p. 527).

Fig. 1. Lateral view ; enlarged three and a half times.

b. First antenna.

c. Second antenna, scaphocerite.

d. Mandible.

e. First siagnopod.

f. Second siagnopod.

g. Third siagnopod.

h. First gnathopod.

i. Second gnathopod.

l. Second pereopod of right side.

ov. Oyum.

PLATE XCVI.

Athanas veloculus (p. 529).

Fig. 1. Lateral view ; enlarged fifteen times.

Cheirothrix parvimanus (p. 533).

- „ 2. Lateral view ; enlarged six times.
- „ 2*a*, *a*. Ophthalmopoda.
- „ 2*b*. First antenna.
- „ 2*c*. Second antenna.
- „ 2*h*. First gnathopod.
- „ 2*i*. Second gnathopod.
- „ 2*l*. Second pereopod.
- „ 2*l*'. Second pereopod ; enlarged.
- „ 2*l*"". Second pereopod ; chela, more enlarged.
- „ 2*l*"". Second pereopod ; one hair, magnified.

PLATE XCVII.

Alpheus edwardsii (p. 542).

- Fig. 1. Lateral view ; enlarged three times.
,, 1*d*. Mandible.
,, 1*h*. First gnathopod.
,, 1*i*. Second gnathopod.
,, 1*k*. First pereopod ; larger chela.
,, 1*m*. Third pereopod ; terminal joints.
,, 1*mb*. Mastigobranchia.

Alpheus acuto-femoratus (p. 545).

- ,, 2. Lateral view ; enlarged three times.
,, 2*k*. First pereopod ; larger chela.

Alpheus cristidigitus (p. 546).

- ,, 3. Lateral view ; enlarged four times.
,, 3*k*. First pereopod ; smaller chela.

Alpheus megacheles (p. 547).

- ,, 4. First pereopod ; larger chela.

PLATE XCVIII.

Alpheus leviusculus, var. (p. 549).

- Fig. 1. Lateral view; enlarged three times.
,, 1c. Cephalon; *b*, first antenna; *c*, second antenna.
,, 1*k*. First pereopod; left side.
,, 1*k*'. First pereopod; left side, pollex.
,, 1*m*. Third pereopod; terminal joints.
,, 1*z*. Telson.

Alpheus crinitus (p. 548).

- ,, 2. Lateral view; enlarged four times.
,, 2c. Cephalon with first and second antennæ; left side.

Alpheus bermudensis (p. 547).

- ,, 3. Lateral view; enlarged three times.
,, 3*k*. First pereopod; larger chela.

Alpheus longimanus (p. 551).

- ,, 4. Lateral view; enlarged three times.
,, 4c. Cephalon; frontal margin.
,, 4c. Second antenna; scaphocerite.
,, 4*k*. First pereopod; larger chela.
,, 4*k*'. First pereopod; smaller chela of left side.

PLATE XCIX.

Alpheus rapax (p. 552).

- Fig. 1. Lateral view ; enlarged twice.
- „ 1c. Cephalon ; *b*, first antenna, left side ; *c*, second antenna, right side.
 - „ 1k. First pereiopod ; larger chela.
 - „ 1k''. First pereiopod ; showing dactylos and pollex, enlarged.
 - „ 1z. Telson.

Alpheus crassimanus (p. 554).

- „ 2. Lateral view ; enlarged twice.
- „ 2k. First pereiopod ; larger chela.

Alpheus lavis (p. 555).

- „ 3. Lateral view ; enlarged three times.
- „ 3c. Cephalon, with first and second antennæ.
- „ 3c'. Carapace, showing vessels of circulation.
- „ 3k. First pereiopod ; larger chela.

Alpheus prolificus (p. 556).

- „ 4. Lateral view ; enlarged three times.
- „ 4c. Cephalon, with first and second antennæ.
- „ 4m. Third pereiopod.

PLATE C.

Alpheus intrinsecus (p. 557).

- Fig. 1. Lateral view ; female, enlarged three times.
,, 1c. Cephalon, frontal region.
,, 1c''. Cephalon ; *b*, first antenna ; *c*, second antenna.
,, 1*k*. First pereiopod ; smaller chela.
,, 1*q*. Second pleopod, with ova attached.
,, 1*z*. Telson.

Alpheus minus (p. 558).

- ,, 2. Lateral view ; enlarged four times.
,, 2*k*. First pereiopod ; larger chela.
,, 2*k*'. First pereiopod ; pollex and dactylos.

Alpheus spiniger (p. 560).

- ,, 3. Lateral view ; enlarged three times.
,, 3c. Cephalon, with first and second antennæ.
,, 3*k*. First pereiopod ; larger chela.
,, 3*k*'. First pereiopod ; smaller chela, left.
,, 3*k*''. First pereiopod, showing form of dactylos.
,, 3*m*. Third pereiopod ; dactylos.
,, 3*z*. Telson.

PLATE CI

Alpheus avarus (p. 544).

Fig. 1. Lateral view; enlarged twice.

Alpheus neptunus (p. 563).

- „ 2. Lateral view; enlarged twice.
- „ 2k. First pereopod; larger chela, left.
- „ 2k'. First pereopod; smaller chela, right.

Alpheus gracilipes (p. 561).

- „ 3. Lateral view; enlarged three times.
- „ 3c. Cephalon, frontal region.
- „ 3k. First pereopod; larger chela.
- „ 3m. Third pereopod; terminal joints.
- „ 3z. Telson.

Alpheus biunguiculatus (p. 562).

- „ 4. Lateral view; enlarged three times.
- „ 4o. Fifth pereopod; terminal joints.
- „ 4z. Telson.

Betæus malleodigitus (p. 565).

- „ 5. Lateral view; enlarged three times.
- „ 5c. Cephalon, frontal region.
- „ 5c. Second antennæ; scaphocerite.
- „ 5k. First pereopod; larger chela.
- „ 5l. Second pereopod.
- „ 5p. First pleopod, with parasites attached to peduncle; stylamblys detached and enlarged.
- „ 5par. Parasitic vesicle, detached; escaped ovum, enlarged.
- „ 5z. Telson.

Betæus microstylus (p. 566).

- „ 6. Lateral view; enlarged three times.
- „ 6c. Cephalon, frontal region and scaphocerites.
- „ 6c. Second antennæ; scaphocerite, enlarged.
- „ 6z. Telson.

PLATE CII.

Paralpheus diversimanus (p. 568).

Fig. 1. Lateral view ; enlarged three times.

- b.* First antenna.
- c.* Second antenna.
- d.* Mandible.
- e.* First siagnopod.
- f.* Second siagnopod.
- g.* Third siagnopod.
- h.* First gnathopod.
- i.* Second gnathopod.
- k.* First pereopod ; smaller chela.
- p.* First pleopod.
- q.* Second pleopod.
- r.* Third pleopod.
- vzv.* Rhipidura.

PLATE CIII.

Synalpheus falcatus (p. 574).

Fig. 1. Lateral view ; enlarged three times

c. Cephalon, frontal region ; with *b*, first, and *c*, second antenna.

d. Mandible.

e. First siagnopod.

f. Second siagnopod.

g. Third siagnopod.

h. First gnathopod.

i. Second gnathopod.

k. First pereiopod ; larger chela, left.

k'. Chela open to show the form of the dactylos.

k''. First pereiopod ; smaller chela, right side.

m. Third pereiopod ; terminal joints.

q. Second pleopod, bearing ova.

zv. Rhipidura.

PLATE CIV.

Latreutes ensiferus (p. 583).

- Fig 1. Lateral view; enlarged six times.
- „ 1*d*. Mandible.
 - „ 1*e*. First siagnopod.
 - „ 1*f*. Second siagnopod.
 - „ 1*g*. Third siagnopod.
 - „ 1*h*. First gnathopod.
 - „ 1*i*. Second gnathopod.
 - „ 1*k*. First pereopod.
 - „ 1*l*. Second pereopod.
 - „ 1*m*. Third pereopod; distal joints.
 - „ 1*q*. Second pleopod, with ova attached.

Platybema rugosum (p. 579).

- „ 2. Lateral view; enlarged six times.
- „ 2*d*. Mandible.
- „ 2*h*. First gnathopod.
- „ 2*k*. First pereopod.
- „ 2*l*. Second pereopod.
- „ 2*q*. Second pleopod, with ova attached, and stylamblys detached and magnified.
- „ 2*vzv*. Rhipidura.

PLATE CV.

Hippolyte bidentatus (p. 591).

- Fig. 1. Lateral view of male ; enlarged three times.
- „ 1*b*. First antennæ.
 - „ 1*d*. Mandible.
 - „ 1*e*. First siagnopod.
 - „ 1*g*. Third siagnopod.
 - „ 1*h*. First gnathopod.
 - „ 1*i*. Second gnathopod.
 - „ 1*k*. First pereopod.
 - „ 1*l*. Second pereopod.
 - „ 1*m*. Third pereopod ; distal joints.
 - „ 2. Lateral view of female ; enlarged three times.
 - „ 2*c'*. Rostrum ; magnified.

Hippolyte projecta (p. 594).

- „ 3. Lateral view ; enlarged three times.
- „ 3*a*. Ophthalmopod.
- „ 3*b*. First antenna.

PLATE CVI.

Spirontocaris spinus (p. 596).

- Fig. 1. Rostrum, after Leach, var. α .
,, 2. Lateral view of animal, after Owen, var. β .
,, 3. Lateral view of var. γ .
,, 4. Lateral view of var. ϵ .
,, 5. Ventral aspect of same, with saccular parasite attached.
,, 6. Ventral aspect of same, with *Phryxus* attached.
,, 7. Lateral view of var. ζ ; ophthalmopoda removed.
,, 8. Rostrum of var. η .
,, 9. *Phryxus*, female, ♀, with male, ♂, attached.
,, 10. Parasite from fig. 5; enlarged.

PLATE CVII.

Spirontocaris spinus, var. δ (p. 599).

Fig. 1. Lateral view ; enlarged three times.

- a.* Ophthalmopod.
- b.* First antenna.
- c.* Second antenna ; scaphocerite.
- d.* Mandible.
- e.* First siagnopod.
- f.* Second siagnopod.
- h.* First gnathopod.
- i.* Second gnathopod.
- k.* First pereopod.
- l.* Second pereopod.
- m.* Third pereopod ; distal joints.
- mb.* Mastigobranchia.

PLATE CVIII.

Nauticaris marionis (p. 603).

Fig. 1. Lateral view ; enlarged twice.

- a. Ophthalmopod.
- b. First antenna.
- c. Second antenna, scaphocerite.
- d. Mandible.
- e. First siagnopod.
- f. Second siagnopod.
- g. Third siagnopod.
- h. First gnathopod.
- i. Second gnathopod.
- i''. Second gnathopod ; mastigobranchia.
- l. Second pereopod.
- v. Sixth somite ; v'', articulated process at the infero-posterior angle.
- vz. Rhipidura ; lateral view.
- „ 2. Branchial apparatus *in situ*.

PLATE CIX.

Nauticaris futilirostris (p. 606).

Fig. 1. Lateral view ; enlarged twice.

Hetairus gaimardii (p. 611).

„ 2. Lateral view ; enlarged four times.

„ 2*d*. Mandible.

„ 2*g*. Third siagnopod.

„ 2*h*. First gnathopod.

Hetairus tenuis (p. 613).

„ 3. Lateral view ; enlarged three times.

Hetairus debilis (p. 615).

„ 4. Lateral view ; enlarged four times.

PLATE CX.

Nauticaris unirecedens (p. 608).

Fig. 1. Lateral view ; enlarged five times.

Chorismus tuberculatus (p. 617).

„ 2. Lateral view.

„ 2*a*. Ophthalmopod.

„ 2*d*. Mandible.

Amphiplectus depressus (p. 623).

„ 3. Lateral view ; enlarged twice.

„ 3*d*. Mandible.

„ 3*i*. First gnathopod.

Merhippolyte agulhasensis (p. 619).

„ 4. Lateral view ; enlarged twice.

„ 4*a*. Ophthalmopod.

„ 4*i*. Second gnathopod.

PLATE CXI.

Heterocarpus dorsalis (p. 630).

Fig. 1 ♀ . Lateral view of female.

- b.* First antenna.
 - c.* Second antenna ; scaphocerite.
 - d.* Mandible ; synhipod detached.
 - f.* Second siagnopod.
 - g.* Third siagnopod.
 - h.* First gnathopod.
 - i.* Second gnathopod.
 - k.* First pereopod.
 - l.* Second pereopod.
 - m.* Third pereopod.
 - p.* First pleopod.
 - q.* Second pleopod.
 - zv.* Rhipidura.
- „ 2. Branchiæ in natural position.

PLATE CXII.

Heterocarpus alphonsi (p. 632).

- Fig. 1. Lateral view.
,, 1*l*, 1*l'*. Second pereopod ; right and left.

Heterocarpus gibbosus (p. 634).

- ,, 2. Lateral view ; enlarged twice.
,, *i*. First gnathopod.
,, *k*, *l*, *m*. First three pereopoda.
,, 2*z*. Telson.

Heterocarpus lævigatus (p. 636).

- ,, 3. Lateral view.

Heterocarpus ensifer (p. 638).

- ,, 4. Lateral view.

Dorodotes levicarina (p. 680).

- ,, 5. Lateral view ; enlarged twice.
,, 5*l*. Second pereopod.

PLATE CXIII.

Plesionika uniproducta (p. 641).

- Fig. 1. Lateral view.
- „ 1a, α. Ophthalmopoda.
 - „ 1b. First antenna.
 - „ 1c. Second antenna; scaphocerite.
 - „ 1ant., 1post. Epistoma and metastomata in relative position.
 - „ 1d. Mandible.
 - „ 1e. First siagnopod.
 - „ 1f. Second siagnopod.
 - „ 1g. Third siagnopod.
 - „ 1h. First gnathopod.
 - „ 1l. Second pereopod, right.
 - „ 1l'. Second pereopod, left.

Plesionika spinipes (p. 646).

- „ 2. Lateral view; enlarged twice.
- „ 2k. First pereopod, terminal joints.
- „ 2m. Third pereopod, articulation of mero-carpal joint.

Plesionika semilævis (p. 644).

- „ 3. Lateral view; slightly enlarged.
- „ 3b. First antenna.

Plesionika unidens (p. 648).

- „ 4. Lateral view; slightly enlarged.

Plesionika brevirostris (p. 650).

- „ 5. Lateral view.
- „ 5l. Second pereopod.

PLATE CXIV.

Nothocaris rostricrescentis (p. 653).

- Fig. 1. Lateral view.
,, 1r.c. Rostral crest.
,, 1a. Ophthalmopod.
,, 1b. First antenna.
,, 1d. Mandible.
,, 1h. First gnathopod.
,, 1i. Second gnathopod.
,, 1k. First pereopod.
,, 1k''. First pereopod, terminal joints.
,, 1z. Telson.

Nothocaris binoculus (p. 656).

- ,, 2. Lateral view.
,, 2r.c. Rostral crest.
,, 2a. Ophthalmopod.

Nothocaris ocellus (p. 657).

- ,, 3. Lateral view.
,, 3r.c. Rostral crest.

Pandalus modestus (p. 670).

- ,, 4. Lateral view; enlarged four times.
,, 4b. First antenna.
,, 4k. First pereopod.
,, 4l. Second pereopod, right.
,, 4l'. Second pereopod, left.
,, 4m. Third pereopod.

PLATE CXV.

Pandalus magnoculus (p. 667).

Fig. 1. Lateral view ; enlarged twice.

„ 1a. Ophthalmopod.

„ 1b. First antenna.

„ 1z. Telson.

Pandalus falcipes (p. 668).

„ 2. Lateral view ; enlarged twice.

„ 2a. Ophthalmopod.

„ 2b. First antenna.

„ 2z. Telson.

Pandalopsis amplus (p. 671).

„ 3. Lateral view.

„ 3a. Ophthalmopod.

„ 3b. First antenna.

„ 3i. Second gnathopod.

„ 3k. First pereopod.

„ 3z. Telson.

PLATE CXVI.

Chlorotocus incertus (p. 674).

- Fig. 1. Lateral view ; enlarged twice.
- „ 1a. Ophthalmopod.
 - „ 1b. First antenna.
 - „ 1c. Second antenna.
 - „ 1d. Mandible.
 - „ 1e. First siagnopod.
 - „ 1f. Second siagnopod.
 - „ 1g. Third siagnopod.
 - „ 1h. First gnathopod.
 - „ 1i. Second gnathopod.
 - „ 1k. First pereopod.
 - „ 2. Pereion, showing branchial arrangement.

Dorodotes reflexus (p. 678).

- „ 3. Lateral view.
- „ 3a. Ophthalmopod.

Nothocaris geniculatus (p. 661).

- „ 4. Lateral view of female.
- „ 4a. Ophthalmopod.
- „ 4q. Second pleopod ; stylamblys detached.

PLATE CXVII.

Thalassocaris danæ (p. 683).

- Fig. 1. Lateral view ; enlarged ten times.
,, 1*b*. First antenna.
,, 1*c*. Second antenna ; 1*c*'', inner margin of scaphocerite, enlarged.

Thalassocaris stimpsoni (p. 684).

- ,, 2. Dorsal view ; enlarged ten times.

Diaphoropus versipellis (p. 687).

- ,, 3. Lateral view ; enlarged ten times.
,, 3*k*. First pereopod.
,, 3*l*. Second pereopod.
,, 3*m*. Third pereopod.
,, 3*o*. Fourth pereopod.

Diaphoropus longidorsalis (p. 688).

- ,, 4. Lateral view ; enlarged eighteen times.

PLATE CXVIII.

Atya sulcatipes (p. 694).

- Fig. 1. Lateral view ; slightly enlarged.
- b.* First antenna.
 - c.* Second antenna, with three articuli of the flagellum enlarged.
 - d.* Mandible.
 - f.* Second siagnopod.
 - g.* Third siagnopod.
 - h.* First gnathopod.
 - i.* Second gnathopod.
 - k.* First pereiopod.
 - v, z, v.* Rhipidura.

PLATE CXIX.

Atya sulcatipes (p. 694).

Fig. 1. Lateral view, showing branchiæ.

- „ 1*p*. First pleopod.
- „ 1*q*. Second pleopod.

Atya serrata (p. 699).

- „ 2. Lateral view ; enlarged twice.
- „ 2*a*. Ophthalmopod.

Caridina typus (p. 704).

- „ 3. Part of pereion, with appendages.
- „ 3*d*. Mandible.
- „ 3*i*. Second gnathopod.
- „ 3*k*. First pereopod.
- „ 3*l*. Second pereopod.
- „ 3*m*. Third pereopod.

PLATE CXX.

Atya bisulcata (p. 700).

Fig. 1. Lateral view ; enlarged twice.

- b.* First antenna.
- c.* Second antenna.
- d.* Mandible ; inner and outer surfaces.
- e.* First siagnopod.
- f.* Second siagnopod.
- g.* Third siagnopod.
- h.* First gnathopod.
- i.* Second gnathopod.
- k.* First pereopod.
- o.* Fifth pereopod.