

Plate 29, fig. 4 *a*, from a Madeira specimen, enlarged two diameters; *b*, hand of same; *c*, part of left leg of third pair, *ibid.*; *d*, from a Tahiti specimen, enlarged four diameters; *e*, hand, side view, of same; *f*, part of left leg of third pair, *ibid.*

Madeira and Porto Praya, Cape Verds; also, Tahiti, Society Islands.

Length, three-fourths of an inch. The alcoholic specimens from Madeira, have no bandings in the colour; the dark reddish brown shade indicates that they were of a uniform dark tint, excepting the tarsi, these being white for three-fourths the length, and then brownish red at base of claw, with the claw black. The specimen from Tahiti, a *dried* one, has the legs dark blue, but not striped with colour. The upper surface of the carpus partakes of the flattening that characterizes the hand, and has the same short conical spines. The eyes are as long as the base of the outer antennæ, but a little shorter than the base of the inner. The species differs from the *virescens* in being less hairy, the legs more compressed, the outer surface of the third and second pairs of legs naked, the tarsus also much more flattened and wider at base. It is nearer the *inæqualis* of De Haan (Faun. Japon., 210, Plate 50, fig. 2), but the right hand is not the larger, or if exceeding the left in size, as is rarely observed, it is but slightly larger; commonly the hands are equal, or the left is a little the longer.

CLIBANARIUS ZEBRA.

P. æquabili affinis. Oculi colore supra unilineati, margine carapacis antico paulo breviores; squamâ basali subovatâ, denticulatâ. Manus maris dextra paulo major. Pedes 2di 3tii colore pauci-lineati, unâ lineâ obscurâ externâ tantum, supra infraque pilosi, latere externo parce pilosi, articulo pedis 3tii sinistri 5to extus paulo complanato et nudiusculo, tarso valde compresso, brevi.

Near the *æquabilis*. Eyes having a longitudinal line of colour above, not as long as anterior margin of carapax. Right hand a little the larger in males. Feet of second and third pairs with a few stripes

of colour, one dark stripe only on outer surface, pilose above and below and somewhat so on outer surface, fifth joint of third leg of left side somewhat flattened, nearly naked on outer surface, and having an edge above; tarsus much compressed and short.

Plate 29, fig. 5 *a*, part of animal, enlarged four diameters; *b*, *c*, hand; *d*, part of right leg of third pair.

Sandwich Islands.

Length, three-fourths of an inch. In its striations of colour along the legs the species resembles the *lineatus*, but the striations are fewer, but one of dark colour on the outer side, one below, one above, and one on the inner side. The anterior region of the carapax is but little oblong. The hands are nearly as in the *æquabilis*; but usually less rough, the tubercles more like granules; the carpus is more tuberculous than in the *virescens*, and less flattened than in the *æquabilis*. In females, the hands are equal or very nearly so. Unlike the *virescens*, the tarsi are nearly naked on the dorsal margin, and the hairs below are shorter and fewer.

The legs are more hairy than in the *æquabilis*, the eyes shorter and less slender; and the sides of the anterior region of the carapax have more and longer hairs. In other respects, excepting the stripes of colour, the species are very similar.

CLIBANARIUS VIRESCENS? (*Krauss*), *Dana*.

Plate 29, fig. 6, *a*, *b*, different varieties.

Feejee Islands, island of Ovalau (fig. 6 *a*), and Viti Lebu, near Rewa (fig. 6 *b*); also, Balabac Passage and Sooloo Sea.

Length, one inch. General colour of specimens varies from grayish green to dark green, brownish green, and also yellow; fingers of hand, yellowish white or yellow, with tips black. Tarsi, in all specimens collected, yellow or yellowish white; eyes black, outer antennæ dull transparent blue. Alcoholic specimens lose the colours, but have the tarsus and tips of fingers whitish. The hands are small and

equal; the four following legs are hairy on outer as well as inner surface, the tarsi rather short and tapering, hardly as long as preceding joint, and with the hairs on both margins long (much longer than diameter of tarsus). The anterior portion of carapax rather longer than broad; a small median point to front, and one still smaller outside of eyes. Eyes not longer than front margin of carapax, whole length equalling base of outer antennæ, and not longer than inner antennæ, twice as long as acicle of outer antennæ; basal scale pointed. Hands with small conical spines of a whitish colour. Left leg of third pair differing but little from right, penult joint narrow.

This species does not appear to differ essentially from the *P. virescens* of Krauss, Südaf. Crust., p. 56, pl. 4, f. 3, 1843. Yet in the figure of that species, the carpus is not more than half as long as broad, and the tarsi, although yellow, are banded with olive-green near middle; moreover, the hairs of the tarsus do not appear to be as long as in our specimens.

CLIBANARIUS BRASILIENSIS.

Regio carapacis antica paulo oblonga; rostrum bene triangulatum. Oculi gracillimi, margine carapacis antico non breviores, squamâ basali valde truncatâ, brevissimâ non longiore quam latiore, pilis sublongis margine apicali instructâ. Pedes antici æqui, manu dextrâ parce majore. Pedes 2di 3tii persparsim hirsuti, subnudi, tarso perbrevis, articulo 5to paris 3tii extus subcomplanato, parce convexo, supra subcarinato. Color pedum paucilineatus.

Anterior region of carapax a little oblong; beak neatly triangular. Eyes very slender and long (not shorter than anterior margin of carapax), basal scale truncate, and, therefore, very short, not longer than broad, with a few longish hairs on summit margin. Anterior feet subequal, right hand of male slightly the larger hirsute. Feet of second and third pairs very sparsely rather long hirsute, appearing nearly naked, tarsus very short, fifth joint of third pair somewhat flattened but still convex on outer side, subcarinate above. Colour of the legs in lines.

Plate 29, fig. 7 a, part of body, enlarged three diameters.

Rio Janeiro.

Length, one and one-fourth inches. The basal scale differs from that of all the other related species in being truncate, and hence rather broader than long; it bears a few longish hairs at extremity. The tarsi are not more hairy than the rest of the legs; they are compressed as in the *æquabilis*.

CLIBANARIUS CORALLINUS? (*Edwards*), *Dana*.

Plate 29, fig. 8 *a*, part of body, enlarged two diameters; *b*, front, with basal scales of eyes, much more enlarged; *c*, right arm and hand, outer view; *d*, part of leg of third pair, right side; *e*, same, left side.

Wakes Island, Pacific Ocean, north of the Equator; also, Feejee Islands.

The hand in our specimens is very short and thick, and the arm is not half longer than its vertical breadth. The anterior region of the carapax is quite oblong, and the V-shaped suture in its posterior part is not distinct. The eyes are slender and longer than the anterior margin of the carapax. The legs are stiff hirsute on the margins, the hairs nearly or quite as long as the breadth of the fifth joint; the fifth joint is little compressed; that of the left side third pair is much flattened on outer side, and rough hirsute on this outer surface. In this hirsute surface, the species differs from all the other Clibanarii described. The tarsus is much shorter than the fifth joint, and hirsute in thick tufts. Colour of alcoholic and dried specimens, deep red. Length, one and a half to two inches.

The *P. corallinus* is imperfectly described by Edwards (in the *Annales des Sci. Nat.*, for 1848, 3d ser., v. 63), and it is, therefore, difficult to decide upon the identity of our specimens with his species. The specimens also answer to the description of the *P. crassimanus*, EDWARDS, as far as it is given; but in the recent memoir by Edwards, just referred to (p. 62), the *crassimanus* is removed from the group of the "*Æquimanes*," and placed among the "*Senestres*." Owing to the uncertainties, we had named our specimens the *obeso-manus* (Proc.

Acad. Nat. Sci. Philad., 1851), a name which may still hold, if the species prove distinct. The Feejee specimen, from which it was first described, was a much injured alcoholic one, and the hairs were mostly broken from the mutilated legs.

CLIBANARIUS HUMILIS.

Oculi breves et crassiusculi, fronte breviores, squamâ basali triangulatâ. Pedes primi subœqui. Pedes 4 sequentes crassiusculi, sparsim pilosi, tarso terete. Color non lineatus.

Eyes short and stoutish, shorter than front, basal scale triangular. Anterior feet nearly equal; four following feet rather stout, sparsely pilose, tarsus terete. Not striped with colour.

Plate 29, fig. 9, animal, natural size.

Feejees and Tongatabu; found abundantly near high water mark, under masses of dead coral.

Length, about one inch. General colour, dark green. Tarsus of legs of second and third pairs, reddish orange, with black tips; preceding joints, same orange colour, excepting apical portion, which is dark green or greenish black. Peduncles of eyes pale yellow, passing into red near centre; the basal scale dark green. Second antennæ, orange, excepting base, which is green. First antennæ, green, with extremities deep orange. Abdomen, dirty brownish green to grayish green.

This small species is readily distinguished by its colours; also by its short stout eyes, nearly equal small hands, without trenchant upper edge.

We write off this description from the notes and drawing taken on the spot, as we have not the specimens to verify it. It has shorter and stouter eyes than either of the allied species. The *virescens* occurs in the same seas, and is very different in its habit, colouring, and the proportions; moreover, it is found about the outer or more exposed reefs, while the *humilis* was met with under stones near high tide level.

FAMILY II. CENOBITIDÆ.

CENOBITA OLIVIERI, *Owen*.

Paumotu Archipelago, at Clermont Tonnerre, and Waterland Islands; Tahiti.

Colour, cinnabar red, brownish red. Peduncles of eyes rough granulous above, very much compressed, height more than half the length; cornea triangular, vertically oblong. Surface of carapax with obsolescent granuliform tubercles, but nearly smooth. Large hand with short and small but spiniform tubercles, which are obsolescent below, and crowded above especially on the moveable finger; they have in general corneous tips. There is a dense tuft of short hair along upper margin of both hands. Inner surface of hands flat or even excavate in upper half. The superior of the flagella of the inner antennæ about double the length of the inferior. Tarsi short (but very little longer than preceding joint), and very stout, with short spiniform tubercles having black corneous tips; and rest of legs similar in surface, except that the points are less crowded. Upper surface of tarsi rounded; under surface of the two left legs flattened, and longitudinally along middle low cristate with denticulate edge to crest. A short pubescence on some of the joints of the legs.

Pagurus clypeatus, OLIVIER, *Encycl. Meth. Ins.*, viii., p. 643, pl. 311, f. 1.
Cenobita Olivieri, OWEN, *Crust. Blossom*, p. 84.

CENOBITA BRUNNEA.

Regio carapacis antica convexa, nuda, lævis. Oculi fronte vix breviores, læves. Pedes spinis conicis perbrevibus apice corneis armati; antici subæqui, manubus sparsim hirsutis, margine superno dense pilosis, carpo sinistro supra gibboso; 2di 3tii laxè sparsimque hirsuti, tarso subterete, prælongo, longiore quam articulus 5tus, infra spinulis male seriatis.

Anterior region of carapax convex, naked, smooth. Eyes hardly shorter than the front, smooth. Feet armed with short conical spines having corneous tips; anterior pair subequal, hands sparsely hirsute, upper margin of hand dense pilose, carpus of left leg having upper surface gibbous; second and third pairs lax and sparsely hirsute, tarsus subterete, very long (longer than fifth joint), spinules of under surface imperfectly seriate.

Plate 29, fig. 10 *a*, animal, natural size; *b*, side view, showing antennæ.

Upolu, Navigator Group. Found in the forests, some miles from the sea. The shell covering the abdomen is like the shell of a nutmeg.

Length, about three inches. Colour, dark brown. The general characters are similar to those of the *Olivieri*; but the legs are longer and hairy, the tarsus more slender, the eye-peduncles smooth instead of granulous, carapax also smooth, and moreover naked. The shorter flagellum of the inner antennæ is about one-third the length of the longer.

CENOBITA RUGOSA, *Edwards*.

Plate 30, fig. 1, animal, natural size.

Paumotu Archipelago, at Raraka; Samoan Islands; Tongatabu; Feejee Archipelago; Sooloo Sea. Common on bushes and on the ground, often fifty rods or so from the sea.

Length, often three inches. Colour, bluish and brownish gray; generally a large brown spot on the outer surface of the hand, and sometimes smaller ones on the four following legs. Eyes, black; peduncles, grayish. The hands are very unequal and a little pubescent. The granules of the surface are not acute. The eye-peduncle is much flattened, but the outer of the upper edges is obtuse or rounded.

C. rugosa, EDWARDS, Crust., ii. 241.

Cenobita clypeata, OWEN, Crust. Blossom, p. 85, pl. 25, f. 3.

Var. *pulchra*.—Plate 30, fig. 2 *a*, *b*, represents a specimen from Pitt's Island, Kingsmill's Group, Pacific Ocean; it is probably a variety of the *rugosa*.

Length, two inches. Carapax, having a tinge of blue, with a faint blush of red on hinder part; abdomen, sulphur-yellow on outer surface; legs, mostly bluish, with a large purplish spot on each joint; peduncles of eyes, burnt sienna; eyes, reddish burnt sienna; antennæ deep red, a little brownish. Margin of anterior part of carapax hairy. Antennæ hardly longer than carapax; inner more than two-thirds the length of the outer. Legs scabrous; also, somewhat hairy, excepting anterior pair and third pair left side. Hand scabrous inside and outside from acute granules on the surface; fingers towards tips with the granules black and more numerous than elsewhere. A dense tuft of auburn hair on inner surface of hand, near upper margin.

CENOBITA CARNESENS.

Regio carapacis antica plana, scabricula, lateribus quoque planis. Oculi fronte longiores, plus duplo longiores quam alti, valde compressi, laminâ basali triangulatâ, acutâ. Pedes antici inæqui, sinistro majore, superficiem granuloso, carpo paulo brevior quam manus, brachio apicem oblique plano-truncato. Pedes quatuor sequentes fere nudi, parce pubescentes, articulo ultimo scabriculo.

Anterior part of carapax flat, finely rough, sides also flat. Eyes longer than front, more than twice as long as high, very much compressed, basal scale triangular, acute. Anterior feet unequal, left hand the larger, surface a little rough, carpus somewhat shorter than hand, arm with apex obliquely flat truncate. Four following feet nearly naked, sparingly pubescent, last joint finely scabrous.

Plate 30, fig. 3 *a*, animal, natural size; *b*, animal, withdrawn into the shell, showing how the shell is closed by the feet.

Pacific, in the Paumotu Archipelago, at Honden Island; also, at

Raraka, Vincennes, Carlshoff, and Waterland Islands. Collected August, 1839. Found mostly in a white *Cerithium*; also, in *Naticas*, &c.

Length, one and one-fourth to one and one-half inches. Colour, a light flesh-tint; anterior portion of carapax, nearly white; legs, whitish, but a flesh tint towards the base, and a little brown spotted with white at base of some of the joints; abdomen light flesh-tint or white; antennæ deep flesh-colour; pigment of eyes brown.

This species resembles the *rugosa*, but is more square in form, less hairy in its legs, and much more delicate in shade of colour. The back and sides of carapax anteriorly meet in a right angle, the edge being neat and exact. The eyes are longer and more compressed triangular, and the edges are more trenchant, not at all rounded. The arm of the anterior legs is wedge-shape, with a flat surface, being trenchant above, and having the sides quite flat; and the oblique truncation of the apex produces a triangular flat surface, slightly rounded above. The large hand is without the series of rugules, characterizing the *rugosa*. The flagellum of the second antennæ is nearly as long as the carapax.

CENOBITA CLYPEATA.

Balabac Passage.

Length, four and three-fourths inches. Front narrow. Upper flagellum of inner antennæ about one-fifth as long as lower. Anterior region of carapax convex, and other characters as mentioned by Edwards for the *clypeata*. The large hand (Plate 30, fig. 4 *a*) is two inches two lines long; breadth, one and a half inches; inner surface near upper margin naked; outer surface hardly smooth in any part, but covered with quite small tubercles, with horny summits and sub-acute. Tarsi quite rough with similar points and sparsely hirsute.

Var. *brevimanus*.—Has the characters of the above, but the larger hand (Plate 30, fig. 4 *b*) is but little longer than broad, nearly circular in outline, and very convex and nearly smooth on the outer surface, the length, sixteen lines; breadth, thirteen and a half lines.

Antennæ and other characters like the above. Length of body, two and three-fourths inches.

Cancer clypeatus, HERBST, ii. 22, pl. 23, f. 2.

Pagurus clypeatus, FABRICIUS, Supp., p. 413.

Cenobita clypeata, EDWARDS, Crust., ii. 239. Not *C. clypeata* of OWEN, Crust. Blossom, 85, pl. 25, f. 3.

BIRGUS LATRO, *Leach*.

Plate 30, fig. 5 *a*, coloured sketch, somewhat reduced from the natural size, made from life, by A. T. Agate, one of the artists of the Expedition. The death of Mr. Agate, and the loss of the specimens by the wreck of the Peacock, have prevented finishing the sketch in some parts; *b*, view of part of inner surface of the stomach, by the author, natural size.

From various islands of the Paumotu Archipelago (the sketch was from a specimen taken at Honden Island); also, from Swain's Island, north of the Navigator Islands.

The loss of our specimens prevents us from making a direct comparison with the species of the East Indies. From notes taken in the Paumotus, we mention the following characters.

Length, nine inches; of carapax, four and one-half inches; greatest breadth, four and seven-eighths inches; second pair of legs in a female, nine inches. The medial line of the posterior part of the carapax is occupied by two narrow wedges, the acute angles of the wedges meeting just posterior to the centre. (These are represented as one piece in the *latro*, as figured in fig. 1, pl. 43, Cuv., by Edwards.) The anterior part of the carapax is marked with transverse linear depressions, about one-fourth of an inch long. The abdomen has at extremity two small crustaceous plates, the penult of which has very minute appendages, and is pubescent, though smooth. Abdomen below laterally verrucose, with the verrucæ pubescent; covered with short imperfectly jointed setæ of very peculiar appearance along its medial space.

Eyes on the exterior part of the extremity of compressed pedicels; outer margin of pedicel uneven. The exterior antennæ are about two-thirds as long as the body. The nasal opening in males is irregularly semilunar; the depth of the cavity is nearly that of the

thickness of the joints. At its apex is a small puncture, or what appears to be one. Within, the cavity was lined by a cellular tissue and covered on all sides with naked hairs that crossed in every direction, which nearly fill the cavity. In a female, the nasal opening was not one-sixth the size in the male, and was triangular.

Fingers with the dentations like molars in form, but having a cutting edge. Surface of carpus and hand marked with short transverse ridges, which are furnished outwardly with a sharp projecting edge. Similar ridges on carpus and arm. Tarsi of second and third pairs of legs thickly hispid with short spines; except outer surface, on which the spines are sparse.

The colours vary. The sketch represents a female. The carapax is orange, passing to a rich brownish tint on the posterior part; arms and the following legs in part reddish brown, with some bright blue; hand, nearly white. In males, carapax red, brownish red or crimson, with the transverse depression of the carapax whitish.

The *Birgus* lives in holes in the soil, at a distance from the sea. On approaching the holes, they come out slowly as if in search of their prey; their motion is slow, and though of large size, they are quite timid. They walk either backward or forward, but usually forward. When approached, they raise one of the legs of the second pair very awkwardly, and bring it down with a show of force, which is found, on exposing the hand to the blow, to be quite weak.

Cancer crementatus, RUMPHIUS, Mus., pl. 4; SEBA, iii. pl. 21, f. 1, 2.

Cancer latro, HERBST, ii. 34, pl. 24.

Birgus latro, LEACH, Trans. Linn. Soc., vol. xi.; EDWARDS, Crust., ii. 246, et Cuv., pl. 43, f. 1; QUOY and GAIMARD, Voy. de l'Uranie, pl. 80.

SUBTRIBE VIII. ÆGLEIDEA.

THE peculiarities already stated, show important differences both in the carapax, abdominal appendages, and branchiæ, between this group and the Galatheidea, and others, no less great, between it and the Porcellanidea. Only one known genus is here included.

GENUS *ÆGLEA*, *Leach*.

The following are the essential characters of this genus.

Body much depressed. Carapax elongate ovate, narrow anteriorly and short rostrate, with orbit-excavations either side of beak. Abdomen partly inflexed; pairs of appendages in male obsolescent, in female oblong. Antennæ of second pair without a basal scale or acicle; of first pair without fossettes, situated posterior to the eyes. Anterior feet stout chelate; six following similar, pediform; fifth pair small and slender, obsoletely chelate, inflexed under the carapax.

The antennæ of the second pair in an upper view of the animal, project from beneath the anterior angles of carapax, towards the extremity of the beak, before reaching which, the flagellum arises and extends forward and outward. The base is four-jointed, the second and third joints quite short, and each triangular in one vertical section, the outer side of the second, and the inner of the third being extremely short.

The *mandibles* have a trenchant longitudinal edge, which is a little dentated. Exterior maxillipeds narrow pediform.

Branchiæ, eleven on each side in a uniform series, excepting the fifth and seventh, which are much smaller than the adjoining; they consist of long, slender, cylindrical vessels, arranged thickly on one side of a curving pedicel. Anterior legs unequal.

Fifth pair of legs quite small, flexed, and concealed below, six-jointed. At base in male an oblong process, which appeared to be sexual.

No abdominal legs to first segment; on the following joints in male, they are extremely small, two-jointed; in female, long and slender.

Abdomen seven-jointed; the first segment very short, and narrower than the following; the following four similar, the first largest, last segment subtriangular.

ÆGLEA LÆVIS (*Latreille*), *Leach*.

Plate 30, fig. 6 *a*, animal, natural size; *b*, carapax, showing sutures,

and areas lettered; *c*, side view of carapax; *d*, extremity of abdomen; *e*, sternum; *f*, branchiæ.

In shallow fresh-water streams, Chili, from beyond the Cuesto del Prado, on the road from Valparaiso to Santiago, sixty miles from the sea; abundant, swimming generally over the bottom. Collected, April, 1839.

Length, one and a half to two inches. Colour, olive-green. Carapax depressed, posterior angles rounded, a little pubescent in some parts, crossed by a transverse suture; in anterior region a U-shaped depression, in posterior, longitudinal sutures dividing the surface across into three nearly equal areas; also, a submarginal suture either side; antero-lateral margin bi-emarginate, extraorbital spine prominent, acute, with a small tooth on inner side near apex, beak acute carinate above. Eyes rather shorter than beak. Anterior feet very stout. Hands unequal, right one the larger, very broad, half as broad as carapax, subrhomboidal, surface somewhat scabrous, outer margin nearly entire, inner margin anterior to finger, short, somewhat compressed and dilatate; finger and thumb denticulate, inner margin trenchant; carpus and arm three-sided, within acutely dentate, and dentato-costate above.

Abdomen laterally pubescent, and sometimes slightly pubescent throughout. Seventh segment not half as broad as preceding, subtriangular, obtuse, having a longitudinal suture, and a slight emargination at apex, ciliated, caudal appendages either side make the caudal extremity as wide as preceding segment; basal joint lamellar, oblong transverse, broadest anteriorly; lamellæ obovate, ciliate, inner one the larger.

Sternum triangular, the anterior piece very narrow; the pieces gradually increase in width backward, the four anterior pieces of equal length, each a very short trapezium in form. Fifth piece very short, and consisting of a medial portion and a lateral, the lateral much smaller than the medial.

First antennæ have the flagella not half as long as base, the stouter one ten-jointed, joints transverse, and a few short hairs at inner apex of each; the other flagellum extremely slender, ten-jointed, naked. Second joint of base arises laterally from inner side of first, oblong; third joint a little shorter than second. The base when extended

reaches as far as apex of beak. Second antennæ long and slender; flagellum about as long as carapax, naked, joints short; base extends a little beyond line of extremity of beak. Fourth, fifth, and sixth joints of exterior maxillipeds together about as long as second and third. Legs of second, third, and fourth pairs nearly equal, of moderate length, pubescent especially towards their extremities. Sixth joint short hirsute, longer than preceding joint; fifth joint but a little longer than fourth, and each shorter than third. Tarsus terminates in a short acute claw. Fifth pair six-jointed, third joint longest.

Some of the females, at the time taken (in April), had eggs, and one male had just shed his skin. The female differs but little from the male: the first pair of feet was a little smaller in females.

This species has been attributed to the shores of Chili. The specimens procured were obtained by the author from a fresh-water stream, as above stated.

SUBTRIBE IX. GALATHEIDEA.

THIS subtribe includes the genera Galathea and Grimothea. Leach proposed, also, the genus Munida for certain species related to Galathea which have a tricuspidate front, and more slender legs than in the Galatheæ then known. The slender form of the legs proves not to be distinctive; for we have a species that should be referred to Galathea, in which the legs are peculiarly slender. But the form of the front is a striking characteristic, and it allies the species to the Grimotheæ. Moreover, we know of no tropical species of the Munidæ, and in this respect they are like the Grimotheæ. We therefore follow Bell* in sustaining Leach's genus, believing it entitled to the rank of a subgenus at least, if not of higher grade.

* British Crustacea, p. 206.

GENUS MUNIDA.

MUNIDA SUBRUGOSA? (*White*), *Dana*.

Plate 30, fig. 7 *a*, animal, natural size; *b*, caudal extremity; *c*, exterior maxillipeds.

Hermite Island, Tierra del Fuego. Obtained by Lieut. Case.

Length, two and a half to three inches. Colour, deep red, or red faintly brownish. Carapax with a moderately long beak (less than half the carapax in length), anterior angles spini-acute, on upper surface behind beak two spines, sides with about six small acute teeth, median area with defined outline; outer antennæ longer than carapax. Anterior feet naked, or nearly so, narrow, very scabrous, apices of carpus and arm with several spiniform teeth, hand not stouter than carpus, inner margin spinulous, outer unarmed, finger exceeding half the length of hand, extremities of fingers incurved. Six following feet subequal, moderately pubescent. Fifth pair in its folded condition not half as long as carapax. Segments of abdomen laterally acute.

Of the transverse ciliated lines of the carapax, the four posterior extend quite across the carapax; the first of these four is partly in the line of the boundary, enclosing the median area; anterior to this boundary there are three ciliate lines crossing the area. Joints of abdomen similarly marked. For extremity of abdomen, see figure *b*. The first abdominal segment has no appendages in the female; the segment lies partially under the preceding and following.

The maxillipeds when thrown forward reach a little beyond the beak; second and third joints largest, the third with a few hairs near base; last three joints nearly cylindrical. The thoracic segment to which the fifth pair of legs is attached has free motion like the following abdominal segments.

Galathea subrugosa, A. WHITE, Voyage of Erebus and Terror, pl. 3, f. 2. Mr. White's specimens were from the Auckland Islands.

GENUS GALATHEA, *Fabricius*.

GALATHEA LATIROSTRIS.

Rostrum latum, latitudine ejus medianâ non duplo longius, lateribus convexis et cum dentibus tribus subovatis alioque dente obsoleto ornatis. Lateralis carapacis obsoletè dentata; area mediana non circumscripta. Oculi sat breves, apice pedunculi ciliati. Pedes primi lineares, manu carpoque sparsim spinulosis et parce laxè setosis, manu non crassiore. Pedes 6 sequentes subæqui, laxè setosi. Abdomen juxta articulationem basalem utrinque rotundatum.

Beak broad, not twice as long as its breadth at middle, with three subovate teeth on either side, and another obsolescent tooth. Sides of carapax obsoletely dentate; no stomachal area. Eyes rather short, ciliate at apex of peduncle. First feet linear, hand and carpus sparsely spinulous and laxly and sparingly setose, hand not stouter than carapax. Six following feet subequal, lax setose. Abdomen near its base on either side, rounded.

Feejees, Island of Viti Lebu, among corals and in cavities of the coral rock.

Plate 30, fig. 8, animal, enlarged, but figure not complete in the antennæ.

Length, one-third of an inch. Nearly colourless. Beak broad and short, teeth prominent. Transverse scabrous lines of carapax nearly straight transverse, but undulate, and many interrupted. Fifth pair of legs, when folded up, much shorter than half the length of carapax.

GALATHEA SPINOSO-ROSTRIS.

Rostrum latum, triangulatum, parce oblongum, apice tenuiter acutum et utrinque 4 dentibus spiniformibus tenuibus armatum, spinis posticis parvulis, in superficie pone has spinas spinulis duabus instructum. Pedes antici graciles, tenuiter spinosi. Area mediana nulla. Abdomen juxta basin utrinque rotundatum.

Beak broad and large, triangular, but little oblong, slenderly acute at apex, and having four slender spines or spiniform teeth on either side, the posterior spines small, and between them, on surface of carapax, two minute spinules. Anterior feet spinous, slender. No median area. Abdomen near base either side rounded.

Plate 30, fig. 9 *a*, front of carapax, much enlarged; *b*, second and third joints of outer maxillipeds, *ibid.*; *c*, anterior legs, *ibid.*

Sandwich Islands.

The breadth of the beak at base is full two-thirds its length, and the spiniform teeth either side of it are long and narrow triangular. The third joint of the outer maxillipeds is rather longer than the second, and has two spines on inner side, one of them apical.

GALATHEA VITIENSIS.

Rostrum oblongo-triangulatum, dimidio carapacis multo breviores, lateribus rectis, regulariter 4-serratis. Carapax lateribus totis paulo dentatus, angulo antico prominente, acuto; areâ medianâ circumscriptâ, posticè bene semicirculari. Abdomen juxta articulationem basalem utrinque rotundatum.

Beak oblong triangular, one-third as long as carapax, sides straight, regularly four-serrate. Carapax with the sides for their whole length somewhat dentate, anterior angle prominent and acute. Median area circumscribed, the outline behind regularly semi-circular. Abdomen at base on either side rounded.

Feejees, about corals.

Plate 30, fig. 10 *a*, animal, enlarged, figure not completed; *b*, portion of flagellum of second antennæ, more enlarged.

Length, one-fourth of an inch. Nearly colourless. The abdomen, as seen in an upper view, flexed so as to be in its natural position, is very broad cordate in outline, rather broader than long, with the

outline either side continuous from the rounded anterior angles, and not interrupted or notched.

GALATHEA LONGIROSTRIS.

Rostrum angustum, recte acuminatum, elongatum, dimidio carapacis fere longius, lateribus rectis, minutè 5-6 serrulatis. Latera carapacis obsolete serrulata. Pedes toti tenues, sparsim pubescentes; primi corporis longitudine, manu lineari, parce latiore quam carpus. Pedes secundi quartis sat longiores. Oculi breves. Abdomen juxta articulationem primam utrinque acutum.

Beak long and narrow, straight acuminate, fully as long as half the carapax, sides straight and minutely five to six serrulate. Sides of carapax obsoletely serrulate. Feet all slender and sparsely pubescent. First pair as long as body; hand linear, slightly broader than carpus, finger not half as long as hand. Second pair considerably longer than fourth. Abdomen at base on either side acute.

Plate 30, fig. 11, animal, enlarged, figure not complete.

Fecjees, brought up on a Comatula, from a depth of ten fathoms.

Length one-third of an inch. Colour, purplish black, with two longitudinal yellowish white bands either side of centre; legs, same colour, except parts of some joints and fingers of hand, which are yellowish white. The abdomen is pubescent. The carapax is broadest just posterior to middle, and the abdomen either side of basal articulation projects and is acute.

GALATHEA INTEGRIROSTRIS.

Rostrum laminatum, elongato-triangulatum, acutum, integrum, ad basin super oculos dente minuto instructum. Carapax angulo antero-laterali acutus, superficie rugulis paucis vix interruptis transversim notatâ, areâ medianâ nullâ. Abdomen juxta basin utrinque rotundatum.

Beak lamellar, elongato-triangular, acute, entire, at base above the eyes furnished with a minute tooth. Carapax acute at the anterolateral angles; surface marked with few transverse lines (about eight), which extend across with few interruptions, no median area. Abdomen near base either side rounded.

Plate 30, fig. 12 *a*, front, showing beak, much enlarged; *b*, second and third joints of outer maxillipeds.

Dredged at Lahaina, Sandwich Islands.

Whole length, two and a half lines. The beak is somewhat concave above. The second joint of the outer maxillipeds is much longer than the third, and is entire on inner margin.

GENUS GRIMOTHEA, *Leach*.

GRIMOTHEA GREGARIA (*Fabr.*), *Leach*.

Plate 31, fig. 1 *a*, animal, enlarged; *b*, one of third, fourth, fifth, or sixth abdominal segments, showing the sternum below; *c*, back view of stomach.

Orange Bay, Tierra del Fuego; abundant, swimming near the surface of the water, hundreds being seen at once in every direction over the harbour.

Length, one to one and a half inches. Colour, deep red. Whole length of exterior maxillipeds about equal to carapax. Each abdominal segment with a small spine on the back, either side of middle. Tarsus of second, third, and fourth pairs of legs longer than half the preceding joint. Eyes oblong, hardly shorter than beak. Facets of eyes *square*. Hand not stouter than rest of leg, fingers hardly longer than half the hand. Hand and carpus densely pilose on inner side. Six following legs very slender and long pilose. Tarsus long and slender. Branchiæ fifteen in number either side; eleven in outer series; and four below the posterior branchiæ of the upper series, composed each of imbricate plates in two series.

APPENDIX TO THE CRUSTACEA ANOMOURA.

MEGALOPIDEA.

THE position of the Megalopæ among Crustacea is still a question of much uncertainty. They are placed by Milne Edwards provisionally near to Porcellana, in his division "Porcellaniens;" while De Haan, on account of the structure of the inner and outer maxillipeds and expanded abdomen, places them among the Macroura, in a family of his section Astacini. The researches of different authors, moreover, have proved their general resemblance to the young of some Brachyura, suggesting that they may be immature individuals of some known genus or genera; and Milne Edwards remarks on their resemblance to young Dromiæ.

This uncertainty as to their maturity is sustained by the unusual size of their eyes, a character of young Brachyura, and by the non-discovery, as yet, of females with eggs beneath the abdomen. Still, on the other side, we observe, that the species have often a much wider geographical distribution than the Brachyura, to which we might refer them, are known to have. Moreover, there is a number of genera among them, of very different general form, which still have a close similarity, in the position and structure of the inner and outer antennæ, and general habit; showing more diversity amid their resemblances, than we look for among the young of any genus of Brachyura. These considerations are, however, of comparatively small weight, and therefore, instead of placing the Megalopidea in their proper position among the Anomoura, we have left them for an Appendix.

Their true position, if mature, is probably next to the *Anomoura Superiora*, in a section that might be designated *Anomoura Supermedia*, being between the *Superiora* and *Media*. Like the *Anomoura Superiora* and the Brachyura, they have the inner and outer antennæ situated between the eyes; in this point they are far above and much unlike the Porcellanidea, and moreover, the inner antennæ fold into fossettes. But, unlike this higher group, the abdomen is elongated, and bears appendages below; and, although when inflexed, it covers

and fills a deep channel in the sternum, as in the Brachyura, it has a pair of caudal appendages, like the Anomoura of a lower grade, though with but a single plate to each appendage. They are, therefore, superior to the Anomoura Media in the cephalic portion of the body, and somewhat inferior to them in the abdomen. Besides, they have not the longitudinal suture near the sides of the carapax common to all Brachyura, and in this respect they are Macroural.

The Megalopidea embrace the two published genera, *Megalopa* and *Monolepis*; and to these we add three others, *Marestia*, *Cyllene*, and *Tribola*. In all, the carapax is rostrate, and except in *Cyllene* and usually also *Megalopa*, it has a prominent point either side of the beak, so that the front is tricuspidate; the inner antennæ are longitudinal or oblique, and fold up into fossettes between the beak and the cusp or tooth either side; the beak is canaliculate above. In *Monolepis* and *Marestia*, the beak is deflexed, so as not to be visible in an upper view. In *Cyllene* and *Megalopa*, the beak projects nearly horizontally, or is obliquely deflected. In *Tribola*, the beak projects nearly horizontally, and also the cusp either side, and the inner antennæ are seen in an upper view, very nearly as in the Plagusiæ. Thus, although the general form of the carapax in these genera is different, still all belong to one type. The outer antennæ are also similar. In the species of the different genera examined, they have a three-jointed cylindrical base, and an eight-jointed flagellum, with commonly two or three long setæ at the apex of the fifth of the joints of the flagellum. The joints are then, first, three basal; then *five* of the flagellum, with the long setæ at the apex of the last; then three terminal. The numbers five and three are typical, as in other Crustacea.

We have not had an opportunity of studying either those species of *Megalopa* of Leach in which the beak is nearly horizontal, or the *M. mutica*, in which it is deflected vertically.* In the genera *Monolepis*, *Marestia*, and *Cyllene*, and probably also in *Tribola*, the posterior legs are capable of overlying the posterior angle of the carapax, and there is a corresponding depression in this surface, which depression is sometimes abrupt and channel-like. The penult pair of legs also admits of being thrown forward over the border of the carapax, and extends

* Leach describes three other species (not noticed by Edwards) in Tuckey's Expedition to the Zaire (London, 1818), p. 404. The *M. Cranchii* may be a true *Megalopa*; the others have a deflexed beak.

above the base of the eyes, so that the tarsus hangs down in front. The second and third pairs fold up and partially overlap the sides of the carapax, beneath the fourth or penult pair, or, as is sometimes seen, the third pair is thrown forward like the fourth. A species very near *Megalopa mutica*, abundant near the Cape of Good Hope (and referred to this species probably by Krauss, in his *Südafrik. Crust.*, p. 54), is figured on Plate 31, with the legs in the position they had *while the animal was swimming*. This position is not often observed, since the animal, when disturbed, is almost sure to swim with the legs extended; and the hinder legs are mostly like the others in form and habit. On the same Plate, this position is shown for another species from the Sooloo Sea; in the former, the surface of the carapax is simply a little depressed or concave for the folded posterior legs (Genus *Marestia*), while in the latter (Genus *Monolepis*), as shown in figure 5 *b*, there is an abrupt channel.

The channel in the sternum for the abdomen is usually deep, with the enclosing margin rounded either side; but in the Sooloo species (and also Say's *Monolepis inermis*), the channel has a prominent trenchant margin. The outer maxillipeds in the Megalopidea are not in contact; the third joint is considerably shorter than the first, yet sometimes a little oblong; the second joint is truncate at top. The palpus is without a multiarticulate flagellum, a single, rather short joint occupying its place. The second pair of maxillipeds has an elongate one or two-jointed extremity to the palpus; while the main stem is narrow, with the terminal joints also narrow and short.

The eight posterior legs are all rather slender, with the second usually shorter than the third, and the fifth the shortest. The fifth in *Megalopa* terminates in a tarsus like that of the preceding pairs of legs, being so described and figured by different authors. In *Monolepis*, the tarsus of the fifth pair is styliform, but bears at extremity three or four serrate or setulose setæ, longer than the tarsus, the presence of these setæ being one of the peculiarities of the genus, distinguishing it from *Megalopa*, according to Edwards.* In *Cyllene*, this joint is lamellar, with some longish setæ towards the extremity. In *Tribola*, it is simple styliform, without long setæ, as in *Megalopa*.

The species of *Cyllene* collected by us, have a recurved spine on the under side of the basal joint of the eight posterior legs, like *Meg. Montagu* and *armata* of Leach, besides being similar to them, also, in

* *Crust.*, ii. 263.

the projecting front; and if Leach's species had lamellar posterior tarsi, the species of *Cyllene* would be true Megalopæ. There is, also, another point of resemblance, that is, a tendency to being spinigerous in other parts of the body: the *M. armata* has a spine to the posterior margin of the carapax, while one of our species has two long spines to the posterior part of the thorax, under side. None of the other genera partake of this peculiarity.

The adopted genera of Megalopidea, have the following characters:—

- G. 1. *MARESTIA*, *Dana*.—Carapax fronte tricuspidatus, sed rostrum valde deflexum et frons superne visus medio non acutus. Pedes 8 postici ad basin infra non armati; 5ti super carapacem sæpe restantes, depressione ad eos recipiendos parce concavâ; tarso styliformi, compresso, spinis infra armato, paris postici setis longis apice instructo.
- G. 2. *MONOLEPIS*, *Say*.—Carapax fronte tricuspidatus, sed rostrum valde deflexum et frons superne visus medio non acutus. Pedes 8 postici ad basin infra non armati; 5ti minores, super carapacem sæpe restantes, depressione ad eos recipiendos abruptâ, tarso styliformi inermi, depresso, postico setis longis apice instructo. Sterni fossa abdominalis marginibus subacutus et prominens.
- G. 3. *MEGALOPA*, *Leach*.—Carapax fronte rostratus, rostro vix deflexo, acuto. Pedes 8 postici ad basin infra uni-spinigeri; 5ti minores, tarso styliformi.
- G. 4. *CYLLENE*, *Dana*.—Carapax fronte simpliciter rostratus, rostro vix deflexo. Pedes 8 postici ad basin infra uni-spinigeri; 5ti 4tis parce minores, tarso lamellato, versus apicem elongatè setigero.
- G. 5. *TRIBOLA*, *Dana*.—Carapax fronte horizontalis, tricuspidatus, rostro (vel cuspidè medianâ) cuspidibus externis vix longiore et supra sulcato. Antennæ internæ inter rostrum et cuspides externas apertè inflexæ. Pedes duo postici minores, tarso styliformi, setis longis non instructo.

GENUS *MARESTIA*, *Dana*.

THE genus *Marestia* includes *Monolepis spinitarsus* of Say. The distinction, in the aspect of the species, between this genus and *Monolepis* is very striking. The carapax is nearly flat above, and much less thick or obese. The sternal fossa is deep, with slender trenchant borders, in *Monolepis*, while in *Marestia*, it is much less deep, and the borders are rounded, or more gradually flaring. The depression on the surface of the carapax for the posterior legs is another point of distinction; moreover, the tarsi are depressed and unarmed in *Monolepis*.

lepis, while in *Marestia*, they are compressed and armed with a series of spines, which are prolongations of the shell, and not mere setæ; and there is a striking uniformity in these spines, the third from the last or outermost, being the longest, and the next either side, smaller than the last. It is this uniformity which leads us to place this peculiarity among the generic characters.

The *Megalopa mutica* of Desmarest is not a true *Megalopa*, and may belong to this genus. The fact that the posterior legs have not been seen to overlie the carapax in that species, is not of much weight, since the specimens when taken do not often have them in this position; the author had often had different species under examination, before he discovered that the individuals were capable of this mode of arranging the legs. There is nothing in the structure of the legs that suggests this habit; for if seen extended, as they usually are, they appear like the other legs, in all their characters, excepting the long setæ at the extremity, which commonly are rather longer than the tarsus. De Haan describes the "*Megalopa mutica*" as found by him in Japan,* and also at the Cape of Good Hope, and it is quite probable that the species was a *Marestia*, for no characters mentioned are at variance with this conclusion; possibly the *Marestia elegans*. But the absence of long setæ on the posterior tarsi, in the different figures of the *mutica*, does not allow us to pronounce on an identity, while De Haan says, "Specimina Japonica omnino cum Gallicis convenire videntur," at the same time citing the published figures. If not a *Marestia*, the *M. mutica* is the type of another genus.

MARESTIA ELEGANS.

Carapax antice angustus et superne visus bilobatus, pone oculos viz saliens, lateribus fere parallelis. Pedes antici parvi, manu oblongâ, margine inferiore et superficie internâ remote hirsutis. Pedes 2di marginibus sparsim ciliati, tarso infra 7-spinoso, ad basin tuberculum infra non gerente. Pedes duo postici paulo breviores, tarso infra 6-spinoso, apice unguiculato et 4 setis longis instructo.

Carapax anteriorly narrow, and as seen from above bilobate, margin behind the eyes hardly salient, sides nearly parallel and abrupt.

* Faun. Japon. Crust., 166.

Anterior feet rather small, hand oblong, with a few remote ciliæ on lower side. Feet of second pair sparsely ciliate along the margins, tarsus below with seven spines, and without a tubercle at base. Posterior feet shorter, tarsus with six spines below, apex unguiculate and furnished also with four longish setæ.

Plate 31, fig. 2 *a*, animal, enlarged four diameters; *b*, front view of front; *c*, outer antennæ; *d*, second maxilliped; *e*, third or outer maxilliped; *f*, hand; *g*, same, with fingers closed; *h*, tarsus of third pair of legs; *i*, tarsus of fifth pair.

Off Cape of Good Hope, abundant.

Length of carapax, four to five lines. Carapax, translucent and smoky brown within; surface, spotted with bright blue, and legs the same; abdominal segments, brown, with a row of largish blue spots near posterior margin; last segment, colourless; eyes, blue-black within, with a greenish reflection. Arm and carpus unarmed.

Krauss mentions that the *Megalopa mutica* was found by him at the Cape of Good Hope; and we have suspected that the above may be the species he obtained. The *mutica* is figured by Desmarest without the setæ of the posterior tarsi, and more recently in the same manner by Edwards, in Cuvier's Animal Kingdom; and moreover, it has the lobes of the front more projecting. It differs from the *spini-tarsus* of Say, in having four instead of three terminal setæ to the posterior tarsi, and from the *atlantica*, in having the posterior tarsi spinous below, like the preceding,—in the number of setæ, being four instead of three,—and the spines of the other tarsi, seven in number, without a basal tubercle.

MARESTIA ATLANTICA.

Carapax antice angustus et superne visus bilobatus, pone oculos vix saliens, lateribus postice parce divergentibus. Pedes antici parvi, manu oblongâ, nudâ aut nudiusculâ. Pedes 6 sequentes nudiusculi, tarso infra 5-spinoso, ad basin tuberculum instar calcis infra gerente. Pedes postici minores, tarso parvulo, infra non spinoso sed setularum brevium paribus duabus instructo, apice unguiculato et setis tribus armato.

Carapax anteriorly narrow, and, as seen from above, rather strongly bilobate, behind the eyes hardly salient, sides posteriorly somewhat divergent. Anterior feet small, hand oblong, naked or nearly so. Six following legs naked or nearly so. Tarsus with five spines and a seta, and at base a tubercle like a heel to the tarsus; posterior pair smaller, tarsus small, not spinous below, but having two pairs of short setules or hairs, at apex unguiculate and armed with three long setæ.

Plate 31, fig. 3 *a*, animal, enlarged four diameters; *b*, outer antennæ, enlarged; *c*, tarsus of third pair; *d*, *ibid*, of fifth pair; *e*, part of one of the setæ of posterior tarsus; *f*, hand; *g*, front view of beak.

Atlantic, lat., $8\frac{1}{2}^{\circ}$ south; long., 26° west. Collected on the 9th of November, 1838, at 4 A. M.

Length of carapax, three lines. Body, nearly transparent; faint reddish colour in the legs, and finely dotted with brown. The carapax is narrow in front, with the margin a little sinuous posterior to the eyes. The hand is smooth, quite broad and compressed, the part anterior to the fingers being hardly as long as its height. The carpus has a spine on the inner margin. Of the setæ at the extremity of the posterior tarsi, two are in part serrate, as in figure 3 *e*, while the other is simply setulose. The tarsi of the second, third, and fourth pairs of legs, instead of having seven spines below, like the *elegans* or *spinitarsus*, have a tubercle at base, in place of the first spine, and a seta in place of the second. The spines, as stated, are prolongations of the shell, and thus differ widely from hairs or setæ. Caudal appendages reach a little beyond extremity of abdomen; plates oval and edged with plumose hairs.

MARESTIA PERVALIDA.

Carapax antice latus, et superne visus obsolete quadrilobatus, lobis subæquis, lateribus postice non divergentibus, propeque medium unidentatis. Pedes antici pervalidi, manu crassâ, tumidâ. Tarsi postici infra spinosi, apice setis tribus instructi.

Carapax anteriorly broad, and as seen in a vertical view obsoletely

four-lobed, the lobes subequal; sides posteriorly not diverging, near middle a single tooth. Anterior feet very stout, hand large and tumid. Posterior tarsi spinous below, and having three setæ at tip.

Plate 31, fig. 4, animal, enlarged eight diameters.

Pacific Ocean, six miles from Hall's Island, one of the Kingsmill Group. Collected one specimen at 4 A. M., April 14, 1841.

Length, two lines. Colour, strawberry-red; legs, same colour, but paler; antennæ, not coloured. Front a little narrower than the posterior margin, and nearly straight. Body and legs short hairy. The very stout hands and the tooth on the side of the carapax, as well as its general form, give this species a peculiar aspect. It has, however, the outer antennæ and posterior tarsi of the other species. The carapax is truncate behind, and rather narrower there than directly behind the eyes.

GENUS MONOLEPIS, Say.

We have seen specimens of but two species of this genus, that of Say, the *M. inermis*, and another from the East Indies, collected by the author. These agree in many points.

The carapax is broadest behind, and narrows gradually forward, and in front, its width between the eyes is about half the width posteriorly. The form is very obese, and nearly straight in front. The beak is flexed downward and a little backward, and its surface is but faintly sulcate at middle; the extremity is tricuspidate, the medial point nearly an equilateral triangle, the others much shorter and hardly acute. The sides are high and vertical, and are impressed obliquely for the second, third, and fourth pairs of legs; while each leg of the fifth pair when folded up, lies in a rather abrupt fossa upon the latero-posterior surface of the carapax. The upper surface of the carapax, in each species, has the outline and most of the markings in fig. 5 *b*. The eyes are large and somewhat oblique. Between the buccal area and the sternal fossa there is a prominence, with the surface around depressed. The sternal plates project in a subacute edge, as a border to the sternal fossa. The orbit is large; but the eyes are not retractile; there is a break in the margin below, where the base of the

outer antennæ stands. The inner antennæ have a globular base. Posterior to the orbit, there is an abrupt tuberculiform projection, which is not seen in an upper view, and not below, without removing, or moving to one side, the anterior legs. The abdomen has a very short penult joint; and the last or caudal segment is nearly semicircular; the caudal lamellæ are single either side and long ciliate. The hand is somewhat gibbous above, with the fingers rather more than half the whole length. The tarsi are depressed styliform, and are edged along either margin with a few short setæ or hairs.

The species are nearly identical in all their characters.

MONOLEPIS ORIENTALIS.

Sterni segmenta fossam sterni includentia anterior margine interiore fere truncata; segmenta proxima parce convexa, non tuberculigera. Tuberculus medianus inter aream buccalem et fossam sterni simplex, subtriangulatus antice acutus, postice hemisphericus. Tarsus pedum 5torum styliformis, apice 3 setis tarso longioribus armatis, infra 4 setulis perbrevis.

The first of the sternal pieces bordering the sternal fossa truncate at inner margin, this and the following without tubercles. The median sternal tubercle between the buccal area and the sternal fossa triangular, with the triangle pointing forward and rounded behind. Posterior feet having the tarsus short, not unguiculate, having three long setæ at apex, and below, four very short hairs, but no spines.

Plate 31, fig. 5 *a*, animal, enlarged four diameters; *b*, carapax; *c*, under view; *d*, front view of front; *e*, outer maxilliped; *f*, extremity of second pair in profile; *g*, extremity of fifth pair.

Sooloo Sea. Collected, Feb. 3, 1842.

Length of carapax, four lines. Body obese, and much convex. The depression of the carapax for receiving the posterior legs, abrupt and deep, with the margin prominent. Surface of the carapax in its anterior half, with seven punctures forming an arc convex forward, also, more posteriorly, two punctures and a reticulate structure; in

the posterior half, near posterior margin, a transverse depression. The long setæ of the posterior tarsi are nearly twice as long as the tarsi. The other tarsi are depressed, and sparsely fringed on the margin with short hairs; those of the anterior margin as long as the diameter of the tarsus, and those of the posterior, about half this length.

This species is exceedingly near the *Monolepis inermis*. In that species, however (see fig. 6, Plate 31), the anterior pieces of the sternum (*s*) bordering the sternal fossa have the inner margin triangulate, and the following piece either side (*t*) has a prominent tubercle on the surface. Moreover, the small prominence (*r*), at the middle of the sternum, between the buccal area and the sternal fossa, consists of three subordinate tubercles, two more anterior than the other. In the figure referred to, *b*, is the buccal area in outline, the parts within being omitted; *p*, the prominence either side behind the orbits, not seen in an upper view.

GENUS CYLLENE, Dana.

Carapax fronte simplicissime rostratus, rostro vix deflexo. Pedes 8 postici ad basin infra uni-spinigeri. Pedes 5ti Atis parce minores, depressione carapacis ad eos recipiendos parce concavâ, tarso lamellato, versus apicem elongatè setigero.

Carapax with a simple beak in front, and beak hardly deflected. Eight posterior feet at base below armed with a short spine, tarsi unarmed. Feet of fifth pair a little shorter than the preceding; the depression of the carapax for receiving the legs slightly concave; tarsus lamellar, long setigerous towards apex.

This genus is very close to Leach's *Megalopa*, but is peculiar in the lamellar posterior tarsi.

CYLLENE HYALINA.

Rostrum parce prominens. Carapax subovatus, p̄ne oculos marginibus paulo saliens, postice inermis. Cephalothorax infra postice inermis.

Pedes antici mediocres, carpo inermi, manu paulo tumidâ, supra gibbosâ, digitis liantibus, apice inflexis, acutis. Pedes 2di 3tii 4tique subæqui, tarsis fere rectis, longis, articulo penultimo longioribus.

Beak but little prominent. Carapax subovate, with the margin behind the eyes somewhat salient, posteriorly unarmed. Cephalothorax behind unarmed below. Anterior feet of medium size, carpus unarmed, hand somewhat tumid, fingers gaping, tips inflexed and acute. Feet of second, third, and fourth pairs subequal, tarsi long and nearly straight, longer than penult joint.

Plate 31, fig. 7 *a*, animal, enlarged four diameters; *b*, outer maxillipeds; *c*, hand; *d*, tarsus of third pair; *e*, tarsus of fifth pair; *f*, outer antennæ.

Atlantic, in open sea, off Rio Negro, Northern Patagonia, January 22 and 23, 1839; also, off Valparaiso, May, 1840.

Length of carapax, three to four lines. Colourless and hyaline, with one or two green spots in the joints of the legs. Eyes, black but with bright blue reflections. Second pair of legs longer than the following; tarsus edged with very short hairs. Last segment of abdomen at extremity truncated, sides rounded.

CYLLENE FURCIGER.

Rostrum elongatum, spiniforme, frontis latitudine non brevior. Cephalothorax ad extremitatem posteriorem spinis duabus longis divergentibus infra armatus. Pedes anticiangusti, carpo articuloque 2do spinâ curvatâ armatis, brachio inermi. Tarsi 2di 3tii 4tique parce arcuati, styliformes.

Beak long and spiniform, longer than breadth of front. Cephalothorax below and behind armed with two large and long divergent spines. Anterior feet narrow, carpus and second joint armed with a short curved spine, arm unarmed. Tarsi of second, third, or fourth pair very sparingly arcuated, styliform.

Plate 31, fig. 8 *a*, beak and front; *b*, two divergent spines of pos-

terior part of cephalothorax below; *c*, anterior leg; *d*, posterior tarsus.

Sooloo Sea.

Length of carapax, one and a half lines. The long spines at the posterior part of the thorax below start from the medial line, and are widely divergent, being seen projecting either side of the base of the abdomen. The tarsus of the posterior pair of legs is rather narrower than in the *hyalina*. The upper margin of the carapax behind is not armed. The hand is oblong, and not much inflated.

GENUS TRIBOLA, Dana.

Carapax fronte fere horizontalis, tricuspidatus, rostro (vel cuspidè medianâ) cuspidibus externis vix longiore et supra sulcato. Antennæ internæ inter rostrum et cuspidès externas aperte inflexæ. Pedes postici parce minores, tarsi styliformi infra armato, setis longis non instructo.

Carapax in front nearly horizontal, tricuspidate; beak (or middle cusp) hardly longer than the cusps either side, and sulcate above. Inner antennæ, when flexed, exposed in the interval between the beak and the cusps adjoining. Posterior feet little smaller, tarsus styliform and armed with spines below, not furnished with long setæ.

TRIBOLA LATA.

Carapax latè ovatus, paulo longior quam latus, rostro et cuspidibus externis fere remotis, his apice acutis et paulo divaricatis, marginibus pone oculos parce undulatis. Pedes antici tenues, manu pedibus sequentibus vix crassiore.

Carapax broad ovate, a little longer than broad, intervals either side of beak quite broad (nearly as broad as long); lateral cusps acute, a little divaricate at apex. Margin behind eyes a little undulate. Anterior feet slender, hand hardly stouter than the following legs.

Plate 31, fig. 9, animal, enlarged.

From the stomach of a Bonito, taken in the Atlantic, off the Canaries, lat., 27° north, long., 19° west, Sept. 27, 1838.

Length, nearly half an inch. Beak straight, not apiculate at apex, but appearing emarginate, the emargination corresponding to the channel above. Carapax behind deeply concave. The hand of first pair of legs not larger in diameter than the carpus or arm. Third pair of legs longest. Last joint of eight posterior legs sharply spinous below. Abdomen oblong-oval. Caudal appendages oblong-elliptical, provided with long plumose setæ.

TRIBOLA PUBESCENS.

Carapax pubescens, oblongus, subovatus, pone oculos undulatus, rostro lineari, marginibus obsoletè denticulato, spatiis inter rostrum et cuspides externas angustis. Pedes antici rostrum paulo superantes, angusti, manu dextrâ non latiore quam carpus, octo sequentes fere duplo longiores, secundi tertiis breviores.

Carapax pubescent, oblong, subovate, undulate behind the eyes, beak narrow linear, margins obsoletely denticulate, spaces either side quite narrow. Anterior feet extending a little beyond apex of beak, narrow, rough linear, not stouter than preceding part; eight following feet nearly twice as long as anterior pair, second pair shorter than third.

Plate 31, fig. 10 *a*, animal, enlarged; *b*, beak; *c*, left hand.

Pacific, at Carlshoff and Peacock Islands, in the Paumotus. Collected September, 1839, in shallow waters along shores, often under stones.

Length, between two and three lines; ratio of length to breadth of carapax, as 1.4 : 1. Colourless; transparent. The linear beak has a

rounded prominence at apex, which is abruptly narrower than the preceding part. Carapax concave behind, with posterior angles rounded; a rounded prominence on the margin posterior to eyes, just anterior to base of first pair of feet. The fifth pair of legs is the shortest, the second next shortest. The last joint is oblong (half as long as preceding), and spinous beneath, with six or seven stout spines, of which the second from apex is stoutest; also one spine near apex on outer margin. There is a spine directed upward on the base of the inner antennæ, as it lies folded adjoining the beak. Whole body—the carapax, abdomen, exterior maxillipeds, and legs—pubescent with very short hairs. Exterior maxillipeds not in contact; third joint much smaller than second.

The species may be the young of a *Plagusia*.

TRIBE III. MACROURA.

BEFORE considering the classification of the Macroura, we must again bring into view the prominent characteristics distinguishing the typical forms among them, from those of the Brachyura. These characteristics are not equally pronounced in all the Macroura. There are variations of development or condition, and these variations mark the greater or less affiliation of the species to the Brachyural, or Macroural type. The same organs and the same range of characters, therefore, which separate the grander divisions of Decapods or Eubranchiates, are generally of pre-eminent importance in tracing out the minor groupings, and their value in the former case is to a certain extent, a criterion of their value in the latter. We must, therefore, have these characteristics in mind, as the first and most essential step towards a correct appreciation of the natural distinctions and arrangement of the species. The attention of the reader is therefore again directed to these characteristics, as detailed on page 49 of this volume.

There are also relations to the Anomobranchiates, or the *Squilla*

and Mysis groups, a grade of species inferior to the Macrourea. The following are the only points in these distinctions which it is necessary now to consider. In the Macroureal *type*:—

A. The branchiæ are thoracic, and are covered by the carapax [instead of being uncovered, and sometimes attached to the abdominal appendages, or wholly wanting, as in the Anomobranchiates].

B. The abdomen is either shorter or but little longer than the thorax [instead of being very much longer, as in *Squilla*].

C. The legs are simple [instead of being two-branched].

We may now apply these distinctive characters in deducing the natural subdivisions of the Macrourea.

a. A free extended abdomen, with pairs of natatory appendages below, and caudal appendages behind; inner antennæ without fosses, and vulvæ in the base of the third pair of legs, characterize all the Macrourea without exception.

b. The lateral suture of the carapax, strongly marked in the Brachyura, is almost wholly confined to Brachyural species, and to the few Anomoural. De Haan makes the absence of this suture an invariable law for the Macrourea, and, as has been stated, he has transferred the Galatheidea from the Macrourea to the Anomoura, on this ground. But there are still a few true Macroureal species which have this peculiarity; these are the THALASSINIDEA or digging Macrourea, and they are thus widely separated from the other groups. But few of the species fail of it.

c. The bending of the carapax either side to form the under surface of the cephalothorax and its union to the epistome, is one of the most striking features of the Brachyura. But, while in most Macrourea the sides are free, there are a few species which approximate to the Brachyura in this respect. This is prominently seen in *Scyllarus*, *Eryon*, *Palinurus*; also, less distinctly in *Astacus* and *Nephrops*, genera that link the preceding to the more typical Macrourea. We observe, therefore, that here is a natural line of division among the Macrourea, marking off a group of *superior* grade—the ASTACIDEA. The importance of this distinction is brought out by De Haan.

d. The *absence* of a scale from the base of the outer antennæ, is, without exception, characteristic of the Brachyura; while its *presence* marks the typical Macrourea. The few Macrourea in which the scale is wanting, hence, bear evidence in this of their higher grade. They

pertain either to the group Astacidea, already pointed out as of superior rank among Macrourea, or to the Thalassinidea, a group ranging towards the same high rank in some of its characteristics, as shown in the longitudinal sutures of the carapax. Throughout both these groups, the scale is either wholly absent, or of comparatively small size.

e. Operculiform outer maxillipeds are seldom to be found among the Macrourea. They occur in a genus of Thalassinidea—*Callianassa*; also in the genus *Gnathophyllum* among the Caridea, and less perfectly in *Pontonia*. In either case the approximation is but slight to the true Brachyural form, in which these organs are not only lamellar, but are fitted neatly to the epistome and lateral margins of the buccal area.

In this review we have indicated the separation of two groups from the other Macrourea, namely, the Thalassinidea and Astacidea. They approach, as shown, most nearly to the Brachyura. It remains to consider, whether the remaining species constitute a single group or more than one. The principle upon which we look for a farther subdivision, rests still on a divergence from the Brachyural structure, that is, an inferior state of concentration in the nervous system as indicated in the structure of the species.

There is no peculiarity of the Brachyura more striking and more uniform than that of the position of the strong chelate legs. They are invariably the anterior pair. This, therefore, is one of the marks of that superior force which belongs to the anterior part of the cephalothorax, that is, of that more highly organized nervous system, which gives to the anterior part of the body its superior or subcephalic character. Among the Macrourea, the diffusion of the forces is apparent not only in the largely developed abdomen, the presence of natatory abdominal appendages, the prolonged thorax, and elongated antennæ without fossettes, and eyes without orbits; it is also seen in the backward transfer of power among the legs. The anterior pair retain their supremacy in the *Astaci* and *Thalassinidea*, although we find a following pair, or two, sometimes small chelate. Among the other Macrourea, the same fact is observed, as, for instance, in *Alpheus*; but often, as in *Palæmon* and others, the second pair is the larger and more powerful pair. These two classes of species—those with the first pair strongest, and those with the second pair so—are so

related in other characters, that no line of demarcation can properly be drawn between them. It appears to be upon this level, admitting of a vibration of force between these two pairs, that the numerous modifications occur among the typical Macroura; for, while the larger second pair, in certain genera, might imply a lower grade, other characters come in as a counterpart to raise the type to a level with those species having the first pair largest, and the gradations from the one to the other are by insensible shades. There is, therefore, no natural subdivision based on this difference of structure.

But this backward transfer of force, or diffusion among the posterior ganglia, takes also another step among the Macroura, so that in certain species, the cephalic part of the body is still less of a head than in those before referred to. The power of the arms, instead of resting between the first and second pairs of thoracic legs, passes to a pair still more posterior, the third pair; and this third pair is not feebly chelate—a fact true of the same legs in *Astacus*,—but it is the strongest and longest pair, to which the two anterior are subsidiary and not in any sense superior. This is the case in the Penæi. This characteristic may, therefore, serve to divide the Macroura, exclusive of the Astacidea and Thalassinidea, into two groups, the CARIDEA and PENÆIDEA.

There are species still lower (*Acetes* and the allied), in which all the legs have the feebleness of those in *Mysis*; even the third pair is not chelate, or only obsoletely so. The anterior legs have no higher value or functions than the posterior. These are properly the lowest of the Macroura, and constitute a division of the Penæidea. Some of them have even one or two posterior pairs of thoracic legs wanting, as in some of the *Mysis* group, and in the Entomostraca.

On these grounds, we institute four grand divisions of the Macroura. We leave it for others to decide whether or not the Thalassinidea should be divided into a higher and lower group, equivalent to the other groups here adopted, on the ground of the branchiæ being solely thoracic or partly abdominal appendages; if so, the number of groups would be *five*, three in the *typical* line, and two in the *aberrant*.

The four groups may be characterized as follows:—

- I. THALASSINIDEA.—Carapax duabus suturis longitudinalibus subdivisus, sæpeque suturâ dorsali transversâ. . Antennæ externæ squamâ basali nullâ vel parvâ instructæ. Pedes 6 postici directione non consimiles; antici longiores et crassiores, fossorii et sæpius chelati.

- II. *ASTACIDEA*.—Carapax suturâ dorsali transversâ sæpe notatus, suturis longitudinalibus obsoletis, testâ antero-laterali cum epistomate connatâ. Antennæ externæ squamâ basali sive nullâ sive parvâ instructæ. Pedes 6 postici directione fere consimiles; antici crassiores, sive didactyli sive monodactyli. [Branchiæ penicillatæ.]
- III. *CARIDEA*.—Carapax suturâ nullâ notatus, epistomate antice non connatus. Antennæ externæ squamâ basali grandi instructæ. Pedes 6 postici directione fere consimiles, 1mi vel 2di crassiores et chelati, 3tii 4tis similes. [Branchiæ foliosæ.]
- IV. *PENÆIDEA*.—Carapax suturâ nullâ notatus, epistomate antice non connatus. Antennæ externæ squamâ basali grandi instructæ. Pedes 1mi 2dique 3tiis non crassiores, 3tii sæpius crassiores longiores et chelati; raro pedes toti debiles et tenues, 3tiis sive obsoletè chelatis sive omnino vergiformibus.

The *Thalassinidea* are related on one side with the *Paguri*, which they approach in the carapax, in the legs in part, and at times in the form of the head and the base of the outer antennæ (as in *Gebia* especially); and, on the other side, they have affinities with the *Squillidæ*. The line of gradation which they occupy between the *Anomoura* and *Anomobranchiata*, is wholly separate from that occupied by other *Macroura*. This section, therefore, is distinct in its range, and cannot properly fall into the section *Astacidea*, where it is placed by De Haan.

The *Astacidea*, *Caridea*, and *Penæidea*, viewed as a whole, constitute together a second line, between the higher *Decapods* and the *Anomobranchiata*, ranging towards the *Mysidæ*. The first is the highest group of the three, and is partly *Brachyural* in its characteristics. It is not, however, especially related in any points to the *Anomoura*; and we therefore view this line, not as a line of gradation from the *Anomoura* down, but rather, that in which the *Macroura* reach upward to their more exalted forms. The *Astacidea* are therefore the *MACROURA SUPERIORA*, while the *Caridea* are the *MACROURA TYPICA*, and the *Penæidea* are the *MACROURA INFERIORA*. In the same manner we might designate the *Thalassinidea*, descriptively, as the *MACROURA PAGURO-SQUILLIDICA*.

The Astaci are widely separated from the Scyllari and Palinuri, by Milne Edwards, on the ground of their having a basal scale to the outer antennæ, while the others have none. But this distinction is not allowed by him to lead to a subdivision of the Thalassinidea, which it should do, if so important. De Haan makes the same separation, although he rejects the character derived from the basal scale of the antennæ, and rests his distinction on the union of the sides of the carapax to the epistome, which in the Astaci is less perfect, or by a suture. But De Haan, as stated, groups with the Astaci the Thalassinidea, a widely divergent group, many species of which show no trace of this union of the carapax to the epistome, any more than Palæmon and Penæus. The Astaci form the transition between the other Astacidea and the Caridea; and it does not seem desirable or proper to make a separate division to include alone these transition species.

We have already remarked, in the course of our observations on the Anomoura, respecting the propriety of separating the Galatheidea and Ægleidea from the Macroura. Should these groups still be retained among the Macroura, they would form together a section, Anomoural in affiliation, having the posterior thoracic leg, short and inflexed alongside of or beneath the carapax; the former constituting one family in the section, having the branchiæ made up of serial leaflets, and the latter, another family, having the branchiæ made up of clusters of filaments.

There is a singular group of Crustacea, which has been referred to the Macroura, that includes the genus Cuma, and some others allied.

These animals have many marks of degradation, or rather, of immaturity. The branchiæ are reduced to a single pair; the eyes are covered by the carapax, and hardly moveable; the abdominal appendages are generally obsolete, and the caudal pair is styliform; the carapax is short, leaving three posterior segments of the thorax as distinct segments or rings, very much as in Cyclops. If actually mature, they should constitute another division of the Macroura—the Cumidea, *Entomostracic* in type. But, according to recent observations by Professor Agassiz, communicated by him to the author, the Cumæ are in part, if not always, the young or immature forms of certain Macroura, as Alpheus, Palæmon, and Hippolyte. This distinguished observer has actually obtained Cumæ from the eggs of *Crangon septemspinus*, *Pulæmon vulgaris*, and *Hippolyte aculeata*.

SUBTRIBE I. THALASSINIDEA.

THE group Thalassinidea is remarkable for the wide limits in rank covered by the species. As has been observed, they fill up an interval between the Anomoura and Squillidea, forming an almost complete line, independent of the other Macroura; they inosculate with the latter (particularly with the Astacidæ) in a few species only, without entering into a common series with them. There is great diversity in the legs, the branchiæ, the maxillipeds, and more remarkably still, in the carapax, and the abdomen with its appendages. We dwell here upon the peculiarities of the carapax alone, as the other points have been more fully developed by other authors.

In some species, as those of the genus *Gebia*, the head has an unusual vertical height, as seen in a profile view; the outer antennæ are placed low and the base is in view, very much as in *Cenobita*; indeed, a comparison brings out a very close similarity to that genus in the position of these parts. In others, as *Callianassa* and *Thalassinia*, the outer antennæ have a much higher position, being nearer the beak; and the base is covered by the expanded side of the carapax. In this, we have a resemblance to the genus *Pagurus*, which differs in this way from *Cenobita*. The figures on Plate 32 exhibit well these peculiarities.

The subdivision of the carapax by sutures, is strikingly diverse in different genera, although conformed to a single system. There is commonly a transverse *dorsal suture*, and either side of the dorsal portion of the carapax, a *longitudinal suture*, more or less distinct. The transverse suture passes either side into the dorsal, and partly or wholly follows it to the anterior margin of the carapax. The two sets of sutures together, hence divide the carapax into four parts or areas, a dorsal anterior, a dorsal posterior, and two lateral.

Let us now examine into the forms of these areas, and the subdivisions they undergo.

The longitudinal suture either side commences at the base of the outer antennæ, and extends to the back margin of the shell; the position of the base of the antennæ will therefore modify somewhat the direction of the longitudinal sutures. In *Gebia*, where the insertion of these antennæ is at an unusually low level, this suture as-

cends obliquely on leaving the front margin; while in *Callianassa* it is nearly horizontal. Hence, in a side profile view of the antero-dorsal portion of *Gebia*, its form is triangular, being highest at middle; while in *Callianassa*, the height is small and nearly equal throughout. At first sight, it seems as if the oblique suture of *Gebia* is wanting; but on consideration, it appears evident, that it only has a different position, and in each there is the same termination of the suture near the base of the outer antennæ. The same difference exists between *Cenobita* and *Pagurus*.

The sutures, thus far alluded to, are all that exist in *Callianassa*. But in other genera there are additional sutures, subdividing either the lateral pieces, or the postero-dorsal, or both. In *Gebia* and *Thalassina* there is a strong suture, sometimes the strongest or most open in the carapax, dividing vertically with a curve the lateral pieces into an *anterior* and a *posterior* portion. In *Thalassina*, this suture descends from near the transverse dorsal suture; in *Gebia*, it has a more posterior position, a large interval separating it from this dorsal suture; its direction is also more oblique, bending more forward, as it descends with a curve towards the lower margin, which it hardly reaches (see Plate 32). In *Thalassina*, this suture is very open, except at a single point of coalescence, and the edge of the posterior portion is dentate or denticulate; although so apparent, it is lost before reaching the lower margin. The point which it would reach if extended is normally very near the same as in *Gebia*.

This suture hence divides the lateral pieces into an antero-lateral and postero-lateral; the antero-lateral is oblique from above downward and forward in *Gebia*, and from above downward and backward in *Thalassina*.

The antero-lateral piece is not farther subdivided in *Thalassina*, or not distinctly so. But in *Gebia*, it is crossed often by a horizontal suture, a little oblique, which divides it into a lower and upper (or marginal and inner) portion. This suture is seen in the lateral view of *Gebia hirtifrons* (pl. 32, fig. 2).

The postero-dorsal piece is broad, and without any subdivisions in all the genera excepting *Thalassina*. In this genus its form is narrow, becoming narrower behind and terminating in a point. Moreover in its posterior part it is crossed by two or three sutures looking something like obsolete articulations. A corresponding suture sometimes occurs for a short distance in the lateral piece adjoining, as seen in

the figure of *Thalassina gracilis*, as if a transverse articulation marked the lateral pieces as well as the medial. In the species referred to, there are two quite distinct sutures on the dorsal piece, and another, anterior to these, more faint, appearing to divide this piece into four segments.

Such are some of the diversities of structure in the carapax of the Thalassinidea. The genera *Axius*, *Calocaris*, and *Laomedia*, differ little in these respects from *Gebia*. In *Axius stirhynchus*, there are only faint traces of the dorsal longitudinal sutures, nearly as in *As-tacus*.

In studying out the homologies of these sutures and the areas they bound, we may first compare the species with the structure in *Pagurus* and *Æglea*, and we would therefore refer again to Plate 28, fig. 4, and Plate 32, figs. 1, 5. A general resemblance is at once apparent. In figures 1 *a* and 1 *b* of the *Gebia pugettensis*, and 5 *a*, 5 *b* of *Thalassina gracilis*, the transverse dorsal suture (*d*) is similar to that of *Pagurus* and *Æglea*; it bends forward on either side to the base of the outer antennæ. The longitudinal dorsal sutures (*p*) are also similar, and either correspond to *p* or *l*. In *Gebia*, the suture *n* is distinct, and the piece *S* of *Pagurus* and *Æglea*, with the space below, has its analogue. In *Thalassina*, the suture *n* is also distinct, though losing itself below, as in *Pagurus*, and the position of it differs from *Gebia*, only in resembling *Pagurus* more closely, although the area *S* is not distinct. It is hence obvious that the structure of the carapax in the Thalassinidea is essentially the same as in *Pagurus* and *Æglea*.

With regard to the relations of these portions of the carapax, or of the sutures separating them, to the Brachyural structure or the normal series of segments, we offer the following considerations, in addition to those presented on page 32 and the following. The portion of the carapax pertaining to the second antennary segment must be the anterior dorsal portion, if the distinction exists. This part covers or encloses the antennary portion of the front, and is circumscribed by a strong suture. It seems, therefore, to be normally this segment and the whole of it. If the rest of the carapax is to be considered the epimeral portion of this segment, what are we to say of its dividing sutures? for they seem to show that this posterior part contains a medial and two epimeral pieces of its own, as if normally an independent segment. Again, the antero-lateral piece in *Gebia* passes with a broad surface into the postero-dorsal, a long part of the longi-

tudinal suture separating them. In *Thalassina*, this union seems to be almost intercepted, yet there is a narrow connexion which is unbroken by a suture. In each, therefore, the antero-lateral piece and the postero-dorsal (or, at least, its anterior part) have a mutual dependence; and the absence of a suture between in one case, and its indistinctness in the other, compared with the transverse dorsal suture, show that this dependence is of the closest kind, even that of parts of a common normal segment; moreover, the postero-lateral piece also is probably a part of the same. We may, therefore, conclude, that the anterior and posterior divisions of the carapax in the *Thalassinidea*, are normally distinct segments; and they correspond, the first to the second antennary normal segment, and the second to the mandibular.

This conclusion, in all its extent, should not be taken as universal for the *Macroura*, or even for the *Thalassinidea*. It has been shown among the *Entomostraca*, that, while the carapax has similar relations to those of the *Brachyura* in some genera, in others, closely allied as the *Cyclopacea*, it undergoes a subdivision into segments. And this subdivision depends partly on the connexion of the carapax with the thorax beneath. The whole carapax, as in *Cypris*, may normally pertain to one or two cephalic segments; again, some of the posterior of the thoracic segments, as in *Cyclops*, may so unite in constituting it, or as it were come to the surface dorsally, that the articulations of these segments become apparent. This last fact may afford the true explanation of the transverse sutures in the postero-dorsal piece in *Thalassina*. The normal segments below, here seem actually to contribute to the carapax; and the sutures corresponding in the postero-lateral portion of the carapax appear to indicate the same articulations or segments, and properly their epimeral portions. The correspondence is so close between these posterior subdivisions and the articulations in the *Entomostraca*, referred to, that we cannot fail to see in both, exemplifications of a single general law. The *Thalassinidea*, however, afford us a good ground for a general conclusion with regard to the other *Macroura*. This is evident from the structure of the carapax in *Astacus*, a genus more closely related than any other to the *Thalassinidea*. There is in this genus a transverse dorsal suture, which is very distinct. But besides this, there are traces of the longitudinal sutures of the posterior part of the carapax, as shown in the figures, on Plate 33; and these sutures are separated sometimes by a narrow linear area, as in *Thalassina*, and sometimes by a broader area,

as in *Gebia* and *Callianassa*. The parts in the *Astaci* and *Thalassinidea* have, consequently, like relations.

In the *Macroura*, therefore, it is probable that the *anterior* part of the carapax corresponds generally to the second antennary normal segment, and the *posterior* and lateral to the mandibular segment, the lateral portions being epimeral to the segment last-mentioned. The *former* corresponds to the main body of the Brachyural carapax, the *latter*, to only its ventral pieces (epimerals of Edwards) separated from the rest by a longitudinal suture.

But before the difficulties of this subject are wholly cleared up, we must consider more particularly the actual relations between the longitudinal suture in the *Brachyura* generally, and those in *Æglea*, *Pagurus*, and the *Thalassinidea*. This suture of the *Brachyura* exists distinctly in *Galathea*, and is the only suture; and in this genus of *Anomoura*, therefore, the carapax must have the same normal relations as in the *Brachyura*. In *Æglea*, a genus near *Galathea*, we find the Brachyural and Macroural sutures strangely combined; there is a lateral (*l*), the analogue of the Brachyural, and besides this, another longitudinal (*p*), nearer the middle of the back, and the latter is the more distinct. The same is shown also in *Pagurus*. Such transition peculiarities in these transition forms are of great interest, and at first thought, are perplexing to the mind. The next grade (represented among the *Thalassinidea* and very many *Paguridæ*) presents but one of these sutures, the other being obsolete; and from the much greater distinctness of the *inner*, in *Pagurus* and *Æglea*, we infer naturally, that it is the outer or true Brachyural suture that has become obsolete. This would also be inferred from the resemblance in the medial area between *Pagurus* and *Thalassinia*; the greater width of this area in *Gebia* does not seem to vitiate the conclusion; for we find both the broad and narrow form in the *Astaci*.

These facts might be thought to prove, that the suture in the *Brachyura*, as Milne Edwards has argued, is only an epimeral suture, inasmuch as the longitudinal suture corresponding, is so subordinate in the *Paguri* and related forms.* But if we remember that these are only transition forms, and this is but the dying out of the Brachyural structure, as the species pass to the Macroural type, we shall not thus conclude. The suture *l* (corresponding to the Brachyural), is

* With regard to the *Macroura*, M. Edwards supposes the posterior region epimeral to the anterior.

wholly absent, as stated, in most of the Paguridæ, and is but faintly seen in any of them; while the *transverse* suture becomes the grand suture of division in the Macroural carapax, being the most prominent, and the last to disappear as the species descend in rank.

From the remarks which have been made, it is clear that there are at least three distinct varieties of structure among the Thalassinidea, one illustrated by Gebia, one by Callianassa, and one by Thalassina. There are other characters which point to these as three important subdivisions of this group. These subdivisions pertain to the section of the Thalassinidea having thoracic branchiæ alone. The other division, in which there are abdominal branchial appendages, contains but two genera. The following is, therefore, our classification of the Thalassinidea:

LEGIO I. THALASSINIDEA EUBRANCHIATA.

BRANCHIIS THORACICIS INSTRUCTA TANTUM.

Fam. I. GEBIDÆ.—Maxillipedes externi pediformes. Appendices caudales et aliæ abdominales latæ.

Fam. II. CALLIANASSIDÆ.—Maxillipedes externi operculiformes. Appendices caudales latæ.

Fam. III. THALASSINIDÆ.—Maxillipedes externi pediformes. Appendices caudales lineares.

LEGIO II. THALASSINIDEA ANOMOBANCHIATA.

PEDES ABDOMINIS APPENDICIBUS BRANCHIALIBUS INSTRUCTI.

The known genera of living species of Thalassinidea are as follows:—

LEGIO I. THALASSINIDEA EUBRANCHIATA.

FAM. I. GEBIDÆ.

- G. 1. *GEBIA*, *Leach*.—Digitus paris antici inferior obsolescens. Pedes 2di 3tii 4ti 5tique monodactyli. Rostrum tridentatum. Antennæ externæ squamâ basali carentes.
- G. 2. *AXIUS*, *Leach*.—Manus latæ, digito inferiore elongato. Pedes 2di minores, sublamellati, didactyli; 3tii 4ti 5tique monodactyli. Rostrum simplex, triangulatum. Oculi pigmento perfecti. Antennæ externæ squamâ basali parvâ instructæ.
- G. 3. *CALOCARIS*, *Bell.**—Manus graciles, digito inferiore elongato. Pedes 2di minores, cheliformes, 3tii 4ti 5tique monodactyli. Rostrum ac in *Axiö*. Oculi pigmento corneâque carentes. Antennæ externæ squamâ basali parvâ instructæ. Segmentum caudale oblongum.
- G. 4. *LAOMEDIA*, *De Haan*.† Manus ac in *Axiö*. Pedes 2di monodactyli, quoque 3tii et 4ti; 5ti obsoleti.
- G. 5. *GLAUCOTHÖE*, *Edwards*.—Manus ac in *Axiö*. Pedes 2di 3tiique pediformes ac in *Paguro*; 4ti 5tique subcheliformes. Antennarum internarum flagella articulo breviora precedente.

FAM. II. CALLIANASSIDÆ.

- G. 1. *CALLIANASSA*, *Leach*.—Oculi sublamellati, corneâ medianâ et non marginali. Flagella antennarum internarum articulo precedente longiora. Pedes 1mi grandes, bene didactyli; 2di didactyli minores, 3tii articulo penultimo late lamellati.
- G. 2. *TRYPÆA*, *Dana*.—Pedibus *Callianassæ* affinis. Flagella antennarum internarum articulo breviora precedente, antennis subpediformibus.

FAM. III. THALASSINIDÆ.

- G. 1. *THALASSINA*, *Latreille*.—Manus validæ, multo inæquæ, digito immobili manus majoris brevi. Pedes 2di articulo penultimo lamellati, 3tii 4ti 5tique angusti, monodactyli.

LEGIO II. THALASSINIDEA ANOMBRANCHIATA.

- G. 1. *CALLIANIDEA*, *Edwards*.—Pedibus *Callianassæ* affinis, anticis bene didactylis, 2dis et 3tiis minoribus, didactylis, compressis, 4tis 5tis subcylindricis. Oculi ac in *Callianassâ*.

* British Crustacea, p. 231.

† Faun. Japon. Crust., p. 162.

G. 2. CALLISEA. — (Isæa, Guérin; Callianisea, Edwards.) Forsan a *Callianideâ* nihil differt, teste Edwardsio (Crust., ii. 321).

The name Isæa was changed by Edwards, on account of its previous use, to Callianisea, which, as this so closely resembles Callianassa and Callianidea, we would change again to Callisea.

I. THALASSINIDEA EUBRANCHIATA.*

FAMILY I. GEBIDÆ.

GEBIA PUGETTENSIS.

Frons tridentatus, dente mediano triangulatus, superficie supernâ usque ad suturam dorsi transversam scabrâ et hirsutâ. Manus marginibus pilosa, non spinulosa nec dentata, superficie externâ lævis non costata, lineâque densè hirsutâ longitudinaliter notata, digito inferiore dentiformi, crasso, acuto, non incurvato, digito mobili elongato, inermi, margine piloso. Pedes 2di infra longissimè ciliati. Antennæ externæ quoad basin partim pilosæ, flagellis paulo hirsutis. Segmentum caudale transversum, rectangulatum, integrum.

Front tridentate, median tooth triangular, upper surface nearly to dorsal suture scabrous and hirsute. Hand pilose at the margins, but not spinulous nor dentate, outer surface smooth, not costate, having a hirsute or lanose longitudinal line just below the middle; tooth corresponding to lower finger stout, acutish, not incurved; moveable finger elongate, unarmed, pilose at margins. Second pair of feet having the lower side very long ciliate. Outer antennæ with the basal portion in part pilose, the flagellum somewhat hirsute. Caudal segment transverse rectangular, entire.

* The following new species of Thalassinidea are described in brief by the author in the Proceedings of the Academy of Nat. Sci. of Philadelphia, for January, 1852.

Plate 32, fig. 1 *a*, animal, natural size; *b*, profile view of carapax, enlarged four diameters; *c*, hand, enlarged two diameters; *d*, caudal extremity.

Puget's Sound.—C. Pickering.

Length, two inches. The outer antennæ have at base the appearance of an appendicular scale, lying against the third basal joint; the form is narrow lanceolate, and its edge on both sides is long ciliate; but it appears to be only a part of the surface of the third joint, without separate motion. The carpus is short triangular, and has a spine at apex; also, a row of short spinules near its lower margin. The arm is not denticulate at the upper margin, which is naked, but has an even row of delicate teeth on the lower margin. The outer surface of the hand is convex; and besides having a lanose line below the middle, it has a line of distant short hairs above the middle, and the hairs of the lower part of this surface conceal entirely the lower finger in a view from the outer side.

GEBIA HIRTIFRONS (*White*).

Plate 32, fig. 2 *a*, animal, natural size; *b*, view of front, enlarged; *c*, side view of carapax, enlarged; *d*, hand; *e*, caudal segment; *f*, appendages either side.

Bay of Islands, New Zealand; found along shores, burrowing, like an Annelid, in the earth, among stones, near low water mark.

Length, two inches nearly. Colour, pale reddish. Scabrous surface of front part of carapax not reaching more than half way to dorsal suture, and the points mostly in six nearly longitudinal lines. Hand with the outer surface smooth, no spinules or denticulations, and few hairs on the upper margin; on lower margin, small denticulations, and rather hairy; lower finger slender and somewhat incurved; caudal segment not broader than long. Flagella of inner antennæ a little shorter than the last joint of base. Outer antennæ about as long as abdomen. A spine at lower apex of carpus.

G. hirtifrons, A. WHITE, Ann. and Mag. Nat. Hist. [2], i. 225; Voy. Erebus and Terror, pl. 3, f. 5.

FAMILY II. CALLIANASSIDÆ.

CALLIANASSA GIGAS.

Frons paulo triangulatus. Manus major valde compressa, lævis, carpo non duplo longior, digitis brevibus, dimidio manus brevioribus, sparsim hirsutis, consimilibus, non hiantibus, superiore arcuato, acuto, brachio angusto, ad basin infra dentigero sed vix latiore, paululo longiore quam carpus, intus vix dentato. Segmentum caudale appendicibus caudalibus vix brevius.

Front low triangular. Hand very much compressed, thin, smooth, not twice as long as carpus, fingers short, not half as long as hand, nearly similar in form, sparsely hirsute, not gaping, the upper arcuate and acute, not dentate within; arm narrow, below at base having a tooth, but not much broader there on this account, little longer than carpus. Caudal segment scarcely shorter than the appendages.

Plate 32, fig. 3 *a*, animal, natural size; *b*, eye, enlarged; *c*, arm; *d*, inner antennæ.

Puget's Sound.—Lieut. Case.

Length, four and a half inches. The outer antennæ are often thrown directly back along the carapax, by a flexure at the second and third articulations of the base. The longitudinal sutures of the carapax are very nearly straight. The posterior portion of the carapax is but little more than one-third the length of the anterior. The eye-peduncles are flat, and the eye is near the middle of the upper surface. The right of the anterior feet is the larger in our two specimens. The carpus is as broad as the hand; its length equals the length of the hand, exclusive of the fingers, and its breadth is about three-fourths the length of the arm.

GENUS TRYPÆA, Dana.

Callianassæ maxillipedibus externis pedibusque affinis. Antennæ internæ subpediformes, flagellis articulo basis ultimo brevioribus.

Near *Callianassa* in outer maxillipeds and feet. Inner antennæ subpediform, flagella shorter than last basal joint.

The name of this genus is from *τροπαεω*, *I bore*, alluding to the burrowing habits of the species of *Thalassinidea*.

TRYPÆA AUSTRALIENSIS.

Frons non triangulatus. Pedes antici valde compressi, brachio carpo manuque pedis majoris supra acutis. Manus major lata, lævis, carpo paululo longior; digitis fere dimidii manus longitudine, non hiantibus, intus subtiliter denticulatis, superiore paulo longiore, arcuato, carpo paulo minore quam manus, brachio cum processu cultriformi juxta basin infra armato. Segmentum caudale non longius quam latum, postice arcuatum.

Front not triangular. Anterior feet much compressed, arm, carpus, and hand having an acute edge above. Larger hand broad, smooth, but little longer than carpus, fingers nearly half as long as hand, not gaping, finely denticulate within, superior finger a little the longer, arcuate, carpus somewhat smaller than hand, arm having a cultriform process below near base. Caudal segment about as long as broad, nearly rounded at apex.

Plate 32, fig. 4 *a*, animal, natural size; *b*, part of inner antennæ; *c*, part of outer maxillipeds.

District of Illawarra, New South Wales, along shores.

Length, two and three-fourths inches. Eyes on very short peduncles. Outer antennæ about half as long as body. Fingers with a

few short tufts of hairs. Lower as well as upper edge of hand, arm, and carpus, acute. Right hand the larger. We have not the specimen to verify the drawing, which we suspect may be wrong in the eyes.

FAMILY III. THALASSINIDÆ.

THALASSINA GRACILIS.

Carapax lævis, rostro perbrevis, acuto, margine extraorbitali acuto. Abdomen sparsim pubescens, marginibus integris, segmento caudali paulo oblongo, postice bene rotundato, non longiore quam appendices caudales. Pedes 1mi subæqui, valde compressi, manu angusto-elongatâ, margine superiore subacuto, breviter spinoso, inferiore integro et inermi, digito mobili paulo brevior quam pars manus anterior, angusto, fere recto, seriatim pubescente, digito immobili plus dimidio brevior, acuto. Pedes 6 postici tenues; 5ti paulo breviores.

Carapax smooth; beak very short, acute, also an acute point just exterior to eyes. Abdomen sparsely pubescent, margins entire; caudal segment a little oblong, regularly rounded behind, not longer than the caudal appendages. Anterior feet subequal, much compressed; hand long and narrow, with upper margin trenchant, spinulous, and lower entire unarmed; finger a little shorter than part of hand anterior to it, narrow, nearly straight, seriatly pubescent; immoveable finger not half as long as moveable finger, acute. Six posterior feet slender, fifth pair a little the shortest.

Plate 32, fig. 5 *a*, animal, natural size; *b*, side view of carapax; *c*, beak, upper view; *d*, first pair of legs; *e*, second pair; *f*, part of exterior maxillipeds; *g*, caudal extremity.

From shores of Telegraph Island, near Singapore.

Length, two and a half inches. Eyes very small, projecting about half as far as beak. Base of second antennæ projecting but little

beyond beak, very slender; the flagellum reaching as far forward as the anterior legs. The large hand is longer than twice its width. Either side of the beak there is a slight ridge running longitudinally for a short distance from the front edge. The postero-lateral piece of the carapax has the anterior margin denticulate. The postero-dorsal piece is subacute behind, and has two distinct transverse sutures, besides another more anterior less distinct.

SUBTRIBE II. ASTACIDEA.

THE division Astacidea is identical with the "Familia Macroura Astacina" of De Haan, in its extent and subdivisions, except that we exclude the Thalassinidea, which De Haan places in the same subdivision with *Astacus*, and we do not add the Megalopidea, as they appear to have closer relations with the Anomoura. The following are the families adopted:

1. *Antennæ externæ squamâ basali non instructæ. Pedes antici monodactyli.*

Fam. I. SCYLLARIDÆ.—Carapax valde depressus, marginibus lateralibus sat tenuibus, carapace lateraliter subito inflexo. Antennæ externæ laminatæ, breves. Sternum trigonum.

Fam. II. PALINURIDÆ.—Carapax subcylindricus, lateraliter late rotundatus. Antennæ externæ basi subcylindricæ, longæ. Sternum trigonum.

2. *Antennæ externæ squamâ basali instructæ. Pedes antici didactyli.*

Fam. III. ERYONIDÆ.—Carapax non oblongus, depressus, lateribus subito inflexis, abdomine multo angustiore.

Fam. IV. ASTACIDÆ.—Carapax oblongus, subcylindricus, abdomine parce angustiore. Sternum angustum.

In the first three families, the epistome is soldered to the inflexed carapax either side, nearly as in the Brachyura; in the last, this union takes place by a suture and is less perfect, the edge of the carapax being a little projecting.

FAMILY SCYLLARIDÆ.

THE established genera of this family are Scyllarus, Ibacus, and Thenus. The genus Scyllarus is subdivided into sections by Milne Edwards; and these sections of Scyllarus, as well as others of Ibacus, are made into subgenera by De Haan, after a profound study of their characters. De Haan has not named the new divisions; and in adopting them as genera, we give names to those that are new.

1. *Carapax oblongus vel subquadratus, non transversus. Oculi versus cephalothoracis angulos externos insiti.*

G. 1. SCYLLARUS, *Fabr.*—Rostrum valde saliens. Latera carapacis non incisa. Antennæ externæ inter se fere contiguæ. Palpus maxillipedis externi flagello confectus. Branchiæ numero 21. Species, *Sc. sculptus, latus, squamosus, equinoxialis, Haanii, Sieboldi.*

G. 2. ARCTUS, *Dana* (Scyllari subgenus 5tum, *De Haan*).—Rostrum perbreve, truncatum. Antennæ externæ inter se remotæ. Palpus maxillipedis externi flagello carens. Branchiæ 19. Sp. *A. ursus*, *D.* (Scyllarus arctus, *Auct.*)

2. *Carapax plus minusve transversus, lateribus non incisus. Oculi in angulis externis.*

G. 3. THENUS, *Leach.*—Oculi oblongi. Rostrum bilobatum. Branchiæ 21.

3. *Carapax plus minusve transversus, lateribus incisus. Oculi angulis externis valde remoti.*

G. 4. PARRIBACUS, *Dana* (Scyllari subgenus 2dum, *De Haan*).—Rostrum sub-

triangulatum. Antennæ externæ inter se fere contiguæ. Oculi fere in medio inter antennis internas et angulos cephalothoracis externos. Branchiæ 21. Species, *P. antarcticus* et *P. Parræ* (*Ibacus antarcticus* et *I. Parræ*, *Auct.*)

G. 5. *IBACUS*, *Leach*.—Rostrum bilobatum. Antennæ externæ inter se paulo remotæ. Oculi versus rostrum insiti. Branchiæ 21. Species, *I. Peronii*, *I. ciliatus*, *De Haan*, et *I. novemdentatus*, *Gibbes*.

The species mentioned are given by Milne Edwards, in his *Crustacés*, ii. 279–289, excepting *Sc. Haanii* of von Siebold, which is described in *Faun. Japon.*, 152, pl. 38, f. 1, and by Berthold, in *Gött. Gel. Anz.*, 1845; *Sc. Sieboldi*, *De Haan*, *Faun. Japon.*, p. 153, pl. 36, f. 1; *Ibacus ciliatus*, von Siebold, *Spicilegia Faunæ Japonicæ*, 15, and *Faun. Japon.*, 153, pl. 36, f. 2; and *I. novemdentatus*, *Gibbes*, in *Proc. Assoc. Amer.*, *Charleston Meeting*, 1850, iii. p. 193.

IBACUS ANTARCTICUS (*Rumph.*)

Plate 32, fig. 6, animal, natural size.

Upolu, Navigator or Samoa Group.

Length, seven and three-fourths inches; breadth across the line of the eyes, three and two-thirds inches; between the eyes, one and eleven-twelfths inches. Colour, yellow or smoky yellow, clouded with smoky brown and some spots of carmine; around the eye carmine. Last abdominal segment, deep ochre-yellow and short hirsute. Eye situated just exterior to base of outer antennæ. Surface of body without spines, squamato-tuberculate. Carapax with seven profound incisions laterally, each hirsute within; second incision deepest. Lateral portions of second and third abdominal segments extend outward and curve forward, with two deep incisions; the following one also extends outward, and has a deep incision, but its extremity is not anterior to its front margin. Legs projecting but little beyond the carapax.

ARCTUS VITIENSIS.

Carapax subtilissimis plumulis pubescens, spinâ pone medium frontis et alterâ gastricâ armatus, versus orbitam utrinque subcarinatus et 1-2-dentatus. Antennæ internæ nudiusculæ, articulo basis penultimo fere

duplo longiore quam ultimus. Antennæ externæ extremitate truncatæ, articulo ultimo apice 5-lobato, lobis oblongis, interno brevior, articulo 2do ultimum fere superante, extus unidentato, intus 3-dentato, superficie carinatâ, carinâ integrâ. Pedes nudi, subteretes, inermes, 2dis pergracilibus, tarso 2do duplo longiore quam 3tius.

Carapax pubescent with exceedingly minute spinules, having a spine on the median line near the front margin and another on the gastric region, near the orbits either side subcarinate, and one or two-toothed. Inner antennæ nearly naked, penult joint of base nearly twice as long as last joint. Outer antennæ truncate at extremity, last or fourth joint with five deep lobes, inner lobe shorter, second joint extending a little farther forward than last joint, having the outer margin one-toothed, and inner three-toothed, with an even carina (not toothed) on its surface. Feet naked, subterete, and not angulate, unarmed; second pair very slender, the tarsus twice longer than tarsus of third pair.

Plate 32, fig. 7 *a*, animal, enlarged four diameters; *b*, sternum, *ibid.*; *c*, leg of first pair, *ibid.*; *d*, leg of second pair, *ibid.*; *e*, leg of third pair, *ibid.*; *f*, abdominal appendage of second segment; *g*, inner antennæ.

Feejee Islands.

Length, one inch. The surface of the carapax and of the outer antennæ is covered with short minute plumes, mostly obscuring the tubercles. The anterior spine of the carapax is simple; the gastric has three or four squamiform tubercles, posterior to it; and then follows a smooth surface; then, just behind middle of carapax, on the median line, there is a prominent ridge extending backward, which is made up of two series of squamiform tubercles, but little prominent except the anterior. The second and third abdominal segments have a median piece, which is lobed anteriorly; and either side, the posterior half of the surface has a regularly lobed appearance, while the anterior half is but faintly divided into a few areolets; the fourth and fifth are also divided into areolets in two transverse series; but the series are nearly equal. The sternum is very broad for its length, with the two lobes in front rounded. The tarsi of the first and third pairs are nearly equal.

FAMILY PALINURIDÆ.

THE Palinuridæ of our present seas have been divided into two sections or subgenera of a single genus *Palinurus*, by Edwards and De Haan, being called *Palinuri communes* and *P. longicornes*, and into two genera by Gray. The species of these sections differ much in aspect; and their distinguishing characters are believed by us, sufficient to authorize the adoption of Gray's genera.

Still a third genus, which he names *Limuparus*, is proposed by Gray, for the *Palinurus trigonus*, De Haan, and the allied species. These belong to the first section, and to the genus *Palinurus*, as adopted.

G. 1. PALINURUS, *Fabr.* — Carapax vix rostratus. Annulus antennalis supra angustissimus, curvatus. Antennæ externæ basi fere contiguæ. Antennæ internæ flagellis breves.

G. 2. PANULIRUS, *Gray.* — Carapax non rostratus. Annulus antennalis supra latus, subquadratus et horizontalis. Antennæ externæ basi remotæ. Antennæ internæ flagellis longæ.

 PALINURUS LALANDII, *Lamk.*

Cape of Good Hope.

PANULIRUS SPINOSUS (*Edw.*), *Gray.*

Pacific Islands.

PANULIRUS PENICILLATUS (*Olivier*), *Gray.*

Pacific Islands.

We are unable to distinguish the separate localities of the *P. spinosus* and *P. pencillatus* owing to the loss of labels through the opening of the specimens at Washington, before the return of the Expedition.

FAMILY ASTACIDÆ.

THE Astacidæ, in the form of the body and in general habit, approach the Carideæ. But the epistome is united to the shell either side, although not so neatly as in the preceding families, since this union is by a kind of adhesion of the parts, the edge of the shell where it meets the epistome being distinct and somewhat projecting. The basal scale of the outer antennæ is, in general, much shorter and narrower than in most of the Caridea. There is, however, a gradation from the small size found in the Madagascar Astacoides, to the expanded form in Paranephrops. The anterior legs are the largest, and terminate in short hands. The next two pairs have small hands, but are scarcely stouter or longer than the remaining two pairs, which are simply unguiculate. Unlike any of the Caridea, the carapax in all the species has a strong transverse suture; and in the posterior dorsal region, traces of two longitudinal sutures may be generally distinguished, which are analogous to those in the Thalassinidea, Paguridea, and Æglea.

In the work of Edwards, this family includes only three genera, *Astacus*, *Nephrops*, and *Homarus*. These genera are adopted by De Haan, who at the same time points out other unnoticed distinctions between them. In a recent elaborate revision of the Astaci by Erichson (Archiv. f. Nat., 1846, p. 86, and 375), other subdivisions are proposed, as subgenera of the genus *Astacus*. These subgenera are *five* in number. In three of them, the first segment of the male abdomen is without appendages, while they are present in the other two. Of the latter, one subgenus (*Astacus*, mostly European), has a pair of branchiæ attached to the base of the fifth pair of legs; and another (*Cambarus*, mostly American), is without this pair of branchiæ. Of the former, *one* genus (*Astacoides*, *Guérin*), has the abdominal feet

wholly membranous, and the caudal segment undivided; in a *second* (Cheraps), these feet are calcareous, the caudal segment is membranous in its posterior segment, and the legs of the fifth pair are without branchiæ; in a third (Engæus), the legs of the fifth pair are furnished with branchiæ, the caudal extremity is as in *Astacus*.

Erichson adds in his characteristic of these subgenera, that in all of them, excepting Engæus, the outer antennæ are situated *exterior* to the inner antennæ, while in the genus just mentioned, they are *under* the inner antennæ,—a character in which the several species of Astaci widely differ, yet restricted, without sufficient study, we think, to the Engæi alone.

The subgenus *Astacooides* was first established by Guérin, in 1839 (Rev. Zool., p. 109), for the *A. madagascariensis* of Edwards, which he described the same year, under the name *Astacooides Goudotii*. Guérin erred in overlooking the small basal scale of the outer antennæ, and based his genus on its supposed absence.

The year preceding the publication of Erichson's Memoir, J. E. Gray, Esq., published a paper on some Astaci from New Holland, in an Appendix to Eyre's Discoveries in Central Australia,* in which he suggests that the genus *Astacus* may be divided into three sections, distinguished as follows:—1. Caudal segment bipartite, and each part hard and calcareous, as in *A. fluviatilis*, *A. Bartonii*, &c.; 2. Caudal segment not divided, calcareous quite to its extremity, as in *A. madagascariensis*, Edwards,† and *Franklinii*, Gray; 3. Caudal segment entire, or only slightly divided near the middle of each margin, with the texture thin and flexible posteriorly, as in *A. 5-carinatus*, Gray, *A. 2-carinatus*, Gray, and *A. chilensis*, Edwards.

In laying down these sections, the caudal segments and appendages afford the principal characters, while the existence or not of appendages to the first abdominal segment, and the presence or not of a branchia at the base of the fifth pair of legs, points seized upon by Erichson, are overlooked by Gray.

With regard to the absence of the branchia from the legs of the fifth pair in the American Astaci, the fact was first noticed by De Haan, who examined particularly the *A. Bartonii*, and *A. affinis*, and men-

* Journals of Expeditions of Discovery into Central Australia, in the years 1840, 1841, by Edward John Eyre. 2 vols., 8vo., London, 1845. Appendix, p. 410.

† Edwards says, that in the *Madagascariensis* the lateral appendages of the tail are semicorneous towards their posterior border. Archives du Muséum d'Hist. Nat. 1839.

tions it in his Faun. Japon., p. 160, stating also, that these species are thereby related to the Thalassinidea. Erichson, on examination, found that the same was true of the *A. pellucidus*, *A. carolinus*, *A. cubensis*, and *A. mexicanus*, other American species. This law has its exceptions, since the author has found an Oregon species, *A. leniusculus*, D., in which the fifth pair of legs has its pair of branchiæ, as in the European species.

Among the distinctions subdividing the genus *Astacus*, that of the presence or absence of prehensile appendages to the first abdominal segment in males, fitted for use in coition, appears to be of the first importance. These appendages are long in the European and American *Astaci*, and those of the second pair are also modified for the same end, so as to differ from those of the third and following pairs. But in the Madagascar and most Australian species, according to Erichson, these appendages are wanting, and the second pair are like the following. In the former, the caudal segment is divided transversely, and in the latter, it is not at all divided, or imperfectly so. But the texture of the caudal segment, whether calcareous or not to its tip, cannot be of much value in classification, for it varies in the same species with age, and must, therefore, be somewhat dependent on the size of the species. The presence of a branchia to the posterior pair of legs may prove to be a characteristic of importance, requiring a subdivision accordingly; but of this we doubt. In the American species without this branchia, which the author has examined, the medial postero-dorsal region of the carapax is narrow linear, while in the European species, and that from Oregon, having the full number of branchiæ, this region is quite broad. But we cannot say how far this is generally true.

For the reasons stated, we accept of *Astacoides* as a distinct genus, separated from *Astacus* by the absence of appendages from the first segment of the abdomen; and we unite with it, *Cheraps* and *Engæus* of Erichson. The occurrence of the Engæi in holes in moist earth, is not peculiar to that group, for the same habit has been observed by Prof. S. F. Baird in an American species. *Cheraps* may perhaps be retained as a subgenus under *Astacoides*, on account of the absence of the posterior branchiæ; and on the same ground, and no other of importance, *Cambarus* may be received as a subgenus under *Astacus*.

Another genus has been added to the Astacidæ by Adam White, called *Paranephrops*. It has the basal scale of the outer antennæ

much longer than the base of these organs, and, moreover, the species, unlike those of Nephrops, are fresh-water. Through Nephrops and Paranephrops the Astacoidea graduate towards the Caridea.

The genera of living Astacidae adopted, will then be as follows:—

1. *Manus crassæ et latæ, marginibus arcuatæ, superficie convexæ* (ASTACINÆ).

A. Branchiæ 19. Segmentum thoracis ultimum non mobile.—Species marinæ.

G. 1. HOMARUS, *Edwards*.—Rostrum tenue, utrinque paucidentatum. Squama basalis antennarum externarum perbrevis.

B. Branchiæ 17–18. Segmentum thoracis ultimum mobile. Rostrum integrum vel utrinque unidentatum.—Species fluviales.

G. 2. ASTACOIDES, *Guérin*.—Segmentum abdominis *maris* Imum appendicibus carens.—Subgen. *Astacoides*, branchiis 18; *Cheraps*. (*Erich.*) branchiis numero 17.

G. 3. ASTACUS.—Segmentum abdominis *maris* Imum appendicibus instructum. Subgen. *Astacus* branchiis 18; *Cambarus*, (*Erich.*) branchiis numero 17.

2. *Manus prismaticæ, lateribus fere rectæ* (NEPHROPINÆ).

G. 4. NEPHROPS, *Leach*.—Rostrum utrinque dentatum vel spinosum. Squama basalis antennarum externarum basi vix longiores.—Species marinæ.

G. 5. PARANEPHROPS, *White*.—Rostrum ac in *Nephrope*. Squama basalis antennarum externarum basi dimidio longiores.—Species fluviales.

In some recent English works, the name *Potamobius* has been substituted for *Astacus*, and *Astacus* for *Homarus*, following *Leach*, who, in 1819, made this arrangement of the species at that time referred to *Astacus*. In the nomenclature generally adopted, as is well known, the system of *Edwards* is followed, who, in the second volume of his *Crustacés*, subdivided the old genus *Astacus* in the same manner as *Leach*, but gave the name *Homarus* to the marine species, and retained *Astacus* for the rest of the genus. In the *Catalogue of Crustacea* of the British Museum, published in 1847, the names of *Edwards* are used, while in the *Catalogue of British species*, published in 1850, *Leach's* nomenclature is adopted.

Leach has undoubted priority, and exhibited his usual discrimination in proposing the subdivision of the old genus. But the appropriating of the name *Astacus* to the single marine species, violates

established principles in nomenclature. For it is giving the old name to far the smaller, instead of the larger and more characteristic part of a genus,—an objection which, if not holding against Leach himself, since the genus at the time of its subdivision by him contained but two species, is still, at the present day, seen to be of much weight. It is giving a name which belonged pre-eminently to one of the fresh-water species, the common one of Europe, and which is properly, therefore, the type of the old genus, to a division of this genus which does not include the typical species; for Gesner, as long ago as in the 16th century, called the common species of the European streams *Astacus fluviatilis*, and Linnæus named it *Cancer astacus*, both names including the name *Astacus*,—while the marine species, although early named *Astacus marinus*, was called by Linnæus, *Cancer Gammarus*. Besides this, it is introducing much confusion into the science, not only by changing the long-established names of species, but by giving a new use to the name once applied by Risso to a species of the genus *Telphusa*. There seem, therefore, to be reasons enough for rejecting Leach's names, if it is of no weight that they remained for thirty years unrecognised by British authors.

ASTACUS LENIUSCULUS.

Rostrum tridentatum, dentibus acutis, medio tenuiter elongato. Carapax lævis, punctulatus, lateraliter pone rostrum utrinque 2-spinosus; areolâ inter suturas longitudinales post-dorsales latâ. Pedes antici compressi, inermes, non tuberculati, manu lævi, punctulatâ, carpo paulo oblongo, intus recto, inermi, apice interno acuto excepto, brachio antice denticulato, apice interno elongate acuto, dorso unispinoso. Pedes sequentes nudiusculi. Segmentum caudale parce oblongum, lateribus fere parallelis. Pedes 5ti branchias parvas gerentes.

Beak tridentate, teeth acute, middle tooth slender elongate. Carapax smooth punctulate, behind beak either side with two spines (the posterior obsolescent in young individuals); postero-dorsal areolet between the longitudinal sutures broad. Anterior feet compressed, in no part tuberculate or spinous, hand smooth, punctulate; carpus

but little oblong, inner margin straight, unarmed, except a short spine at apex; arm with anterior margin denticulate, and a longer tooth at apex, on outer margin, short distance from apex, unispinous. Following pairs of feet nearly naked. Caudal segment sparingly oblong, sides nearly parallel. Fifth pair of feet bearing small branchiæ.

Plate 33, fig. 1 *a*, male, natural size; *b*, a younger individual, having the two posterior spines of frontal part of carapax obsolescent.

Columbia River and Puget's Sound.

Length of largest specimen, four inches. In the younger specimen the hands are nearly equal, while in the larger they are much unequal, the left being the larger. The punctulations of the surface are slight impressions, each bearing one or more very short and minute hairs.

ASTACUS (CAMBARUS) BARTONII (*Fabr.*), *Erichson.*

Plate 33, fig. 2 *a*, carapax and antennæ, natural size; *b*, larger hand; *c*, caudal segment.

Locality uncertain; possibly from Brazil.

The beak is entire, and terminates in a low angle; either side of its base, along the carapax, there is a low ridge, but no spines. The post-medial areolet is narrow linear, enlarging somewhat anteriorly and more posteriorly—for the exhibition of which fact, and a comparison with the corresponding part in the European and Oregon species, the figure of the carapax has been introduced into the Atlas. The hand has its upper surface and the fingers pitted and in part small tuberculate.

Astacus Bartonii, FABR., Supp., p. 407; SAY, Jour. Acad. Nat. Sci. Philad., i. 167; HARLAN, Med. and Phys. Res., p. 230, plate facing p. 230, f. 3.

A. Cambarus Bartonii, ERICHSON, Arch. f. Nat., 1846, 97.

Astacus affinis, EDWARDS, Crust., ii. 332.

ASTACOIDES NOBILIS.

Rostrum sat longum, fere integrum, apice obtusum, utrinque obsolete unidentatum, basi antennarum externarum paulo brevius. Carapax lateraliter infra rostri basin obsolete utrinque armatus. Abdominis segmenta utrinque paulo uni-tuberculata, junioris tuberculis obsolescentibus; segmentum 2dum prope marginem lateralem spinis brevibus armatum; segmentum caudale paulo oblongum. Pedes antici æqui, crassi, carpo intus elongatè trispinoso, manu infra supraque marginatâ et breviter dentatâ, superficie fere lævi, nudâ. Epistomatis processus medianus anticus triangulatus et elongatus, et perangustus.

Beak rather long, nearly entire, apex obtuse, and either side having an obsolete tooth, a little shorter than base of outer antennæ. Carapax obsoletely armed on either side below base of beak. Segments of abdomen more or less distinctly uni-tuberculate, the tubercles on younger individuals obsolescent; second segment with short spines near lateral margin; caudal segment a little oblong. Anterior feet equal, stout, carpus very prominently three-spinous, hand above and below with a prominent margin, which is short dentate, surface nearly smooth, naked. Anterior median process of epistome triangular, very narrow and elongate.

Plate 33, fig. 3 *a*, animal, natural size; *b*, anterior part of epistome, with base of outer antennæ either side.

New South Wales?

Length of body to extremity of beak, five inches. In a younger specimen, three inches long, the segments of the abdomen have but a faint tubercle on upper surface either side, while in the large one, the same surface is quite prominent in a transverse line somewhat oblique, and there is a more prominent point constituting the tubercle. The anterior triangular part of the epistome is quite oblong in the large specimen, and but little so in the smaller; it projects in both nearly to apex of second basal joint. In both, the base of the outer antennæ is close alongside of this part of the epistome, and beneath the other pair of antennæ. The head is narrow, and the epistome, in

a lateral profile view, is broad and long, and nearly vertical in direction.

PARANEPHROPS TENUICORNIS.

Rostrum elongatum, acuminatum, tenue, bases antennarum longitudine superans, utrinque 4-spinosum et posterius super carapacem utrinque aliis spinis duabus. Pedes 8 postici gracillimi. Pedes antici longi, manu vix crassiore quam carpus, margine superno biseriatim spinoso, superficiebus internâ externâque uniseriatim spinosis, margine inferiore et superficie proximâ spinuli-scabris et non seriatim spinosis.

Beak elongate, acuminate, slender, reaching beyond the bases of the antennæ, on either side armed with four spines, and posteriorly on the carapax, other two spines. Eight posterior feet very slender. Anterior pair long, hand hardly stouter than carpus, upper margin with two unequal rows of spines, outer and inner surface each with a single row, lower margin and surface adjoining spinuli-scabrous, and not seriatly spinous.

Plate 33, fig. 4 *a*, animal, natural size; *b*, under view of head, enlarged four diameters; *c*, outer maxilliped.

Fresh-water streams of New Zealand, about the Bay of Islands.

Length, three to four inches. Colour, olive-green to brown. Body smooth; a little hirsute on upper surface of beak. Two small spines near either lateral part of transverse suture. Anterior prolongation of epistome oblong triangular, acute, and distant from base of outer antennæ. The basal scale of outer antennæ with outer apex acutely prolonged; also a short point at inner apex, though mostly concealed by the fringe of plumose setæ, which extends along the inner margin, even to the outer apex. Four or five spines on side of carapax about the latero-anterior angle, two of them being on the margin. No appendages to anterior abdominal segment in male, and those of the following segments similar to one another, quite small and slender.

Unlike species of *Astacus*, the base of the outer antennæ is remote

from the anterior projecting part of the epistome, and the base of the inner antennæ is wholly inside of the base of the outer. Spines are situated on the joints, as shown in figure *b*.

This species is near the *planifrons*, but has a narrower and more slender beak, with four spines either side on the beak itself, besides having no prominent spines on the lower margin of the hand.

SUBTRIBE III. CARIDEA.

IN arranging the Caridea into groups, much stress is usually laid upon external form and length of beak. The unimportance of these characters might be inferred, from the fact that they involve no striking variations of structure: nothing but their running parallel with other characteristics of real value could entitle them to paramount consideration. A survey of the species of a single group, enables us to discover their subordinate rank. In the Crangon group, in which the form is commonly depressed and the beak short, there are species as much compressed and as long rostrate as the typical Hippolyte, with the same form and general habit; and the depressed, short-beaked Pontoniæ graduate into the compressed, long-rostrate Palæmon, by so insensible gradations, and differ from them so little in essential characters, that both groups are parts of a common family.

The relative positions of the first and second pairs of antennæ would seem to be a character of more value. But this position varies directly with the breadth or depressed form of the species; so that in the same genus Pontonia, as this genus is laid down by Edwards, these antennæ may be either in the same horizontal line, or the first more or less over the second. It is not a character indicating superiority of grade; for those Brachyura are of higher rank in which the pairs of antennæ are most nearly one above the other, while among the Macrourea the reverse is true, to at least a great extent.

Among the organs of Crustacea, those earliest in development are the *mandibles*, and any essential differences they present, are, therefore, of early origin and of a fundamental character, compared with

those of other organs posterior to them in position. The constancy of character observed in these parts throughout the Brachyura, amid all the diversities among the species, is evidence of their prime value in classification. Were they less fundamental in their relations, we should find them undergoing modifications like the maxillæ, maxillipeds, and legs; for those parts that are lowest in relative rank are those which are most liable to changes. Such are the legs, and the hinder legs for like reason are subject to the widest variations in size, with less differences in other respects than the anterior legs.

We should, therefore, give a prominence to the peculiarities of the mandibles, in our endeavours to trace out the limits of groups. De Haan, in his work on the Crustacea of Japan, has recognised their importance, and his groups are partly based upon the characters they afford. In this respect we adopt his method, yet with some modification of his subdivisions.

The mandibles may be viewed as of four distinct types.

1. Form slender, simple, much inflexed, with the crown not enlarged or dilated; as in *Crangon* and *Nika* (Plate 33), &c.

2. Form stout, simple, not inflexed, with a broad dentate terminal crown, as in the *Penæidæ*. The organ is placed very obliquely.

3. Form stout, nearly simple, the crown broad, somewhat divided into a terminal and lateral process, the terminal short and dilated; as in *Atya* (Plate 34, fig. 1) and the allied.

4. Form stout, deeply furcate above, so as to have a terminal and lateral process, each long and narrow; as in *Palæmon*, *Alpheus*, &c. (see Plates 34, 35, 36).

These forms are characteristic of prominent sections of the Caridea; sections that are well sustained by other peculiarities of structure.

Besides these peculiarities, the mandibles differ in bearing or not bearing a palpus. This distinction appears at first to be of no less consequence than those pointed out. But it is to be observed, that the portion of a mandible which is of most essential importance in the performance of its functions, is the crown. Differences in this part show difference of habit, and corresponding differences in some points of structure. But the palpus is a small, jointed, accessory appendage, having the same uses as the inner maxillæ and not affecting by its presence or absence the capability of the mandible to fulfil its end. This view is sustained by a reference to the species themselves. Among the Palæmons, the organ varies greatly in size, being rela-

tively large in some species, and quite short and slender in others; and there is, also, a gradation from species with a three-jointed palpus, to those in which this appendage is almost obsolete, consisting of but two very small joints. Such changes occur among species that would be called true Palæmons. And it is a fact worthy of note, that the length of the palpus varies with the disjunction of the flagella of the inner antennæ. If the two flagella that are conjoined at base are united only for a very short distance, the palpus is long; if nearly to the summits of these flagella, the palpus is reduced to two joints. Again, if the union is almost or quite through the entire length of the flagella, the palpus is altogether obsolete. Hence, the existence or absence of a palpus is equivalent among the Palæmonidæ to the existence of three or two flagella to the inner antennæ; and no other essential characters, higher than those of generic value, accompany such variations.

It is, therefore, true, both on general and specific considerations, that the presence or absence of the palpus is a fact of far less taxonomic value than the differences in the form of the crown or triturating portion of the mandible. It may guide in subdividing into genera, but cannot be used for grouping the genera themselves.

The differences in the mandibles lead to a subdivision of the groups into families. The slender incurved form of the mandible of Crangon, Nika, and Gnathophyllum, is of a wholly different character from the stout straight form and broad oblique crown of Atya, or the two-branched summit of the mandible in Palæmon, Hippolyte, and Alpheus: and the science is much indebted to De Haan for bringing forward these characters in his classification.

Besides the characters based on the mandibles, there are others which bear on the arrangement of the Caridea.

The development of the two outer pairs of maxillipeds into slender legs, which is sometimes observed, is a character of great value. It is commonly true that the outer pair is pediform, and thus the Macroura show their low rank; but when a *second* pair is also pediform, it marks another step of degradation, evincing a further diffusion of the forces posteriorly, along the ganglionic cord. This peculiarity is a source, therefore, of important distinctions among the species.

The presence of the palpus of the thoracic legs, and its enlargement to a natatory appendage in some species, a prominent characteristic of the Schizopods, can hardly be employed in subdividing the

Caridea. Even in the inferior group of Oplophorinæ, we have one genus without the palpi, and another with them much elongated. The Penæoids, also, illustrate the little importance to be attached to this development of the palpus of the legs.

We cannot regard, moreover, in studying out the families, the length of the beak, or the relative position of the pairs of antennæ.

De Haan has observed that in some of the genera, the carapax behind overlaps laterally the first abdominal segment, and in others, the first abdominal segment overlaps the margin of the carapax. The latter must be considered as evidence of a higher grade than the former, since the body is more firmly compacted by this method of connexion, while the free carapax is a universal characteristic of the lowest grade of the Macroura, as well as of the Anomobranchiates. But we have not been able to verify his application of this character in laying down his subdivisions, neither have we succeeded in applying it as a basis of arrangement. His "Palæmonidea" and "Alpheidea," as far as we have examined specimens of the species, have the abdominal segment overlapping the carapax, no less than the "Crangonidea" and "Atyadea," although De Haan's characteristic makes it otherwise.

The natural families at which we arrive from our survey of the subject, are as follows: while they diverge widely from the system of Milne Edwards, they coincide in part with those of De Haan, though under a different general arrangement.

1. *Maxillipedes 2di breves, lamellati.*

Fam. I. CRANGONIDÆ. — Mandibulæ graciles, valde incurvatæ, non palpigeræ, coronâ angustâ et non dilatatâ. Pedum pares 1mi 2dique inter se valde inæqui.

Fam. II. ATYIDÆ. — Mandibulæ crassæ, non palpigeræ, coronâ latâ, parce bipartitâ, processu terminali brevi et dilatato. Pedum pares 1mi 2dique inter se æqui, carpo nunquam annulato.

Fam. III. PALÆMONIDÆ. — Mandibulæ crassæ, sive palpigeræ sive

non palpigeræ, supra profunde bipartitæ, processu apicali oblongo, angusto.

2. *Maxillipedes 2di tenuiter pediformes.*

Fam. IV. PASIPHÆIDÆ.—Mandibulæ uti in *Atyidis*.

It will be observed, that the *Alpheus* group is not a separate division in this classification, but is included with the *Palæmonidæ*. Among the characters usually given to it, there are none that are important as distinctions, and any application of them is full of exceptions and difficulties. The absence of a beak in the genus *Alpheus* gives a peculiar appearance to the species; but this character does not belong to the other accepted *Alpheidæ*. The genus *Pontonia* is closely related to *Palæmon*, much more nearly than to *Alpheus*. A depressed form and short beak characterize some of the species; but from these there is a transition by slight shades, of difference, to *Palæmon*. In both groups, the hands of the second pair of legs are stout, whereas, in *Alpheus*, they are filiform and annulated.

In the farther subdivision of the families into subfamilies, we deem it of the first importance to regard the relative character of the first and second pairs of legs. The distinction between them is so wide and unvarying, through all the *Brachyura*, that characters based on the differences, cannot be of small value among the *Macroura*. We, therefore, place the species having the *first* pair the stouter in a separate subfamily from those in which the *second* is the stouter.

We here present a synopsis of the families, subfamilies, and known genera.

FAM. I. CRANGONIDÆ.

SUBFAM. 1. CRANGONINÆ.—Pedes 1mi 2dis crassiores. Maxillipedes externi pediformes. Digitus mobilis in manus marginem claudens, immobilis spiniformis. Pedes 2di non annulati.

G. 1. CRANGON, *Fabr.*—Rostrum brevissimum. Oculi liberi. Pedes 2di chelis armati, 4ti 5tique acuminati, gressorii.

- G. 2. *SABINEA*, *Owen*.*—Rostrum brevissimum. Oculi liberi. Pedes 2di chelis carentes; 4ti 5tique acuminati, gressorii.
- G. 3. *ARGIS*, *Kröyer*.†—Rostrum nullum. Oculi sub carapace fere occulti. Pedes 2di chelis armati.
- G. 4. *PARACRANGON*, *Dana*.—Rostrum elongatum. Oculi liberi. Pedes 2di obsoleti, 4ti 5tique acuminati, gressorii.

SUBFAM. 2. *LYSMATINÆ*. — Pedes 1mi 2dis crassiores. Maxillipedes externi pediformes. Digniti subæqui uno ad alterum claudente. Pedes 2di annulati.

- G. 1. *NIKA*, *Risso*.—Rostrum breve. Antennæ internæ duobus flagellis confectæ. Pedes antici impares, uno chelato, altero monodactylo. Carpus paris 2di elongatus, annulatus.
- G. 2. *LYSMATA*, *Risso*.—Rostrum elongatum, subensiforme. Antennæ internæ tribus flagellis confectæ. Pedes antici ambo chelati. Carpus paris 2di elongatè filiformis.
- G. 3. *CYCLORHYNCHUS*, *De Haan*.‡—Rostrum sat breve, compressum et suborbiculare. Carpus 2dus brevis, pauci-annulatus.

SUBFAM. 3. *GNATHOPHYLLINÆ*. — Pedes 2di 1mis crassiores. Maxillipedes externi lati, operculiformes.

- G. 1. *GNATHOPHYLLUM*, *Latreille*.

FAM. II. ATYIDÆ.

SUBFAM. 1. *ATYINÆ*.—Pedes thoracici palpo non instructi.

- G. 1. *ATYA*, *Leach*.§—Rostrum breve, depressum. Antennæ internæ flagellis duobus confectæ. Pedes 4 antici sat breves, carpis sublunatis, cuspidè inferiore manum ferente, digitis penecillo setarum longo ad apicem armatis; 3tii 5tis multo longiores et crassiores.
- G. 2. *ATYOIDA*, *Randall*.||—Rostro, antennis pedibusque anticis *Atyæ* affinis. Pedis 3tii tenues, 5tis breviores. [An distinctio valida?]
- G. 3. *CARIDINA*, *Edwards*.—Rostrum sat breve sat longum. Antennæ internæ flagellis duobus confectæ. Pedes 2di 1mis longiores, digitis parium amborum

* *Owen*, Append. Voy. Capt. Ross, p. 82.—*Crangon septemcarinatum*, *Sabine*.

† *Tidskrift*, iv. 1843, p. 217.

‡ *Faun. Japon. Crust.*, p. 174.

§ In a paper on new species of *Atya*, by G. Newport, in the *Ann. Mag. Nat. Hist.*, xix. (1847), 158, a species is attributed to Apia, Upolu, in New Zealand. Apia is on the Island of Upolu, which is one of the Navigator or Samoan Group, in the Pacific.

|| *Journ. Acad. Nat. Sci. Philad.*, viii. p. 140.

apice penecilli armatis, carpis Imis perbreuibus et antice excavatis, 2dis subcylindricis oblongis.

SUBFAM. 2. EPHYRINÆ.—Pedes thoracici palpo instructi.

- G. 1. EPHYRA, *Roux, De Haan*.*—Rostrum dentatum. Antennæ internæ flagellis duobus confectæ. Pedes 4 antici parvi, nudi vel nudiusculi. Pedes 6 postici graciles.

FAM. III. PALÆMONIDÆ.

SUBFAM. 1. ALPHEINÆ.—Pedes 1mi crassiores, chelati, 2di filiformes, carpo sæpius annulati et chelati. Mandibulæ palpigeræ.

- G. 1. ALPHEUS, *Fabr.*—Rostrum brevissimum. Antennæ internæ flagellis duobus confectæ. Oculi sub carapace occulti. Manus paris 2di major non inversa, digito mobili superiore. Pedes 2di carpo filiformes, annulati. Maxillipedes externi subtenues, mediocres.—Species maris calidioris.
- G. 2. BETÆUS, *Dana.*—Rostrum nullum. Oculis et ceteris *Alpheo* plerumque affinis. Manus paris 2di major fere inversa, digito mobili inferiore vel exteriori.—Species maris frigidioris.
- G. 3. ALOPE, *White*.†—Rostrum breve, inter spinas duas longas insitum hisque sæpe partim celatum. Antennæ internæ flagellis duobus confectæ. Maxillipedes externi longissimi. Oculi paulo salientes.
- G. 4. ATHANAS, *Leach*.—Rostrum breve. Antennæ internæ flagellis tribus confectæ. Oculi paulo salientes. Pedes 2di carpo annulati.
- G. 5. HIPPOLYTE, *Leach*.‡—Rostrum sat longum, plus minusve ensiforme, non mobile. Abdomen medio deflexum. Antennæ internæ flagellis duobus confectæ. Oculi salientes. Pedes 2di carpo annulati.
- G. 6. RHYNCOCINETES, *Edwards*.—Rostrum ensiforme, mobile, fronte articulo-coniunctum. Oculi antennæque uti in *Hippolyte*. Pedes 2di carpo non annulati.

[Ubi pertinet genus sequens?

- G. AUTONOMEA, *Risso*.—Pedes antici crassi, chelati. Pedes 2di non chelati et carpo non annulati, 3tiis similes. Maxillipedes externi tenues. Rostrum breve. Oculi salientes. Antennæ internæ flagellis duobus confectæ; externæ squamâ basali non instructæ.]

SUBFAM. 2. PANDALINÆ.—Pedes antici gracillimi, non chelati, 2di filiformes, carpo annulati.

* De Haan, Faun. Japon., p. 185, pl. 46, f. 7.

† Ann. and Mag. Nat. Hist., [2] i. 225.

‡ Periclimenes, *Costa* (Ann. dell' Acad. degli Aspir. Nat. di Napoli, ii. 1844), hardly differs from *Hippolyte*, according to *Erichson*, Arch. f. Nat., 1846, p. 310.

G. PANDALUS, *Leach*.

SUBFAM. 3. PALÆMONINÆ.—Pedes 4 antichi chelati, 2di 1mis crasiores, carpis nullis annulatis. Pedes nulli palpigeri.

1. *Antennæ internæ duobus flagellis confectæ. Mandibulæ non palpigeræ.*

- G. 1. PONTONIA, *Latreille*.—Corpus depressum. Rostrum breve. Oculi parvuli. Maxillipedes suboperculiformes, articulo 2do lato, 3tio 4toque simul sumtis longiore, his subeylindricis.
- G. 2. ŒDIPUS, *Dana*.—(Pontonia, *Auct.*) Corpus plus minusve depressum. Rostrum longitudine medioere. Oculi permagni. Maxillipedes externi latiusculi, articulis totis latitudine fere æquis. Tarsi infra elongatè gibbosi.
- G. 3. HARPILIUS, *Dana*.—(Pontonia, *Auct.*) Corpus non depressum. Rostrum longitudine medioere. Oculi magni. Maxillipedes suboperculiformes, articulo 2do lato, 3tio 4toque simul sumtis brevior, his subeylindricis. Tarsi uncinati, infra non gibbosi.
- G. 4. ANCHISTIA, *Dana*.—Rostrum tenue, sæpius ensiforme et elongatum. Corpus vix depressum, sæpe compressum. Oculi medioeres; antennæ duobus flagellis instructæ, unâ parce bifidâ. Maxillipedes externi omnino tenues, pediformes.

2. *Mandibulæ palpigeræ.*

a. Oculi aperti.

- G. 5. PALÆMONELLA, *Dana*.—Corpus non depressum. Rostrum sat longum, dentatum. Oculi medioeres. Mandibularum palpus bi-articulatus, perbrevis. Antennæ internæ flagellis duobus confectæ, uno apicem bifido. Maxillipedes externi tenues.
- G. 6. PALÆMON, *Fabr.**—Corpus non depressum. Rostrum longum, dentatum. Oculi medioeres. Palpus mandibularum 3-articulatus. Antennæ internæ flagellis tribus confectæ. Maxillipedes externi tenues. Pedes 2di nunquam lamellati.
- G. 7. HYMENOCERA, *Latreille*.—Corpus non depressum. Rostrum sat longum. Oculi medioeres. Pedes 2di tenuiter laminati, latissimi; 1mi tenuissimi, manu minutâ. Maxillipedes externi subfoliacei.

b. Oculi sub carapace celati.

- G. 8. CRYPHIOPS, *Dana*.—Rostrum longitudine medioere. Oculi parvuli, omnino occulti. Antennæ internæ flagellis tribus confectæ. Maxillipedes externi subtenues.

[Ubi pertinet Genus TYPTON, *Costa* (Annal. dell' Acad. degli Aspir. Nat. di Napoli, ii. 1844); squamâ basali antennarum externarum carens; Pontoniæ affinis.]

* *Leander*, Desmarest (Ann. Ent. Soc. France, 1849, p. 87), is here included.

SUBFAM. 4. OPLOPHORINÆ.—Pedes 1mi sive didactyli sive vergiformes; 2di chelati, crassiores. Squama antennarum externarum acuminata, extus spinis armata.

G. 1. OPLOPHORUS, *Edwards*.—Rostrum longum, dentatum. Antennæ internæ flagellis duobus confectæ. Pedes toti palpigeri, 4 antici chelati. [Abdominis dorsum processibus spiniformibus uno vel pluribus armatum.]

G. 2. REGULUS, *Dana*.—Rostrum longum, dentatum. Antennæ internæ flagellis duobus confectæ. Pedes nulli palpigeri, 2 antici non chelati, 2di crassè chelati. Mandibularum palpus 3-articulatus. [Abdominis segmentum 3tium dorso postico instar spinæ longæ productum.]

FAM. IV. PASIPHÆIDÆ.

G. 1. PASIPHÆA, *Savigny*.—Rostrum obsolescens. Antennæ internæ flagellis duobus confectæ. Pedes 4 antici subæqui, manibus gracilibus.*

FAMILY CRANGONIDÆ.

SUBFAMILY CRANGONINÆ.

CRANGON VULGARIS, *Fabr.*

Bay of San Francisco, California, and Puget's Sound, Oregon.

This species was first reported from the California coast by Owen, in the *Voyage of the Blossom*, *Crust.*, p. 87.

CRANGON MUNITUS.

Rostrum brevissimum, rotundatum. Carapax partim 7-carinatus, ca-

* Brief descriptions of the following new species of *Macroura* are published by the author in the *Proc. Acad. Nat. Sci. Philad.*, for January, 1852.

rinâ mediâ (vel primâ) bispinosâ, 2dâ unispinosâ, brevi, 3tiâ nudâ, 4tâ unispinosâ, brevi. Abdomen læve, inerme. Manus nuda. Pedes 2di 3tiis vix breviores, 4ti 5tique paulo hirsuti, 5tis minoribus. Maxillipedes externi utrinque valde ciliati. Segmentum caudale apice subacutum et quatuor setis instructum.

Beak very short and rounded. Carapax in part seven-carinate, middle carina bispinous, second, or next either side, with one spine anteriorly, third naked, fourth with one spine and short. Abdomen smooth, unarmed. Hand naked, thumb short. Second pair of feet hardly shorter than third, fourth and fifth somewhat hirsute, the last smaller. Outer maxillipeds long ciliate. Caudal segment subacute at apex, and having four slender setæ.

Plate 33, fig. 5 *a*, animal, natural size; *b*, extremity of caudal segment.

Puget's Sound.

Length of body, one inch and ten lines; of carapax, six lines. The flagellum of the outer antennæ is a little uneven, with short hairs. The extremity of the abdomen is short triangulate at apex. The spines of the carapax are nearly parallel with its surface.

GENUS PARACRANGON.

Crangoni similis. Pedes 2di omnino obsoleti, 4ti 5tique acuminati, gressorii. Oculi liberi.

Near *Crangon*. Second pair of feet wholly obsolete, fourth and fifth pairs acuminate, gressorial. Eyes free.

The only species of this genus is from Puget's Sound, and is rough with spines, besides having a long, reflexed beak, and an inflexed abdomen. The form is very much like that of an Hippolyte. There are eight specimens in the collections, and all agree in having the second pair of legs obsolete.

PARACRANGON ECHINATUS.

Rostrum elongatum, porrectum, apice bidentatum, dorso unidentatum, juxta basin infra unispinosum, spinâ longâ porrectâ. Carapax multispinosus, medio dorso inæque 4-dentatus, utrinque 5-7-spinosus. Abdomen superne partim carinatum, superficie paulo sculptum, lateribus acutis. Manus elongata, digito immobili longo et gracillimo. Pedes 4ti 5tique fere nudi, subæqui.

Beak elongate, obliquely porrect, bidentate at apex, uni-dentate above near middle, at base below in front a long curved spine. Carapax multispinous, along middle of back unequally four-toothed, either side 5-7-spinous. Abdomen above partly keeled, somewhat sculptured, sides acute. Hand elongate, immoveable finger long and very slender. Fourth and fifth pairs of feet nearly naked subequal.

Plate 33, fig. 6 *a*, animal, natural size; *b*, under view, showing natural position of first, third, and fourth pairs of legs, the second pair being obsolete; *c*, upper view of carapax; *d*, profile of penult abdominal segment in vertical view; *e*, mandible; *f*, *g*, extremity of mandible, different views; *h*, second maxilliped; *i*, outer maxilliped.

Puget's Sound, Oregon, obtained by dredging.

Length of body, one and three-fourths inches. Length of beak half as long as carapax, or rather longer than the line of it along the back. The exterior maxillipeds are very slender and short hairy. The fourth abdominal segment has a tooth and inside of it an emargination either side of middle, and the fifth is nearly similar.

SUBFAMILY LYSMATINÆ.

NIKA HAWAIENSIS.

Rostrum brevissimè triangulatum, oculis multo brevius, latius quam longum. Squama antennarum externarum basi internarum parce

brevior. Pedes antici subæqui, dexter chelatus, nudiusculus. Articulus pedis 2di 4tus 3tio vix longior, non annulatus; carpus 11-articulatus, articulis quatuor anticis vix disjunctis. Pedes 6 postici subæqui, nudiusculi, gracillimi.

Beak very short triangular, much shorter than eyes, broader than long. Scale of outer antennæ, hardly as long as base of inner pair. Anterior feet subequal, right foot chelate, nearly naked. Fourth joint of feet of second pair slightly longer than third, not annulate; carpus eleven-jointed, first four joints faintly separated. Six posterior feet subequal, very slender, nearly naked.

Plate 33, fig. 7 *a*, female with eggs, enlarged, outer maxillipeds wanting; *b*, mandible; *c*, first maxilliped; *d*, second maxilliped; *e*, left hand leg of first pair; *e'*, same, more enlarged; *f*, leg of second pair; *g*, leg of third or fourth pair; *h*, tip of beak.

Lahaina, Island of Maui, Hawaiian Group, Pacific.

Length of body, eight lines (a female with eggs). The beak has a minute point below at tip, seen with a high magnifier, and also two minute hairs directed upward, as shown in figure *h*. The breadth of the triangular beak is about twice its length, and its length is not half the length of the eyes. The tarsi of the six posterior feet is unarmed on inner margin, but has numerous short setæ around it near tip. The mandible has two stout teeth above, with a more slender one, and a cutting edge on a little lower level, precisely as in Crangon. The base of the outer antennæ is nearly as long as the basal scale.

FAMILY ATYIDÆ.

THE maxillæ and maxillipeds of the following species have a peculiar calcareous character, unlike the usual membranous texture of these organs. The mandible, though divided at summit into a ter-

minal and lateral process, still has the appearance of having a simple corona with a continuous cutting edge; yet the dentate portions are distinct, and the intermediate edge is setigerous or ciliate. The abdomen is twice as long as the carapax, and is not inflexed at the third joint.

GENUS ATYOIDA, *Randall*.

Atyæ affinis. *Pedes 6 postici tenues, 5ti 3tiis longiores.*

Near *Atya*. Six posterior feet slender, fifth pair longer than third.

Among the species of *Atya*, there is a very great difference as to the relative size of the third and following pairs of legs; and it seems possible that the transitions may be such as to render it unnecessary to sustain the genus *Atyoida*.

ATYOIDA BISULCATA? *Randall*.

Rostrum oculis paulo longius, acutum, supra carinatum. Carapax infra oculos acutus, quoque angulis anticis lateralibus acute productus. Carpus pedum 4 anticorum antice valde excavatus, U-formis. Pedes 6 postici subtiliter scabriculi, 3tii 4tique æqui, 5ti paulo longiores, parce tenuiores. Maxillipedes externi apicem squamæ antennalis non attingentes.

Beak longer than eyes, acute, carinate above. Carapax below the eyes acute, and also at its lateral anterior angles acutely produced. Carpus of four anterior feet deeply excavate, U-shape. Six posterior feet minutely scabrous, third and fourth pairs equal, fifth a little longer and somewhat more slender. Outer maxillipeds not reaching to apex of antennary scale.

Plate 34, fig. 1 *a*, animal, enlarged two diameters; *b*, mandible, more enlarged; *b'*, crown in different position; *c*, first maxilla, outer view; *c'*, same, inner view; *d*, second maxilla; *e*, first maxilliped; *f*, second maxilliped with palpus broken; *g*, outer or third maxilliped;

g', extremity of same, inner view, more enlarged; *h*, hand of second pair; *i*, extremity of leg of fourth pair.

Oahu, Hawaiian Islands.

Length of body, fourteen lines. The beak either side of the carina above is canaliculate or longitudinally concave, owing to the fact that the margin is a little raised. A strong spine on outer side of first basal joint of inner antennæ. The last joint of the outer maxillipeds is a little longer than the preceding, and terminates in a stout point or spine; it bears several longish black spines on its surface. The palpus is a little longer than the second joint. The four anterior legs are very nearly naked, excepting the black setæ at the tips of the fingers, which are as long as the fingers. The tarsi are short and stout, with four or five short spines below. The surface of the fourth and fifth joints of the six posterior legs is set with minute spinules in a few lines, giving it a scabrous character. The transverse sulci of the carapax mentioned by Dr. Randall, we do not observe in our specimen, and his figure of the leg of the third pair differs from this leg as observed by the author.

A. bisulcata, RANDALL, Jour. Acad. Nat. Sci. Philad., viii. 140.

FAMILY PALÆMONIDÆ.

SUBFAMILY ALPHEINÆ.

GENUS ALPHEUS, *Fabricius*.

THE tooth or spine externally at the base of the inner antennæ, and the jointing of the carpus of the second pair of legs, afford convenient characteristics for distinguishing the species of *Alpheus* in addition to those commonly used. The first joint of the carpus may be very much shorter or much longer than the second, or equal to it, and

similar differences exist as regards the other joints. The third joint of the third and fourth pairs of legs often has a tooth on the lower apex, although unarmed in most species.

We separate from *Alpheus* the species without a beak, in which the hands of the anterior legs have a partially reversed position, the lower margin being either inward or upward, so that the moveable finger is below or outside. Of these we have made the genus *Betæus*.

I. ROSTRUM MARGINE FRONTIS ORTUM, SUPERFICIE INTER OCULOS SÆPIUS LEVITER CARINATA.

A. Antennarum articulus 1mus externarum spinâ externâ sive nullâ sive obsolescente armatus.

1. *Manus marginibus inferiore superioreque versus digitos excavata. Dens antennarum internarum basalis articulo 1mo non longior. Articulus pedum 3tiorum 3tius omnino inermis.*

a. Orbitæ margo inermis.

ALPHEUS EDWARDSII, *Audouin*.

Plate 34, fig. 2 *a*, front and antennæ, much enlarged; *b*, extremity of outer maxillipeds; *c*, larger hand (right); *d*, smaller hand; *e*, part of second pair of feet; *f*, part of third or fourth pair.

Cape Verdes, Island of St. Jago.

The species agree closely with the original figure in the work on Egypt, Plate 10, fig. 1, but not with Edwards's description, which represents the orbital margin as armed with a spine as long nearly as the beak, instead of arcuate and unarmed. The second joint of the inner antennæ is about one and a half times as long as either the first, or the third. The lamellar spine or tooth at the outer base of the inner antennæ extends to apex of first joint. Moveable scale of outer antennæ as long as base of inner antennæ, and shorter than base of outer. Legs rather long. Larger hand very stout, outer surface of hand having a sinuous furrow, extending backward from below the sinus in the superior margin; lower margin rounded; fingers short and stout and furnished with a few hairs principally towards

the margin in tufts; moveable finger broad, thin above, much longer than lower finger. Smaller hand narrow oblong, nearly linear, very thin hairy, fingers half as long as hand, similar, terete, hairs on inner margin not denser than on outer surface. Last joint of outer maxillipeds long pilose. Carpus of third pair of feet having joint 1 as long as $2+3+4$; joint 2 and 5 equal; 3 and 4 equal, and together about as long as the second; hand as long as the two preceding, a very few light hairs on the fingers. Following two pairs of feet rather slender, third joint unarmed; fifth with about five spines on inner margin and a few hairs.

A. Edwardsii, AUDOUIN, Explic. des Planches de la Descrip. de l'Égypte, par M. Savigny, Crust., pl. 10, f. 1, p. 90.

A. monopodium (?), Bosc, Crust., ii. pl. 13, f. 2, and p. 73.

Var. *leviusculus*.—Plate 34, fig. 3 *a, b, c, d, e, f*, represent parts of a specimen of the same or an allied species from Wakes Island, north Pacific. The front, antennæ, and legs are nearly as in the *Edwardsii*. The second basal joint of the inner antennæ is, however, but little longer than the first; the large hand is proportionally narrower, but this is often a varying character in the same species; the third and fourth pairs of legs are more nearly naked. The first joint of the carpus is hardly as long as the second and third. The differences are so small that we doubt with regard to the species being distinct from the *Edwardsii*. It is near the *A. 2-incisus* of De Haan (Faun. Japon., p. 179, pl. 45, f. 3), which De Haan considers a variety of the *A. avarus* of Fabricius. But in De Haan's figure, the base of the outer antennæ is not longer than the basal scale, and the rostrum is trigonal between the eyes, with a flat surface and concave sides.

ALPHEUS STRENUUS.

Rostrum elongatum, acutum, superficie inter oculos leviter carinatâ. Squama antennarum externarum basalis basi non longior. Articulus antennarum internarum 2dus 1mo fere duplo longior. Pedes antici multo inæqui, manus majoris sinu infero-marginali concavo et non triangulato, brachio ad apicem internum acute uni-dentato; manu minore angusto-oblongâ, paulo pubescente, digitis intus dense hirsutis,

pilis apicem digiti mobilis omnino celantibus. Pedes 2di 3tiis multo longiores, carpi articulis 1mo 2doque fere æquis, 2do longiore quam 5tus.

Beak long and acute, the surface between the eyes slightly carinate. Basal scale of outer antennæ not longer than base; second joint of inner antennæ nearly twice as long as first joint. Anterior feet very unequal, *larger* hand nearly as in *A. Edwardsii*, the excavation in inferior margin concave, and not triangular, arm having an acute tooth or spine at inner apex; *smaller* hand narrow oblong, somewhat pubescent, fingers densely hirsute within, hairs covering wholly extremity of moveable finger. Second pair of feet much longer than third, carpus having the first and second joints nearly equal, and second longer than fifth.

Plate 34, fig. 4 *a*, front and base of antennæ, enlarged two diameters; *b*, large hand (left); *c*, smaller hand; *d*, part of second pair of feet; *e*, part of third pair.

Island of Tongatabu, Pacific Ocean.

Length of body, one and three-fourths inches. Colour, dull olive green; legs, bright yellow. The hairs of inner edge of fingers of smaller hand are dense; they become super-marginal gradually and meet from either side on the upper surface of the upper finger, some little distance from the apex. The fingers of the larger hand are a little pubescent. The hand of the second pair of feet has a few short divaricate hairs. The tooth at base of inner antennæ extends to apex of first joint. The fifth joint of the third and fourth pairs of feet has about six sets of spinules on inner margin. The outer surface of the larger hand is uneven, very nearly as in the *Edwardsii*.

ALPHEUS PACIFICUS.

Rostrum breve, acutum, superficie inter oculos breviter carinatâ. Squama antennarum externarum basalis basi planè brevior; articulus antennarum internarum 2dus 1mo duplo longior. Pedes antici multo inæqui; manus majoris sinu infero-marginali profundè triangulato.

brachio apicem internum inermiti; manu minore angusto-oblongâ, paulo pubescente, digitis intus dense hirsutis, apicibus supernè non tectis. Pedes 2di 3tiis parce longiores, carpi articulo 2do multo breviorè quam 1mus, viz longiorè quam 5tus.

Beak short, acute, surface between the eyes slightly carinate. Basal scale of outer antennæ shorter than base of same; second joint of inner antennæ twice as long as first joint. Anterior feet very unequal; *larger* hand as in *A. Edwardsii*, the sinus of lower margin deep triangular, arm unarmed at inner apex and elsewhere; *smaller* hand narrow oblong, a little pubescent, fingers densely hirsute within, upper surface of extremity not covered. Second pair of feet but little longer than third, second joint of carpus much shorter than first, and little longer than fifth.

Plate 34, fig. 5 *a*, front and base of antennæ; *b*, side view of front; *c*, part of outer maxilliped; *d*, *e*, hands; *f*, part of foot of second pair; *g*, part of foot of third or fourth pair.

Sandwich Islands.

Length of body, one and three-fourths inches. This species differs from the *A. strenuus* in having the notch on the lower margin of larger hand abrupt triangular, the tips of the fingers of the smaller hand not at all concealed by hairs, the arm without a tooth at inner apex, the base of outer antennæ longer than scale, second pair of feet much shorter proportionally, with the second joint of carpus much shorter than first. The general form of the larger hand, the uneven surface, and the shape of the fingers, are much as in the *strenuus*. The third and fourth joints of the carpus of the second pair of feet are together hardly as long as the second, and about equal to the fifth joint; the first equals the second, third, and fourth together; the hand is as long as the fourth and fifth joints.

b. Orbitæ margo spinulâ armatus.

ALPHEUS EUCHIRUS.

Rostrum paulo elongatum, superficie inter oculos carinatâ. Squama

antennarum externarum basalis basi non longior. Articulus antennarum internarum 2dus 1mo paulo longior. Pedes antici multo inæqui; manus majoris sinu infero-marginali concavo; brachio apicem non spinigero; manu minore oblongâ, crassiusculâ, lævi, digitis extus et intus leviter laxèque pubescentibus. Pedes 2di 3tiis paulo longiores, carpi articulo 1mo duplo longiore quam 2dus, manu vix brevior quam tres articuli precedentes simul sumti. Pedes 3tii 4tive parce criniti, articulo 3tio apicem internum brevissime acuto, 5to intus 7-8-setuloso.

Beak a little elongated, acute, surface between the eyes carinate. Basal scale of outer antennæ not longer than base of same. Second joint of inner antennæ a little longer than first joint. Anterior feet very unequal; sinus of lower margin of larger hand concave, arm not spinigerous at apex; smaller hand oblong, a little stout, smooth, fingers light pubescent without and within. Second pair of feet a little longer than the third, first joint of carpus twice as long as second, hand hardly shorter than the three preceding joints together. Feet of third or fourth pair sparingly hairy, third joint very short acute at inner apex, fifth with seven or eight sets of spinules on inner margin.

Plate 34, fig. 6 *a*, profile view of front and base of antennæ, much enlarged; *b*, part of outer maxillipeds; *c*, larger hand (the right); *d*, smaller hand; *e*, part of leg of second pair; *f*, part of third or fourth pair.

Straits of Balabac, north of Borneo.

Length of body, three-fourths of an inch. The fingers of the smaller hand are hardly as hairy on inner margin as on outer surface, and all the hairs are very slender. The larger hand is also thin pubescent, but especially on its inner surface and near upper surface. The lower surface is broadly rounded. The fingers are somewhat turned out of the plane of the hand.

2. *Manus margine inferiore integra. Dens antennarum internarum basalis articulo primo viz longior.*

a. Orbitæ margo inermis.

ALPHEUS OBESO-MANUS.

Rostrum brevissimum, in carinam paulo postice productum. Squama antennarum externarum basalis basi non brevior, basi internarum multo brevior; dens internarum basalis perbrevis; articulus 2dus 1mo plus duplo longior. Pedes antici valde inæqui, manu majore lævi, elongatâ, obesâ, non compressâ, versus apicem angustiore, digito mobili perbrevis, malleiformi, minore lineari, digitis brevissimis. Pedes 2di portentosè elongati, 3tiis plus duplo longiores, carpi articulo 1mo quadruplo brevior quam 2dus, 3tio 4to 5toque brevibus, subæquis. Articulus pedis 3tii 3tius apice inferiore acutus.

Beak very short, continued in a carina for a short distance along the back. Basal scale of outer antennæ not shorter than their base, considerably shorter than base of inner antennæ; basal tooth of inner antennæ very short, second joint more than twice as long as first. Anterior feet very unequal; larger hand smooth, elongate, rotund-obese, not compressed, narrowing towards apex, moveable finger very short, mallet-shape; smaller hand linear, fingers very short. Feet of second pair exceedingly long, more than twice as long as third, first joint of carpus one-fourth the length of second, third, fourth, and fifth short, nearly equal. Third joint of third or fourth pair of legs, acute at lower apex.

Plate 34, fig. 7 *a*, front, enlarged; *b*, part of outer maxilliped; *c*, larger hand (left); *d*, smaller hand; *e*, leg of second pair; *f*, part of third or fourth pair.

Feejee Archipelago.

Length, three-fourths of an inch. Second joint of inner antennæ full one and a half times as long as the first, and basal scale of outer pair hardly reaching beyond its apex. Larger hand without carinæ, tubercles, or furrows. Fingers of hands very short, those of smaller hand hardly exceeding one-fourth the hand in length. Fifth joint of

carpus of second pair somewhat longer than third or fourth; hand nearly as long as third, fourth, and fifth together, and naked; second joint longer than third, fourth, fifth, and hand; fifth pair of legs very slender, compared with the fourth. Tarsus of third and fourth pairs slender. The very great length of the feet of the second pair is a striking peculiarity of the species.

ALPHEUS CRINITUS.

Rostrum acutum, superficie inter oculos carinatâ. Squama antennarum externarum basalis basi harum parce brevior, basi internarum paulo brevior; dens internarum basalis perbrevis. Articulus antennarum internarum 2dus 1mo duplo longior. Pedes antici multo inæqui; manu majore obesâ, parce compressâ, infra rotundatâ, omnino lævi, partim leviter pubescenti, digitis perbrevibus (manu quadruplo brevioribus), digito mobili arcuato; minore oblongâ, leviter crinitâ, digitis parte manus ante digitos paulo brevioribus. Pedes 2di valde elongati, 3tiis sesqui longiores, articulo carpi 2do parce longiore quam 1mus, 3tio 4to 5tove oblongo, his inter se longitudine æquis. Pedes 3tii 4tive leviter criniti, articulo 3tio apicem inferiorem dentigero.

Beak acute, prolonged into a carina between the eyes. Basal scale of outer antennæ hardly shorter than base, somewhat shorter than base of inner antennæ; second joint of inner antennæ twice as long as first; basal tooth of inner very short. Anterior feet very unequal; larger hand obese, sparingly compressed, rounded below, wholly smooth, in part light pubescent, fingers very short (one-fourth as long as hand), moveable finger arcuate; smaller hand oblong, light crinite, fingers little shorter than part of hand preceding fingers. Feet of second pair very long, one and a half times as long as third pair, second joint of carpus a little longer than first, third, fourth, fifth each oblong, nearly equal; feet of third and fourth pairs light crinite, third joint having a tooth at lower apex.

Plate 34, fig. 8 *a*, front much enlarged; *b*, part of outer maxillipeds; *c*, large hand (left); *d*, smaller hand; *e*, part of foot of second pair; *f*, leg of third or fourth pair.

Balabac Straits.

Length of body, ten lines. Large hand largest in its basal half, and diminishing a little towards apex, at lower margin as well as elsewhere broadly rounded. The apex above the articulation of the moveable finger nearly in same line with the upper margin of the finger; carpus transverse; arm with lower apex very short acute. Carpus of second pair of feet has second joint as long nearly as third, fourth and fifth together; the hand is rather shorter than the fourth and fifth. The fifth joint of the third or fourth pair of legs has about four sets of spinules on inner margin.

ALPHEUS MITIS.

Rostrum acutum, superficie inter oculos carinatâ. Squama antennarum externarum basalis basi harum internarumve parce longior. Articulus antennarum internarum 2dus 1mo paulo longior, densque basalis articulo 1mo fere longior. Pedes antici inæqui; manu majore lævi, paulo compressâ, marginibus rotundatâ, digitis regularibus, manu fere triplo brevioribus; manu minore simili, angustiore. Pedes 2di 3tiis multo longiores, articulo carpi 2do 1mum longitudine æquante, 3tio 4tove oblongo, parce brevior quam 5tus, manu perbrevis. Pedes 3tii 4tique fere nudi, articulo 3tio apicem internum non acuto.

Beak acute, surface between the eyes carinate. Basal scale of outer antennæ rather longer than base of outer or inner antennæ. Second joint of inner antennæ a little longer than first, basal tooth hardly longer than first joint. Anterior feet unequal; larger hand smooth, a little compressed, margins rounded, fingers regular, one-third as long as hand; smaller hand like the larger, but narrower in proportion. Feet of second pair much longer than third; first and second joints of carpus equal, third and fourth oblong, sparingly shorter than fifth, hand very short. Feet of third and fourth pairs nearly naked, third joint not acute at inner apex.

Plate 35, fig. 1 *a*, front, enlarged eight diameters; *b*, extremity of outer maxillipeds; *c*, larger hand; *d*, smaller; *e*, part of leg of second pair; *f*, part of leg of third pair.

Balabac Straits, East Indies.

Length, nine lines. Scale or tooth at the outer side of base of inner antennæ very slightly longer than the first joint. Hands without costæ or any unevenness of surface. Legs of second pair about one-third longer than third. The third joint of the third and fourth pairs rather narrow, and all the joints with very few hairs.

δ. Orbitæ margo spinulâ dentevè armatus.

ALPHEUS ACUTO-FEMORATUS.

Rostrum acutum, postice in superficiem inter oculos productum. Squama antennarum externarum basalis basibus antennarum non longior. Dens basalis antennarum internarum brevis, articulus 2dus 1mo parce longior. Orbitæ margo acutus sed spinâ non productus. Pedes 2di 3tiis sat longiores, carpi articulo 1mo brevi, 2do plus duplo longiore quam 1mus. Pedes 3ti Atique crassiusculi, articulo 2do 3tioque apicem inferiorem instar spinæ elongate acuto.

Beak acute, surface between the eyes carinate. Basal scale of outer antennæ not longer than base of either pair of antennæ. Basal tooth of inner antennæ short, second joint hardly longer than first. Margin of orbit acute, but hardly produced into a spine. Feet of second pair considerably longer than third; first joint of carpus short, second more than twice as long as first. Third and fourth pairs of feet rather stout, second and third joints having the lower apex produced into a rather long spine.

Plate 35, fig. 2 *a*, front, much enlarged; *b*, part of outer maxilliped; *c*, part of front of second pair; *d*, *ibid.* of third or fourth pairs; *e*, *ibid.* of fifth pair.

Balabac Straits.

Length, nine lines. The hands of the specimen are gone, and we are not sure that the species should not be in the preceding division, although its general characters are more like those in which the lower margin of the hand is straight. It is peculiar in having a spine at the apex of both the second and third joints of the third and fourth

pairs of legs. The fifth pair of legs is much narrower than the fourth.

B. *Articulus antennarum externarum* Imus spinâ externâ armatus.

a. *Orbitæ margo inermis.*

ALPHEUS PARVI-ROSTRIS.

Corpus nudum. Rostrum acutum, breve, superficie inter oculos carinatâ. Squama antennarum externarum basalis basi utroque paulo longior; spina basalis mediocris; dens internarum basalis brevis; articulus 2dus 1mo vix longior. Pedes antici valde inæqui, manu majore crassissimâ, marginibus ambobus indentatâ, superficie externâ partim sulcatâ, digitis perbrevis, digito mobili extus arcuato; manu minore regulari, pubescente. Pedes 2di 3tiis paulo longiores, articulo carpi 1mo fere duplo longiore quam 2dus, manu brevi. Pedes 3tii 4tiique crassiusculi, articulo 3tio apicem inferiorem unidentato.

Body naked. Beak acute, short, surface between the eyes carinate. Basal scale of outer antennæ rather longer than base of either pair. Basal spine moderately long; basal tooth of inner pair short, second joint hardly longer than first. Feet of first pair very unequal, larger hand very stout, both margins indented, outer surface having a sulcus, fingers very short, the moveable one arcuate in outer margin; smaller hand regular, with some long pubescence. Feet of second pair but little longer than third, first joint of carpus twice as long as second, hand short. Third and fourth pairs of feet rather stout, third joint unidentate at inferior apex.

Plate 35, fig. 3 *a*, side view of front, much enlarged; *b*, part of outer maxilliped; *c*, larger hand, enlarged; *d*, smaller hand; *e*, part of leg of second pair; *f*, part of leg of third pair.

Straits of Balabac, north of Borneo.

Length of body, eight lines. The beak rises from the frontal margin and is short and acute. The carpus of the second pair of feet has the

first joint rather longer than the second and third; the hand is hardly as long as the fourth and fifth. The smaller hand is oblong, smooth, with terete fingers. Some long pubescence on the third and fourth pairs of legs.

δ. Orbitæ margo spinulâ dentevæ armatus rostro vix brevior.

ALPHEUS TRIDENTULATUS.

Rostrum perbreve, dentiforme. Squama antennarum externarum basalis basi brevior, basi internarum vix brevior, spina externarum basalis mediocris, spina internarum longissima, articulo 1mo multo longior; articulus 2dus 1mo non longior. Pedes antici valde inæqui, manu majore lævi, paulo compressâ, marginibus latè rotundatâ, digitis perbrevibus, manu triplo brevioribus. Pedes 2di 3tiis paulo longiores, articulo carpi 1mo quadruplo longiore quam 2dus, 2do perbrevi, vix longiore quam 3tius. Articulus pedum 3tiorum 4torumve 3tius apice interno inermis.

Beak very short, dentiform. Basal scale of outer antennæ shorter than base, as long as base of inner pair; basal spine of outer pair of moderate length; of inner very long (much longer than first joint), second joint of this pair not longer than first joint. Anterior feet very unequal, larger hand smooth, but little compressed, margins broadly rounded, fingers very short (not one-third as long as hand). Feet of second pair but little longer than third, first joint of carpus full four times as long as second, second, third, fourth all very short and nearly equal. Third joint of feet of third or fourth pair unarmed at inner apex.

Plate 35, fig. 4 *a*, front, enlarged four diameters; *b*, part of outer maxillipeds; *c*, larger hand, enlarged two diameters; *d*, smaller, *ibid.*; *e*, part of leg of third pair, *ibid.*

Rio Janeiro?

Length of body, ten lines. The three teeth of the front are very low and equal. The basal spine of the inner antennæ is two-thirds as

long as the base of the antennæ. The outer maxillipeds are nearly naked, and terminate in a cluster of spinules or short setæ. The smaller hand is quite small and rather short; fingers about half whole length of hand. The second joint of carpus of second pair of feet is slightly longer than the third or fourth, either of which is about as broad as long; the large hand is as long very nearly as the third, fourth and fifth joints together, and is but little shorter than the first; it bears some dense tufts of short hairs, especially on the under margin.

ALPHEUS NEPTUNUS.

Frons elongate trispinosus, rostro spinisque orbitalibus prælongis, æquis. Squama antennarum externarum basalis basi brevior et spina externa elongata; spina internarum basalis longa, articulo 2do brevior quam 1mus. Pedes antici multo inæquæ, manu majore lævi, paulo compressâ, marginibus rotundatâ, digitis brevibus, manu triplo brevioribus, digito mobili supra arcuato; manu minore angustâ. Pedes 2di 3tiis longiores, articulo carpi 1mo quadruplo longiore quam 2dus, 2do 3tio 4toque inter se fere æquis, non oblongis. Articulus pedum sequentium 3tius apice inferiore inermis.

Front with three long spines, the beak and orbital spines being quite long and equal. Basal scale of outer antennæ shorter than base, and outer spine elongate; basal spine of inner antennæ long, second joint shorter than first. Anterior feet very unequal; larger hand smooth, slightly compressed, margins rounded, entire, fingers short, one-third as long as hand, moveable one arcuate above; smaller hand narrow. Feet of second pair longer than third, first joint of carpus about four times as long as second, the second, third, and fourth equal, not oblong. Third joint of following feet unarmed at lower apex.

Plate 35, fig. 5 *a*, front, enlarged six diameters; *b*, larger hand, enlarged six diameters; *c*, moveable finger, thrown back; *d*, smaller hand, enlarged six diameters; *e*, part of leg of second pair; *f*, *ibid.* of third pair.

Sooloo Sea at six and a half and nine fathoms; also, Feejee Islands.

Length, 8-9 lines. Basal spine of inner antennæ a little longer than first joint, and extending about as far forward as apex of spine of outer antennæ, and half way to apex of basal scale of outer pair. The beak is about two-thirds as long as first joint of inner antennæ. The outer maxilliped has the last joint short pubescent with short hairs at apex. The smaller hand is oblong, nearly linear. The fingers of larger hand are out of plane of hand. The hand of the second pair is as long as the third, fourth, and fifth joints of the carpus. Fifth joint of third or fourth pair quite long, more than twice as long as fourth joint, seven or eight sets of spinules below; third joint somewhat pubescent.

II. ROSTRUM INTER OCULORUM BASES ORTUM, SULCO PROFUNDO IN CARAPACE¹
UTRINQUE EXCAVATO.

a. Orbitæ margo inermis.

ALPHEUS PUGNAX.

Rostrum acutum, anguste triangulatum, planum, inter oculorum bases ortum. Spina antennarum externarum basalis parva; squama basi paulo longior. Spina antennarum internarum basalis articulo 1mo non brevior, articulus 2dus brevis, 3tius squamam externarum non superans. Pedes antici inæqui; manu majore elongatâ, lævi, marginibus rotundatâ, supra angustè emarginatâ, digitis brevibus (manu triplo brevioribus), brachio apicibus instar spinæ acuto. Pedes 2di longi, articulo carpi 1mo dimidio brevioris quam 2dus. Pedes 3tii 4tique graciles, articulo 3tio apicem inferiorem unidentato.

Beak acute, narrow triangular, flat above, arising from between the bases of the eyes. Basal spine of outer antennæ small, basal scale longer than base. Base of inner antennæ shorter than scale of outer; basal spine of inner antennæ not shorter than the first joint, second joint short. Anterior feet unequal; larger hand long, smooth with rounded margins, narrow emarginate above near articulation, fingers short (about one-third the length of hand), arm having a spine at both outer and inner apex. Feet of second pair long, first joint short, hardly half the second in length. Third and fourth pairs slender, third joint with an acute tooth at lower apex.

Plate 35, fig. 6 *a*, side view of front, much enlarged; *b*, upper view of front; *c*, outer maxilliped; *d*, *e*, larger hand in different positions; *f*, smaller hand; *g*, part of leg of second pair; *h*, part of leg of third pair.

At Lahaina, Island of Maui, Hawaiian Group.

Length, twelve lines. The beak from its base is very narrow triangular, with straight sides, and there is no carina prolonged down the back. Second joint of inner antennæ hardly longer than first. Larger hand partly pubescent, somewhat fusiform, but little compressed, the finger turned out of plane of hand; moveable finger short, thin above, with arcuate dorsal margin. First joint of carpus of second pair of feet less than half the second; third shorter than fourth; fifth longer than fourth; hand as long as fourth and fifth. The fifth joint of third pair of legs long, very much longer than fourth, about eight sets of spinules on its lower side, rather long hairy above.

ALPHEUS DIADEMA.

Rostrum latum, apice triangulatum et acutum, inter oculorum bases ortum, lateribus concavis. Spina basalis antennarum omnium brevis; squama externarum basi utroque longior. Pedes 2di 3tiis parce longiores, articulo carpi 1mo paulo longiore quam 2dus vel 5tus, 3tio 4tove parce oblongo. Pedes 3tii 4tive 5tis valde crassiores, articulo 3tio apicem inferiorem unidentato.

Beak broad, apex triangular and acute, arises from a broad base between the bases of the eyes, and has the margins much concave. Basal spine of either pair of antennæ short, scale of outer pair longer than base of either. Feet of second pair but little longer than third, first joint of carpus much longer than second or fifth, third or fourth sparingly oblong. Feet of third or fourth pair much stouter than fifth, third joint unidentate at lower apex.

Plate 35, fig. 7 *a*, front, much enlarged; *b*, profile of front; *c*, part of outer maxilliped; *d*, part of leg of second pair; *e*, part of leg of third pair.

At Lahaina, Island of Maui, Hawaiian Group.

Length of body, ten lines. Beak starts from a broad space back of eyes, and narrows rapidly with a curve, is nearly linear between the eyes, and in front equilaterally triangular. There is an appearance of an irregular crenulation, but it seems to be owing to the colour alone. Second joint of inner antennæ a little longer than first, nearly one and a half times. Carpus of second pair of feet has the third and fourth joints together about equal to second, and hand equal to fourth and fifth in length. The fourth and fifth joints of the third and fourth pairs are short hairy externally, and the fifth joint has about six sets of spinules on inner side. In a side view of the front there is a low angle to the orbit, but there is no proper tooth or spine.

There are two specimens of this species in the collections and neither has the hands.

b. Orbitæ margo dente spinulave armatus.

1. *Spina orbitalis rostro plane brevior.*

ALPHEUS LÆVIS, *Randall.*

Rostrum acutum, spiniforme, inter oculorum bases ortum, lateribus fere rectis. Squama antennarum externarum basalis basi non brevior, basi internarum parce longior; spina basalis externarum mediocris, internarum valde elongata. Spina orbitalis perbrevis. Pedes antici paulo inæqui, manu majore lævi, compressâ, marginibus rotundatis, integris, digitis brevibus (manu plus triplo brevioribus); manu minore oblongâ, digitis manu plus duplo brevioribus. Pedes 2di 3tiis parce longiores, articulo carpi 1mo parce longiore quam 2dus, manus longitudinem æquante. Pedes 3tîi parce criniti, articulo tertio apicem inferiorem non acuto, tarso lato et brevi.

Beak acute, spiniform, arising from between the bases of the eyes, sides nearly straight. Basal scale of outer antennæ not shorter than base, a little longer than base of inner pair. Basal spine of outer pair of moderate length, of inner much elongate. Orbital spine very short. Anterior feet not very unequal, larger hand smooth, compressed, margins rounded, entire, smaller oblong, fingers

not half as long as hand. Second pair of feet but little longer than third, first joint of carpus slightly longer than second, and as long as hand. Third pair having lower apex of third joint not acute, tarsus broad and short.

Plate 35, fig. 8 *a*, front, enlarged three diameters; *b*, profile of front, *c*, part of outer maxillipeds; *d*, larger hand, two diameters; *e*, smaller hand, two and a half diameters; *f*, part of second pair of feet; *g*, part of third pair, enlarged two diameters; *h*, form of tarsus.

Sandwich Islands; also Feejees or Friendly Islands.

Length of body, one and one-fourth inches. Basal spine or tooth of inner antennæ longer than first joint; second joint nearly one and a half times the first. Tarsus not uncinatè. Carpus of second pair of feet with all the joints rather short, third and fourth joints very short, as long together as second or fifth.

Alpheus lævis, DR. J. W. RANDALL, Jour. Acad. Nat. Sci. Philad., viii. p. 141.

ALPHEUS MALLEATOR.

Rostrum perbreve, triangulatum, inter oculorum bases ortum. Spina orbitalis brevis. Squama antennarum externarum basalis basi brevior; spina basalis externarum mediocris, internarum brevissima; articulus 2dus internarum 1mo sesqui longior. Pedes antici inœqui; manus majoris superficiebus supernâ et internâ partim minutè tuberculatis, margine superiore sulcato, juxta articulationem digiti 2-3-inciso, digitis perbrevibus, mobili malleiformi, obtuso. Pedes 2di 3tiis parce longiores, articulo carpi 1mo duplo longiore quam 2dus. Pedes 3tii crassiusculi, articulo 3tio apicem inferiorem obtuso.

Beak short triangular, arising from between bases of eyes. Orbital spine short. Basal scale of outer antennæ shorter than base; basal spine of outer antennæ of moderate length, of inner antennæ very short; second joint of inner pair one and a half times as long as first. Anterior feet unequal; upper and inner surface of larger hand partly minute tuberculate, upper margin sulcate and next to the articulation 2-3 incised, lower rounded, fingers very short, the

upper mallet-shape, obtuse. Feet of second pair a little longer than third, first joint of carpus about twice as long as second. Third pair of feet rather stout, third joint obtuse at lower apex.

Plate 35, fig. 9 *a*, cephalothorax, natural size; *b*, profile of front, enlarged four diameters; *b*, upper view of front, enlarged; *c*, caudal segment and appendages; *d*, larger hand outer surface, natural size; *e*, same, inner surface (from a larger specimen); *f*, smaller hand; *g*, second pair, natural size; *h*, outer maxillipeds, enlarged.

Rio Janeiro?

Length, two and a half inches. Second joint of inner antennæ nearly twice the length of first; basal spine or tooth of inner antennæ shorter than first joint. Larger hand with lower margin entire, a sulcus in outer surface of lower finger extending along hand, inner surface of hand towards upper margin rough with small tubercles, and somewhat hirsute. Smaller hand rather stout. Carpus of second pair has first joint equal to twice the second, or nearly to the second, third, and fourth together; hand rather longer than fifth joint.

The species is probably from Rio Janeiro.

GENUS BETÆUS, Dana.

Alpheo oculis antennis pedibusque affinis. Frons non rostratum. Manus anticæ plus minusve inversæ, digito mobili inferiore vel exteriore.

Like *Alpheus* in the eyes, antennæ, and feet. Front without a beak. Anterior hands more or less inverted, the moveable finger being the lower or outer.

The front has no trace of a tooth in the species observed, but is sometimes deeply notched at middle. In each of our species, the carpus of the second pair of feet has the first joint two or three times as long as the second joint, and the second, third, and fourth joints are very short and nearly equal. The hands are moderately large, and either equal or unequal.

BETÆUS TRUNCATUS.

Frons truncatus, medio non emarginatus. Squama antennarum externarum basi non longior; spina externa brevis; spina internarum basalis prælonga, articuli basales elongati, subæqui. Pedes antici multo inæqui, manu majore longâ, sublineari, valde compressâ, fere lævi, scabriculâ, digitis longis, fere dimidii manus longitudine, mobili terete. Pedes 2di 3tiis sat longiores, carpo sat brevi, articulo carpi 1mo plus duplo longiore quam 2dus, 2do 3tio 4toque brevibus. Articululus pedum sequentium 3tius omnino inermis.

Front truncate, not at all emarginate at middle. Basal scale of outer antennæ about as long as base of either pair; outer spine short; basal spine of inner pair very long, basal joints elongate, subequal. Anterior feet much unequal, larger hand long, nearly linear, much compressed, minutely scabrous but nearly smooth, fingers long, hardly as long as half the hand, the upper terete; smaller hand linear. Feet of second pair longer than third, carpus rather short, first joint of carpus more than twice as long as second, second, third, and fourth all short. Third joint of the following legs wholly unarmed.

Plate 35, fig. 10 *a*, animal, enlarged two diameters; *b*, upper view of front; *c*, smaller hand.

Hermite Island, Fuegia, where it was dredged up in ten fathoms water, Jan. 27, 1839.—Lieut. Case.

Length, fifteen lines. Last joint of outer maxillipeds rather densely pubescent, hairs not half as long as joint. All legs slender; carpus and hand of second pair hardly longer than fourth, fifth, and sixth joints of third pair, fourth joint of carpus shortest, third joint not shorter than second. The three joints of the base of the inner antennæ are unusually long, and the second is a little the longest. The lower margin of the hand is subtrenchant, and fine scabrous; margins of the arm also minutely scabrous.

BETÆUS ÆQUIMANUS.

Frons medio profundè incisus. Squama antennarum externarum basalis basi paulo brevior; spina externa perbrevis; spina internarum basalis prælonga, articulo 2do multo brevior quam primus. Pedes antici æqui, manu lævi, compressâ, digitis perbrevibus. Pedes 2di 3tiis sat longiores, articulo carpi 1mo plus duplo longiore quam 2dus, 2do 3tio 4toque perbrevibus. Articulus pedum sequentium 3tius omnino inermis.

Front with a deep emargination in place of beak. Basal scale of outer antennæ a little shorter than base, outer spine very short; basal spine of inner pair very long, second joint much shorter than first. Anterior feet equal, hand smooth, compressed, fingers very short. Feet of second pair longer than third, first joint of carpus more than twice as long as second, second, third, and fourth, very short. Third joint of following feet wholly unarmed.

Plate 35, fig. 11 *a*, body, enlarged four diameters; *b*, upper view of front.

Along shores of Black Rocks, among sea-weeds, Bay of Islands, New Zealand.

Basal spine of inner antennæ extends nearly to apex of second joint. The hands are so turned over, when in their natural position, that the moveable finger is below; this finger is about one-third as long as hand, and arcuate above. The hand of the second pair is fully as long as three preceding joints.

BETÆUS SCABRO-DIGITUS.

Frons leviter arcuatus, medio obsolete excavatus. Squama antennarum externarum basalis mediocris, basi parce brevior, basin internarum fere æquans; flagellum latè compressum; spina externa brevis; spina internarum basalis longa. Pedes antici feminæ valde inæqui, manu

majore mediocri, leviusculâ, compressâ, margine inferiore rotundato, digitis scabriculis, dimidio manus paulo brevioribus, vix dentigeris; maris æqui, crassiores, digitis brevibus, valde incurvatis, immobili crassè unidentato. Pedes 2di 3tiis paulo longiores, articulo carpi Imo plus duplo longiore quam 2dus, 2do 3tio 4toque brevibus. Articululus pedum sequentium 3tius extus prope basin spinâ armatus.

Front slightly arcuate, at middle obsoletely excavate. Basal scale of outer antennæ of moderate size, a little shorter than base, and as long as base of inner pair; flagellum broad compressed, outer spine short; basal spine of inner antennæ long. Anterior feet of *female* very unequal, larger hand of moderate size, nearly smooth, compressed, inferior margin rounded, fingers scabriculate, nearly half as long as hand, without distinct teeth; of *male* equal, stout, fingers short and much incurved, the immoveable one with a large tooth. Feet of second pair little longer than third, first joint of carpus more than twice as long as second, second, third, and fourth short. Third joint of following feet on outside, near its base bearing a spine.

Plate 35, fig. 12*a*, front of female, magnified two diameters; *b*, caudal segment; *c*, outer maxilliped, *ibid.*; *d*, larger hand, *ibid.*; *e*, part of second pair, *ibid.*; *f*, part of third or fourth pair, *ibid.*

Valparaiso, Chili.

Length of body, one and a half inches. This species is near the *Alpheus emarginatus* of Edwards, but has a short spine to base of outer antennæ. The second joint of the inner antennæ is rather longer than the first. The basal spine of the inner pair extends very nearly to apex of second joint. The second joint of the carpus of the second pair of legs is hardly longer than the third, and the hand is about one-half of the length of the carpus. The male referred to this species is like the other specimens in form, front, antennæ, eight posterior legs; but differs in the hands, which have the moveable finger very much incurved, with two teeth on the basal half of its inner margin; and the tooth of the other finger is a long low triangle, with the hypotenuse on the upper side, which side is nearly flat. The outer maxillipeds are narrow, and the hairs are throughout quite short.

GENUS HIPPOLYTE.

1. *Rostrum super carapacis dorsum non productum.*

HIPPOLYTE ENSIFERUS (*Edwards*).

Gulf-weed, Atlantic, latitude, 36°–39° north; longitude, 71°–44° west.

The beak in the specimens seen by us, has either three or five teeth at apex, the middle one longest, and the outer next longest. Length, three-fourths to one inch. Colour, brownish yellow, with spots of cerulean blue. Legs transparent; excepting first pair and maxillipeds, which are brownish yellow like the body. Tarsus spinulous on inner margin.

H. ensiferus, EDWARDS, Crustacés, ii. 374; GOODSIR, Ann. Mag. Nat. Hist., 1845, xv. 74; KRAUSS, S. Af. Crust., p. 56.

HIPPOLYTE ACUMINATUS.

Rostrum elongatè acuminatum, subensiforme, apice parce recurvatum, squamâ antennali non brevius, medio margine supra infraque unidentato. Carapax supra oculum unispinosus. Antennarum flagellum brevius internarum 5–6-articulatum, apicem rostri non superans. Pedes antici perbreves, manu ovatâ. Pedes 2di 3tiis breviores, carpo 3-articulato. Maxillipedes externi basin antennarum externarum superantes, pubescentes. Tarsi pedum 6 posticorum infra spinulosi.

Beak long, acuminate, subensiform, sparingly curved upward at extremity, not shorter than basal scale of outer antennæ, near middle of upper and lower margin one-toothed. Carapax having a spine above the eye, shorter flagellum of inner antennæ five or six-jointed, not reaching beyond apex of beak. Anterior feet very short, hand ovate. Second pair shorter than third, carpus three-

jointed. Outer maxillipeds reaching beyond apex of base of outer antennæ, pubescent. Tarsi of six posterior feet spinulous below.

Plate 36, fig. 1 *a*, part of animal, enlarged; *b*, inner antennæ; *c*, hand of first pair; *d*, leg of second pair; *e*, part of leg of third pair.

From Gulf-weed (*Sargassum natans*) in the Atlantic, latitude, $36^{\circ} 07'$; longitude, $71^{\circ} 36'$, August 24, 1838; also, latitude, $38^{\circ} 12'$ north; longitude, $44^{\circ} 44'$ west, September 2, 1838; also, latitude, $4^{\circ} 07'$ north; longitude, $20^{\circ} 43'$ west.

Length of body, nine to twelve lines. Colour, yellow, with orange dots; sometimes a dirty yellow; at base of thorax and in fifth joint of abdomen translucent. Inner antennæ with first joint one-third as long as beak, and having an appressed tooth on outer margin; longer flagellum twelve to fourteen-jointed, and a few short hairs at apex of each joint. Second pair of feet one-third longer than first pair; hand hardly longer than carpus. Scattered tufts of short hairs on joints of six posterior legs. Caudal segment with two pairs of spinules on outer surface. Some of the females had eggs under the abdomen.

Differs from the *tenuirostratus*, which is attributed by Edwards to the same localities in the Atlantic, in having no spine on the back over the stomach region, and but one tooth on lower margin of beak.

HIPPOLYTE EXILIROSTRATUS.

Rostrum longum, omnino angustissimum, versus apicem non latior, rectum, apice acutum, supra 4-spinosum, infra rectum, integrum. Antennarum flagellum brevius internarum apicem rostri multum superans, multiarticulatum. Maxillipedes externi elongati, apicem basis antennarum externarum multum superantes. Pedes antici perbreves, manu subovatâ, fere per ejus latus carpo articulatâ. Pedes 2di 3tiis breviores, carpo 3-articulato; 6 sequentes nudiusculi, tarsis infra spinulosis, spinulis apicis longis, reliquis brevissimis.

Beak long, throughout very narrow, and not broader towards apex, straight, acute at apex, above four-toothed, below straight and entire. Shorter flagellum of inner antennæ many-jointed, reaching

much beyond the beak. Outer maxillipeds elongate, extending much beyond apex of base of outer antennæ. Anterior feet very short, hand subovate, articulated with the carpus nearly by its side. Second pair of feet shorter than third, carpus eight-jointed. Six following feet nearly naked, tarsi below spinulous, spinules of apex long, the rest very short.

Plate 36, fig. 2 *a*, animal, enlarged six diameters; *b*, hand of second pair, enlarged about seventy diameters; *c*, extremity of leg of third pair, enlarged; *d*, tarsus of same, enlarged seventy diameters.

Dredged in the harbour of Rio Janeiro.

Length of body, six to eight lines. The teeth of the beak are anterior to the line of the eyes. The straight lower margin of the beak is a peculiar characteristic. The fifth joint of the six posterior legs is a little the widest about one-fourth its length from the apex, and at the point of greatest width on inner margin, there is a spinule longer than others above or below; the tarsus closes against the oblique margin below this spinule. The hairs of the hand of second pair are minutely spinulous. Eyes long, and a spine on the carapax over the eye.

The closing of the tarsi against the preceding joint is more perfectly accomplished in this species, than in other species of Hippolyte, and it gives the legs an imperfect prehensile character.

HIPPOLYTE OBLIQUI-MANUS.

Rostrum longum, tenuiter laminatum, rectum, versus apicem verticaliter latius, infra 2-dentatum non rectum, supra 4-dentatum, apice bifidum. Flagellum antennarum internarum minus apicem rostri superans, majus paulo longius. Pedes antici perbreves, manu subovatâ, carpo manu multo brevior, vix oblongo. Pedes 2di 3tiis breviores, carpo 3-articulato. Tarsi pedum 6 sequentium infra spinulosi, spinulis apicis longis, deinde sensim brevioribus.

Beak long, thin laminate, straight, towards apex broader, below not straight and two-toothed, above four-toothed, apex bifid. Smaller

flagellum of inner antennæ reaching beyond apex of beak, larger a little longer than the other. Anterior feet very short, hand subovate, carpus much shorter than hand, scarcely oblong. Feet of second pair shorter than third, carpus three-jointed. Tarsi of six following feet spinulose below, spinules of apex long, and thence gradually becoming shorter.

Plate 36, fig. 3 *a*, part of body, enlarged six diameters; *b*, part of leg of second pair, *ibid.*; *c*, hand of first pair, *ibid.*; *d*, hand of first pair, enlarged twenty-four diameters; *e*, extremity of leg of third pair; *f*, tarsus of same leg, enlarged seventy diameters.

Dredged in the harbour of Rio Janeiro, along with the *H. exilirostratus*.

Length, eight lines. The beak has an angle below, unlike that of the *exilirostratus*, and also, two teeth, besides a bifid apex. The tarsi of the six posterior legs are also different, in having longer spinules below; and the preceding joint is linear in outline, with pairs of spinules on the inner margin. The carpus of the first pair of legs is hardly longer than broad, and is articulated with the hand by the lower apex. Eyes long, and a spine on the carapax over each eye.

2. *Rostrum super carapacis dorsum productum.*

HIPPOLYTE GIBBOSUS, *Edwards.*

Plate 36, fig. 4 *a*, animal, natural size; *b*, beak; *c*, part of leg of first pair, enlarged; *d*, *ibid.* of second pair; *e*, under view of part of abdomen.

In Feejees, along shores of Viti Lebu; also, at the Sandwich Islands.

Length, two and one-fourth inches. Colour of a Feejee specimen, clouded with light verdigris-green and flesh-red, the tints delicate, but colours opaque; legs and antennæ, banded with olive-green and a paler greenish shade. Anterior legs very slender, the hand not

stouter than rest of leg, and fingers one-fourth the length of the hand. Second pair filiform, carpus ten-jointed, joints subequal.

In a specimen from the Paumotus, agreeing with this species in the teeth of the beak, and in its slender anterior feet, the general colour consists of areolets of a slate shade, bordered by a bright green, with a few small concentric circles of alternate slate and green. Only an imperfect figure was made when the specimen was collected, and in it the beak is not as much reflexed as in the *gibbosus*; yet as we have not the specimen to refer to, we cannot say that the species is different.

EDWARDS, Crust., ii. 378.

HIPPOLYTE BREVIROSTRIS.

Rostrum breve (basi antennarum internarum multo brevius) acutum, spiniforme, dorso breviter productum, supra 4-spinosum, spinis inter se æque remotis. Maxillipedes externi longi, squamam antennalem longe superantes. Pedes antici crassiusculi, manu oblongâ. Pedes 2di 3tiis longiores, carpo elongato, 7-articulato.

Beak short, very much shorter than base of inner antennæ, acute, spiniform, produced a short distance on the back, above four-spinous, spines equally spaced. Outer maxillipeds long, reaching far beyond scale of outer antennæ. Anterior feet stoutish, hand long. Feet of second pair longer than third, carpus elongate, seven-jointed.

Plate 36, fig. 5, animal, enlarged two diameters.

Dungeness, in Straits of De Fuca.

Length of body, one and one-fourth to one and a half inches. Of the spines of the beak two belong to the beak proper and two are on the cephalothorax. Below the eyes on anterior margin two spines, the lower quite small. Base of inner antennæ with a longish spine to outer side of basal joint, and one or two short spines at apex of other joints. Smaller flagellum short, and joints very numerous and

very short. Outer maxillipeds have some short spinules at apex, and on upper margin towards apex, but are not prominently hirsute or pubescent. Hand of first pair not shorter than carpus, linear, two or three times as thick as following pairs of legs. Six posterior legs nearly naked, penult joint quite long; tarsus spinulous within. Fourth and fifth joints of abdomen acute either side.

HIPPOLYTE LAMELLICORNIS.

Rostrum longum verticaliter latissimum, fere ad thoracis basin productum, apice bifidum, supra sinuosum, super cephalothoracem 4-spinosum, anterius 6-spini-dentatum, spinulis inæquis, totis inter se subæque remotis; infra triangulatum, 2-dentatum. Antennæ internæ rostro parce longiores. Pedes antici gracillimi, 2dis paulo crassiores. Pedes 2di 3tiis vix breviores, carpo elongato, 7-articulato, articulo carpi 3tio longo. Tarsi pedum sequentium fere inermes, spinulis versus basin subtilissimis. Maxillipedes externi apice spinulosi, articulo ultimo supra pubescente.

Beak long, broad lamellate, produced nearly to posterior margin of thorax, bifid at apex, undulate above, four spines upon cephalothorax, and about six upon proper beak, teeth or spines unequal, all nearly equally spaced; outline of beak below triangulately salient, two-dentate. Inner antennæ little longer than the beak. Anterior feet very slender, but little stouter than the next pair. Second pair hardly shorter than third, carpus elongate, seven-jointed, third joint quite long. Tarsi of following pairs nearly unarmed, a few very minute spinules towards base. Outer maxillipeds spinulous at apex, last joint pubescent above.

Plate 36, fig. 6 *a*, animal, natural size; *b*, extremity of outer maxillipeds, enlarged six diameters; *c*, carpus and hand of second pair, *ibid.*; *d*, part of third pair, *ibid.*

Dungeness, in the Straits of De Fuca, Northwest America.

Length of body, one and a half to two inches. The four dorsal spines are rather larger than those of the beak proper; and the first

and last of the latter (not counting the bifid tip), are much smaller than the others; the outline of the whole is separately arcuate along the back and along the beak, with a concave outline between the two parts. The naked tarsus is peculiar. The base of the inner antennæ is hardly as long as half the beak, and the flagella scarcely reach beyond the tip of the beak. The second and third joints of the abdomen have the lateral margin triangulate or obtusely pointed, and in the next two, this margin is acute. The third joint of the carpus of the second pair of feet is twice as long as the first and second joints together. The six posterior legs are nearly naked.

RHYNOCINETES TYPICUS.

Plate 36, fig. 7 *a*, female, natural size; *b*, beak of same; *c*, outer maxilliped of male, natural size; *d*, first pair of legs of male, natural size.

Valparaiso.

The species has been described with detail by Milne Edwards, and figured by him in the *Ann. des Sci. Nat.* [2], vii. pl. 4, and also in the *Voy. dans l'Amer. Merid.*, of Alcide d'Orbigny, *Crustacés*, pl. 17. The coloured drawing by the author, represents a fresh living specimen, and shows the usual colouring of life, while that in D'Orbigny's work, is much faded in its colours.

It is important to observe, that the exterior maxillipeds are very much more elongate in the male than in the female, being in the former as long as the body.

SUBFAMILY PANDALINÆ.

PANDALUS PUBESCENTULUS.

Carapax dense brevissimeque pubescens, margine infra oculum bispinoso. Rostrum squamâ antennali longius, ensiforme, paulo recurvatum sed apice non altius quam dorsum, supra 16-18-dentatum, dentibus parvulis et fere ad dorsi medium continuatis, versus apicem edentulum.

infra 7-dentatum, apice bifidum. Pedes toti nudiusculi, 3tii 4ti 5tique longitudine sensim decrescentes, 3tii longi, 1mi articulis 2dorum tribus primis paulo longiores.

Carapax densely very short pubescent, margin below the eye with two spines. Beak longer than basal scale of outer antennæ; ensiform, somewhat recurved, but apex not raised above level of back, sixteen to eighteen-toothed above, teeth small and continued nearly to middle of back, towards apex unarmed, apex bifid, below seven-toothed. Feet nearly naked, third, fourth, and fifth pair decreasing regularly in length, anterior pair but little longer than first three joints of second pair.

Plate 36, fig. 8, animal, natural size.

Straits of De Fuca, at Dungeness, Oregon.

Length of body, five inches; of carapax, two and one-fourth inches; of beak to the posterior tooth on the back, one and five-eighths inches; of beak to the orbital sinus, its proper base, one and one-fourth inches.

SUBFAMILY PALÆMONINÆ.

We have added several new genera to this subfamily; and they show the little importance of external form compared with certain other characteristics. In the two extremes of the group, *Pontonia* and *Palæmon*, we have a striking contrast in beak and body, the one depressed, with a short beak, the other compressed, with a long ensiform beak; in the former, the outer maxillipeds are suboperculiform, in the latter, slender throughout. The genus *Pontonia*, as adopted by Milne Edwards, embraces two genera; one, *Pontonia* proper, with small eyes, and living in the shells of living molluscs; and the other, swimming free, and often found among the branches of a coral, where it had secreted itself. The latter (our *Ædipus*), has large eyes, with the outer maxillipeds equally broad throughout, and the tarsus having a high prominence below. Another group (*Harpilius*, as here adopted) has probably been included under *Pontonia*; but although near the last in general form, and having also an uncinatè tarsus, the promi-

nence on the under side of the tarsus is wanting, and the outer maxillipeds are peculiar, the second joint being broad, and the following narrow, as in the true *Pontonia*, but the latter two together longer than the second, unlike *Pontonia*.

In another genus (our *Anchistia*), differing but little from the preceding, the outer maxillipeds are slender throughout; the tarsus is also slender and nearly straight; the body is not depressed.

In all the groups which have been mentioned, the mandible is without a palpus, and the inner antennæ have but two flagella, although one of them is sometimes bifid at apex.

The next group (*Palæmonella*) is between the last mentioned and *Palæmon*. The form is that of *Palæmon*; the inner antennæ have two flagella, with one bifid at tip; the tarsi are slender; the mandibles have a rudimentary palpus of two joints. They pass into *Palæmon* through those species of the latter genus, which have two of the three flagella of the inner antennæ united nearly to their extremities.

From this survey of these genera and their relations, it is evident that *Pontonia* and *Palæmon* pertain to the same natural group, and both are removed by important characters from the *Alpheinæ*.

GENUS PONTONIA, Latreille.

Corpus depressum. Oculi parvi. Maxillipedes externi suboperculiformes, articulo 2do latiusculo, latiore et longiore quam duo sequentes. Rostrum depressum, breve. Antennæ internæ flagellis duobus confectæ. Tarsi uncinati.

Body depressed. Eyes small. Outer maxillipeds suboperculiform, second joint rather broad, broader and longer than the two following. Rostrum depressed, short. Inner antennæ ending in two short flagella. Tarsi unciniate.

The *Pontonia tyrrhena* is the type of this genus. We refer to this group another species, found, like that, within the shell of a bivalve mollusc. The shell is more opaque and thicker than in the *Pontonia macrophthalma* and allied; the legs are shorter; the eyes very much smaller; the outer maxillipeds very different; the tarsi destitute of

the protuberance below. In our species, but four branchiæ were counted on either side of the thorax; none were attached to the fifth pair of legs; the leaflets were long linear. The abdomen posteriorly, for the last three segments, is very narrow, the three anterior segments being very broad, and the fourth rapidly narrowing; the last three were flexed upon the venter, and filled up the space left between the sides of the preceding segments. Eyes quite small, and projecting only their diameters. Scales of the outer antennæ partly concealed beneath the front. Beak flat and short.

The single specimen of this species collected by us, was lost at the wreck of the Peacock. The drawings and descriptions were made from the living animal.

PONTONIA TRIDACNÆ.

Corpus depressum. Carapax nudus, lævis, paulo oblongus, rostro triangulato, obtuso. Antennæ internæ perbreves, flagellis subæquis, articulis duobus precedentibus non oblongis. Squama antennarum externarum basalis apicem rostri non superans; flagellum rostro paulo longius. Pedes antici longiores, tenues, digito dimidio brevioribus quam manus; 2di crassiusculi, breves, subæqui, manu oblongâ, digitis manu plus dimidio brevioribus, brachio ultra carapacem parce saliente. Pedes 6 postici breves, æqui, nudi.

Body much depressed. Carapax naked, smooth, a little oblong, broadest at middle; beak triangular, obtuse. Inner antennæ very short, flagella subequal, two joints next preceding not oblong. Scale of outer antennæ not reaching beyond apex of beak, flagellum a little longer than beak. Feet of anterior pair longest, slender, finger half as long as hand; second pair rather stout, short, subequal, hand oblong, fingers less than half the length of hand; arm but little salient beyond carapax. Six posterior feet about equal, naked.

Plate 37, fig. 1 *a*, animal, enlarged; *b*, under view of abdomen; *c*, under view of anterior part of cephalothorax, more enlarged; *d*, one of the branchial leaflets.

Found in a *Tridacna*, at Tutuila, one of the Samoan or Navigator Islands.

Length, one-third of an inch, the abdomen being inflexed; but, with the abdomen extended, nearly two-thirds of an inch.

Several of the characters of this species are given in the remarks on the genus. The sides of the carapax curve around below, and leave ventrally, between, a space about one-third the width of the thorax. Abdomen when inflexed reaches to base of thorax. Eggs were contained in the cavity formed beneath the inflexed abdomen.

Antero-lateral angle of scale of second antennæ acute. Base of same antennæ slender, last joint longer than preceding, flagellum shorter than base. The superior antennæ have a very stout base, excepting the last two joints, which are very short. Length of hand of first pair of legs about half that of carpus.

GENUS *ÆDIPUS*, Dana.

Pontoniæ affinis. Corpus depressum. Oculi permagni, multo salientes. Maxillipedis externi articuli toti latiusculi, laminati, 3tio non angustiore quam 2dus, ultimo non brevior quam 2dus. Rostrum sive depressum, sive compressum et laminatum. Antennæ internæ flagellis duobus confectæ. Manus 2dæ sæpius permagnæ, longissimæ, subequalæ. Tarsi uncinati, breves, processu crasso infra armati.

Near *Pontonia*. Body depressed. Four anterior feet chelate, second pair the largest. Eyes quite large and much salient. Outer maxillipeds having all the joints equal, broad and laminate, third not narrower than second, and fourth or last not shorter than second. Beak either depressed or compressed and laminate. Hands of second pair of feet usually very large and long, subequal. Inner antennæ ending in two flagella.

The protuberance on the under side of the tarsus near its base, is one characteristic distinguishing this genus from *Harpilius*, and suggested the name of the genus, from *οίδημα*, a swelling, *πους*, foot. The outer maxillipeds are remarkable for the breadth of all the joints.

while the third and fourth are narrow in *Pontonia*. The eyes are peculiarly large and projecting.

The body is depressed, nearly as in *Alpheus*, and the larger hands have often an *Alpheus*-like form, being large and oblong, with short fingers. In the known species they are equal in size. The basal scale of the outer antennæ is very broad.

The species swim free, and are not found within the shell of a living mollusc, like some (if not all) *Pontoniæ*. They have a thin shell, and are frequently rich and beautiful in their colours.

This genus includes the *Pontonia macrophthalma* of Edwards, *Crustacés*, ii. 359, and Cuvier's *Règne An. Illust.*, pl. 52, f. 3.

ŒDIPUS SUPERBUS.

Corpus paulo depressum. Rostrum horizontaliter latum, oblongo-triangularatum, rectum, supernè medio carinatum et 5-dentatum, infra prope apicem 2-dentatum, squamâ basali antennarum externarum plus duplo brevius, basi internarum paulo brevius. Pedes antici tenues, manu breviter villosâ; proximi æqui, crassissimi, manu magnitudine portentosâ, plus dimidio longiore quam carapax, tumidâ, versus basin crassiore, digito mobili plus quadruplo brevior quam manus, angusto, tenuiore quam immobilis, margine externo angulate sinuoso. Oculi magni.

Body somewhat depressed. Beak horizontally broad, oblong-triangular, straight, carinate along middle, and five dentate above, below near apex two-dentate, not half as long as basal scale of outer antennæ, and a little shorter than base of inner antennæ. Two anterior feet slender, hand short villous in tufts. Second pair equal, very large and stout; hand more than half longer than carapax, inflated, largest towards base, moveable finger not a fourth as long as hand, narrow, more slender than other finger and angulato-sinuous on outer margin. Eyes large.

Plate 37, fig. 2 *a*, animal, enlarged three and a half diameters; *b*, extremity of caudal segment; *c*, second pair of maxillipeds; *d*, outer maxilliped; *e*, outline of tarsus; *f*, rostrum and outline of carapax.

Pacific, among the growing corals of Tongatabu.

Length, ten lines. Colour, mostly opaque white, with a bluish, yellowish, or flesh tinge; antennæ and scales, eyes, feet, and posterior part of body from the fourth abdominal segment, transparent wine-yellow, or burnt sienna, dotted with brown; extremity of caudal segment and lamellæ, purple. Beak acute and the margin either side in upper view slightly convex, then concave as it approaches the eyes, and over the base of the ocular peduncle there is a low angle. In profile the carapax a little longer than broad. Inner antennæ with the first joint very broad, and the outer apex triangular and acute; the two following joints quite short, not oblong, and the beak extending about to the apex of the second; exteriorly and from below the first joint, a long curving tooth arises, which extends forward exterior to the first joint, as far as base of second joint; second and third joints hairy within, shorter flagellum the stouter, and three-fourths as long as longer or inner; it is divided near apex; inner flagellum longer than carapax and hairy below. Second antennæ about as long as body; basal scale quite broad; a tooth below apex on outer side; apex projecting beyond the tooth, obtuse. Carpus of second feet short, obconical; apical margin in part acutely dentate. Penult abdominal segment acute on either side of base of caudal appendages. Caudal segment slightly shorter than adjoining lamella, at apex truncate and having six short spines, of which the second from either side is the longest.

ÆDIPUS GRAMINEUS.

Corpus paulo depressum. Rostrum angustum, rectum, squamâ basali antennarum externarum fere dimidio brevius, basin internarum longitudine æquans, supra 4-dentatum, infra prope apicem 1-dentatum. Oculi magni. Pedes antici elongati, antennis internis non breviores. Pedes 2di æqui, crassissimi, manu magnitudine portentosâ, plus dimidio longiore quam carapax, inflatâ, versus basin crassiore, digito plus quadruplo brevior quam manus, sublumato, extus integro, arcuato.

Body somewhat depressed. Rostrum narrow, straight, much shorter than basal scale of outer antennæ, and as long as base of inner,

above four serrate, below near apex one-serrate. Eyes large. Anterior feet long, not shorter than inner antennæ. Second feet very large, the hand of same size usually as in preceding, more than half longer than carapax, inflated, stouter towards basè, finger hardly one-fourth the hand in length, sublunate, outer margin entire, thumb narrower, one-toothed within.

Plate 37, fig. 3 *a*, animal, enlarged three and one-half diameters; *b*, profile of beak; *c*, under view of carpus and extremity of arm; *d*, maxilliped of second pair; *e*, *ibid.* of third pair.

Pacific, on the coral reef, among growing coral at Rewa, Viti Lebu, one of the Feejee Islands.

Length, eight lines. Colour, grass-green, with many dark, irregular longitudinal lines along the carapax and abdominal segments. Beak much more slender than in the preceding, and the margin concave from the tip of the beak backward, and around below the eyes; in profile the beak is linear, the upper and under margins being very nearly parallel. Moveable finger of the large hand with the inner margin concave and the outer much more convex, and broadest at middle; lower finger less stout, and having a single notch in the inner margin. Carpus of the second feet and the preceding joint also, with one or two spiniform teeth on apical margin. Outer antennæ about as long as body.

GENUS HARPILIUS (*Dana*).

Pontoniæ (*Ædipoque affinis*). *Corpus sive depressum sive fere cylindricum. Oculi permagni, valde salientes. Maxillipedis externi articulus 2dus latus, 3tius 4tusque angusti, tenues, simul sumti 2do longiores, ultimo (4to) multo brevior quam precedens. Rostrum longum, compressum et laminatum. Antennæ internæ flagellis duobus connectæ. Manus 2dæ longæ sat tenues, æquales. Tarsi uncinati, breves, processu inferiore carentes.*

Near *Pontonia* and *Ædipus*. Body either depressed or nearly cylindrical. Eyes large and much salient. Outer maxillipeds with

second joint broad, the following slender, last much shorter than preceding. Beak long, compressed and laminate. Inner antennæ ending in two flagella. Hands of second pair long and rather slender, equal. Tarsi uncinata, short, but without a protuberance below.

The outer maxillipeds have the form nearly of those of *Pontonia*, yet the last two joints are much longer in proportion. In the form of the body and eyes, the species are like the *Ædipi*, and quite unlike the small-eyed *Pontoniæ*. The tarsi are those of *Pontonia*. The mandible has the lateral process low bidentate at apex, as in *Ædipus*. The beak is usually more or less ensiform, though sometimes rather broad at base, as in some *Ædipi*. The branchiæ are five in number on either side, and the leaflets are rather short.

The name of the genus is from *ἀρπυ*, *pruning hook*, and alludes to the hooked form of the tarsus. The species have a thin shell, and like the *Ædipi* swim free.

HARPILIUS LUTESCENS.

Corpus paulo depressum. Rostrum angustum, parce recurvatum, squamâ antennali paulo brevius, basi internarum multo longius, supra 7-8-dentatum, infra prope medium 1-dentatum. Pedes antici quoad manum sparsim pubescentes; 2di angusti, manu gracili, fere lineari, digitis linearibus, vix dimidii manus longitudine.

Body somewhat depressed. Rostrum narrow, sparingly recurved, a little shorter than scale of outer antennæ, and much longer than base of inner, above having seven or eight serratures, and one near middle below. Two anterior feet with the hand sparsely short pubescent. Second feet narrow; hand slender, nearly linear, fingers linear, nearly half as long as hand.

Plate 37, fig. 4 *a*, animal, enlarged four diameters (caudal segment mutilated); *b*, profile of beak; *c*, upper view of head and antennæ, more enlarged; *d*, *d'*, different views of mandible; *e*, maxilliped of first pair; *f*, *ibid.* of second pair; *g*, *ibid.* of outer pair; *h*, extremity of one of eight posterior pairs.

Pacific, reef of Tongatabu.

Length, seven lines. Colour, yellowish, with three brown longitudinal bands in the abdomen, and two in thorax, the latter concave towards one another. [Colours probably not constant for the species.] The beak is curved slightly upward, and like the preceding is acute at apex, both in a vertical and profile view. The larger part of the first joint of the inner antennæ is covered by the eyes. The eyes do not project laterally beyond the carapax. The anterior angles of the carapax are acute. The tooth at outer apex of second antennæ projects much beyond the terminal margin of the scale. The hand of the second pair of legs is scarcely broader than the carpus, a slight pubescence towards extremities of finger and thumb. The carpus is full one-third as long as the hand. Six posterior legs hairy towards apex.

GENUS ANCHISTIA (*Dana*).

Pontoniæ Palæmonique affinis. Corpus vix depressum. Rostrum tenue, sæpius laminatum, elongatum. Oculi mediocres. Maxillipedes externi omnino tennes. Antennæ internæ duobus flagellis instructæ, uno parce bifido. Mandibulæ non palpigeræ. Manus secundæ (in speciebus scrutatis) sat graciles, elongatæ et æquales. Tarsi rectiusculi tennes.

Related both to *Pontonia* and *Palæmon*. Beak long, slender, usually laminate. Eyes moderately large. Outer maxillipeds throughout slender. Inner antennæ furnished with two flagella, one sparingly bifid. Mandible not palpigerous. Hands of second pair (in species examined) rather slender, long, equal. Tarsi very slender and nearly straight.

The *Anchistiæ* form a link of relationship between *Palæmon* and *Ædipus*. Some of the species are precisely like *Palæmons* in form and habit; yet the inner antennæ have properly but two flagella, one of these two being bifid only for a very short distance at tip. Moreover, the mandibles are without palpi. Unlike *Harpilius* and *Ædipus*, the outer maxillipeds are slender throughout, and the tarsi are nearly straight and slender, as in *Palæmon*. The absence of a palpus from the mandibles, is the surest characteristic for distinguish-

ing the species from those of Palæmon, although they may generally be distinguished by their more salient eyes, hardly compressed and rather longer body, and the inner antennæ with two flagella. The slender, nearly straight tarsi separate them from Harpilius or Œdipus. The lateral process of the mandibles has a broad summit, molar-like, usually, as in Palæmon, and not bidentate as in Harpilius and Œdipus.

The name of the genus alludes to its being in close relationship to genera on either side, from *αγγιστεία*, *relationship*.

ANCHISTIA GRACILIS.

Rostrum tenue, rectum, acutum, longum, squamâ antennali fere brevius, basi antennarum internarum longius, supra 6-dentatum, dente postico inter oculos, infra unidentatum. Antennarum internarum articuli 2dus 3tiusque perbreves. Pedes 2di longi, carpo perbrevis, apice acuto, brachio apice externo acuto, manu subcylindricâ, digitis manu fere triplo brevioribus.

Beak slender, straight, acute, hardly shorter than scale of outer antennæ, much longer than base of inner pair, six-toothed above, posterior tooth situated between the eyes, unidentate below. Second and third joints of inner antennæ very short. Feet of second pair long, carpus very short, acute at apex, arm acute at outer apex, hand subcylindrical, fingers nearly one-third as long as hand.

Plate 37, fig. 5 *a*, animal, much enlarged; *b*, outline of beak; *c*, mandible; *d*, extremity of terminal process; *e*, maxilliped of first pair; *f*, maxilliped of second pair; *g*, one of the setæ of same; *h*, outer maxilliped; *i*, last joint of same, more enlarged; *k*, under view of carpus and arm of second pair of feet; *l*, extremity of third pair; *m*, one of the setæ of the basal scale of outer antennæ.

Sooloo Sea.

Length, eight or nine lines. Carpus of second pair of feet not one-fourth as long as hand, and about half as long as arm. Mandibles rather slender, with extremity of terminal process five-toothed, the

three median teeth smaller than the outer, extremity of lateral process minutely setigerous. Some of the setæ of basal scale of outer antennæ in part jointed or annulate.

ANCHISTIA LONGIMANA.

Rostrum elongatum, acutum, basi angustum, tenue, supra 6-dentatum, dente postico oculis posteriore. Antennæ internæ elongatæ, articulis basalibus 2do 3tioque longissimis, apice 2di extremitatem rostri fere attingente, 3tio dimidii rostri longitudine. Pedes 2di prælongi, æqui, brachio apicem rostri multo superante, carpo elongatè obconico, apice interno spinigero, manu longâ, angustâ, digitis dimidio manus multo brevioribus.

Beak elongate, acute, narrow at base, slender, above six-dentate, last of the teeth posterior to the line of the eyes. Inner antennæ having the base much elongate, second and third joints long and slender, apex of second joint reaching nearly to extremity of beak, third half as long as beak. Feet of second pair very long, equal, arm extending farther forward than apex of beak, carpus long obconical, inner apex with a spine, hand long and narrow, fingers shorter than half the hand.

Plate 37, fig. 6 *a*, head, with antennæ, much enlarged; *b*, beak in profile.

Loc. — ?

Length, six to eight lines. Form, nearly like that of a Palæmon; but eyes more oblong, and inner antennæ with but two flagella, besides being peculiar in its long basal joints, the third reaching nearly its whole length beyond the beak, although half as long as the beak, and the whole base longer than basal scale of outer pair. Arm of second pair of feet reaches nearly as far forward as the base of these antennæ; first pair of feet reach about to apex of carpus of second pair. Fingers of hand of second pair about two-fifths as long as hand, and carpus half as long as hand. Basal scale of outer antennæ rather narrow. Six posterior legs very slender, and last pair, when thrown forward,

reaching beyond apex of arm of second pair, and much beyond apex of beak. Tarsus slender and but little curved.

ANCHISTIA ENSIFRONS.

Rostrum ensiforme, valde recurvatum, squamâ antennali non longius, apice bifidum, supra 6-7-dentatum, infra paulo dilatatum et 3-dentatum. Carapax super orbitam spinâ armatus, infra orbitam spinis duabus in eâdem lineâ horizontali. Antennæ internæ rostrum parce superantes. Pedes antici graciles, apicem carpi 2di non attingentes; 2di crassiusculi, subcylindrici, per carpum manumque rostrum superantes, carpo longo, apice inermi, obtuso, manu prælongâ, lineari, digitis dimidio manus paulo brevioribus. Pedes 6 sequentes gracillimi, longi, fere nudi.

Beak ensiform, much reflexed, not longer than basal scale of outer antennæ, bifid at apex, above six or seven-toothed, below somewhat dilated and three-toothed. Carapax above line of orbit bearing a spine, below orbit two spines in nearly same horizontal line. Inner antennæ extending but little beyond apex of beak. Anterior feet slender, not reaching to apex of carpus of second pair. Second pair rather stout, subcylindrical throughout, exceeding the beak by the carpus and hand, carpus long, not armed or acute at apex, hand very long linear, fingers not half as long as hand. Six following pairs very slender, long, nearly naked.

Plate 38, fig. 1 *a*, animal, enlarged five diameters; *b*, inner antennæ and eye, more enlarged; *c*, outer antennæ, *ibid.*; *d*, *d'*, mandible in different positions, *ibid.*; *e*, second pair of maxillipeds, *ibid.*; *f*, outer maxilliped, *ibid.*; *g*, extremity of leg of third or fourth pair.

Straits of Balabac, north of Borneo.

Length, eight to nine lines; a female, with eggs under the abdomen, eight lines. The form of the beak and of the body is wholly that of a Palæmon. Yet the mandible has no palpus, and the inner antennæ have properly but two flagella, one being only slightly bifid at tip.

The mandible has the lateral process a regular molar in form, with several prominences, nearly as in Palæmon. The terminal process is tridentate. Basal scale of the outer antennæ quite narrow. Eye rather short, as in Palæmon. Palpus of outer maxillipeds reaches not quite to middle of penult joint. Two very long spines to extremity of caudal segment. Carpus of leg of second pair half as long as hand.

ANCHISTIA AURANTIACA.

Corpus vix depressum. Rostrum angustum, integrum, basis antennarum internarum longitudine, squamâ externarum paulo brevius. Pedes antici superficie manus internâ prope basin densè laxèque pubescentes. Pedes 2di graciles, manu parce crassiore quam carpus, fere lineari, digitis dimidio manus multo brevioribus, parce pubescentibus, angustis.

Body hardly at all depressed. Beak narrow, entire, as long as base of inner antennæ, a little shorter than basal scale of outer pair. Anterior feet with dense short pubescence on inner side of hand near base. Second feet narrow, hand hardly broader than carpus, almost linear, fingers rather more than one-third the length of hand, sparingly pubescent, narrow.

Plate 38, fig. 2 *a*, animal, enlarged six diameters; *b*, first abdominal appendage; *c*, second ditto; *d*, part of caudal segment.

Pacific, among corals of Viti Lebu, Feejees.

Length, half an inch. Colour, light vermilion spotted with yellow. Carapax and body elongate, hardly depressed. Anterior angles scarcely prominent. Last segment of abdomen slightly shorter than caudal lamellæ, a little hairy at tip, with two short spines. Hands of first pair of legs with a little pubescence at tips. Carpus without spines or teeth. Last six legs of thorax rather longer, claw nearly straight and slender; second pair of abdominal legs, with a narrow accessory branch, in addition to the usual pair; third, fourth, and fifth pairs similar, except that the accessory branch becomes smaller, and the whole organ is shorter.

GENUS PALÆMONELLA (*Dana*).

Palæmoni affinis, rostro tenui, laminato, elongato, pedibus 4 anticis chelatis, 2dis majoribus, antennis internis cum tribus flagellis instructis, mandibulo palpigero. Palpus mandibularis perbrevis, 2-articulatus. Flagella duo antennarum internarum fere ad apices in uno conjuncta.

Related to *Palæmon*, the beak being long, thin and slender, the four anterior feet chelate, and second pair the larger, the inner antennæ with three flagella, mandibles palpigerous. Palpus of mandibles very short, two-jointed. Two of the flagella of the inner antennæ united nearly to their tips.

In both of the species of the genus here described, the carapax has two spines below the eye in nearly the same horizontal line. The outer maxillipeds are slender, as in *Palæmon*. The anterior legs are very slender; the second pair moderately stout, with the hand nearly cylindrical, and hardly stouter than preceding part of the leg.

PALÆMONELLA TENUIPES.

Rostrum rectum, non reflexum, squamâ antennali non longius, supra 6-7-dentatum, dentibus inter se fere æquè remotis, infra 2-dentatum et non dilatatum, apice acutum. Pedes 2di valde elongati, apice brachii apicem rostri vix superante et infra supraque acuto, carpo dimidii manus longitudine, apice spinâ armato, digitis dimidio manus brevioribus. Pedes 6 postici gracillimi fere nudi.

Beak straight, not reflexed, not longer than basal scale of outer antennæ, above six or seven-toothed, teeth nearly equally spaced; below not dilated, two-toothed, acute at apex. Second pair of feet very long, apex of arm reaching to apex of beak, and acute above and below, carpus half as long as hand, having a spine at apex, fingers not as long as half the hand. Six posterior feet very slender, naked or nearly so.

Plate 38, fig. 3 *a*, part of animal, enlarged; *b*, mandible, more enlarged; *b'*, terminal process of mandible and palpus, still more enlarged; *c*, second pair of maxillipeds; *d*, outer maxilliped.

Sooloo Sea.

Length of body, eight lines. Beak very narrow (vertically), and equally so throughout. Base of inner antennæ but little shorter than beak, and the whole antennæ twice as long as beak. Fingers of hand of second pair in contact. Mandible with terminal process tridentate; palpus very short; lateral process molar-like, nearly as in *Palæmon*. Outer maxillipeds equally slender throughout; palpus considerably longer than second joint.

PALÆMONELLA ORIENTALIS.

Rostrum rectum, non recurvatum, squamâ antennali non longius, apice acutum, supra 6-dentatum, dentibus inter se fere æque distantibus, infra 1-dentatum. Pedes 2di crassiusculi, subcylindrici, apice brachii apicem rostri non attingente et non acuto, carpo brevior quam dimidium manus, apice non acuto, digitis dimidio manus brevioribus. Pedes 6 postici fere nudi, graciles.

Beak straight, not reflexed, not longer than scale of outer antennæ, acute at apex, above six-toothed, teeth nearly equidistant, below one-toothed. Feet of second pair rather stout, subcylindrical, apex of arm not reaching to apex of beak and not acute, carpus shorter than half the hand, and apex not acute, fingers shorter than half the hand. Six posterior feet naked or nearly so, slender.

Plate 38, fig. 4 *a*, part of a female, enlarged; *b*, mandible, more enlarged; *c*, maxilliped of second pair; *d*, outer maxilliped.

Sooloo Sea.

Length of body of a female carrying eggs, eight lines. Beak rather wider than in the *tenuipes*, but not narrower towards base than in outer half. Leg of first pair reaches about to apex of carpus of second

pair. Six posterior legs twice stouter than in the *tenuipes*. Mandible with terminal process tridentate, lateral process somewhat molar-like, with three or more prominences. Palpus of outer maxillipeds considerably longer than second joint of these organs.

GENUS PALÆMON (*Fabricius*).

1. *Carapax margine antico infra oculum spinis duabus armatus.*

PALÆMON AFFINIS, *Edwards.*

Plate 38, fig. 5 *a*, animal, natural size; *b*, outline of beak and cephalothorax; *c*, view of base of inner antennæ; *d*, mandible; *e*, inner maxillæ; *f*, second maxilliped; *g*, outer maxilliped.

New Zealand.

Beak a little longer than scale of outer antennæ, seven-toothed above and four-toothed below, a little recurved, bifid at apex, second of the teeth below (counting from apex) directly beneath the first of those above, and last of those above near middle of back of cephalothorax. Hands all very slender; first pair not half length of carpus; second pair considerably longer than carpus, fingers much less than half the length of the hand, a little short hairy within. Following legs very slender, unarmed and naked, except a few hairs at tips of joints, and for a short distance at lower apex of penult joint two flagella, inner antennæ united to eighth or ninth joint, tooth of first basal joint extends very nearly to apex of second basal joint. Outer maxilliped short, about reaching to apex of base of outer antennæ. Extremity of abdomen very narrow, having three minute spinules, and between them, two longish setæ. Length, two inches. Nearly pellucid, with some bright green lines of extreme delicacy along the cephalothorax and abdomen; four posterior legs with two red spots, one at either extremity of the femur; second pair, with three red spots, one in the hand at the base of the fingers.

Although very near the *P. squilla*, the coalesced flagella of the inner antennæ are united to a longer distance from the base of these organs;

the palpus of the outer maxillipeds is considerably shorter than the second joint.

PALEMON DEBILIS.

Rostrum prælongum, gracile, paulo recurvatum, squamâ antennali multo longius, apice bifidum, dimidio apicali supra integro, basali 4-6-dentato, margine inferiore 6-9-dentato. Antennarum internarum flagella duo longè conjuncta. Pedes nudi, inermes; 1mi 2dique inter se subæquales, parvuli, gracillimi, manu dimidio carpi paulo longiore, non incrassatâ. Flagellum minus antennarum internarum perbreve.—Var. *a*, *Rostrum supra 4-dentatum, infra 6-dentatum; var. ß, attenuatus, Rostrum longissimum, supra 6-dentatum et infra 9-dentatum.*

Beak very long and slender, a little reflexed, much longer than basal scale of outer antennæ, bifid at apex, apical half above entire, basal half with four to six teeth, inferior margin with six to nine teeth. Two flagella of inner antennæ united for a considerable distance. Feet all naked and unarmed; first and second pairs subequal, quite small and slender, hand longer than half the carpus, not incrassate. The smaller flagellum of inner antennæ very short.

Plate 38, fig. 6, cephalothorax, enlarged two diameters.

Sandwich Islands.

Length, 1-1½ inches. Beak in the common variety one-fourth to one-half longer than antennary scale; first spine or tooth of upper margin (counting from extremity), is nearly over the fifth of the lower margin. The posterior tooth of beak is situated but little back of line of eyes, and the next one is just anterior to this line. Hands nearly naked; fingers of second pair a little shorter than half the hand.

Var. *attenuatus* (fig. 7, Plate 38, enlarged two diameters).—A specimen from Hilo, Hawaii, has the hands equal, and feet naked and slender, as in the preceding; but the beak is much longer, being two-thirds longer than the antennary scale, and there are six teeth to basal half of upper margin, and nine teeth below. The specimen is a female. It is, probably, a variety of the *debilis*.

PALÆMON EXILIMANUS.

Rostrum lanceolatum, apice brevi deflexum, supra paulo arcuatum et 6-dentatum, infra 3-serratum, squamam antennalem non superans. Flagella duo antennarum internarum parce conjuncta. Pedes antici gracillimi, manu plus duplo brevior quam carpus; 2di non crassiores, nudi, manu duplo longiore, carpo dimidio longiore quam manus, digitis dimidio manus paulo brevioribus. Pedes duo postici tenuissimi, prorsum porrecti apicem rostri superantes.

Beak lanceolate, somewhat arcuate above and six-dentate, at tips for a short distance deflexed, below three-dentate, not longer than basal scale of outer antennæ. Two flagella of inner antennæ united for a very short distance. Anterior feet very slender, hand not half as long as carpus; second pair not stouter, naked, hand twice as long, carpus once and a half the length of the hand, fingers hardly half as long as the hand. Posterior feet very slender, when thrown forward, extending beyond the beak.

Plate 38, fig. 8, cephalothorax, enlarged two diameters.

Feejee Islands, Pacific Ocean.

Length, one and a half inches. Teeth of upper margin of beak nearly equidistant along the margin; beak a little shorter than antennary scale. Hand of first pair of feet laxly pubescent about the fingers, as stout as hand of second pair though half shorter, and neither stouter than the carpus. Outer maxillipeds of moderate length, reaching somewhat beyond the base of the outer antennæ.

PALÆMON SQUILLA, *Fabr.*

Plate 38, fig. 9, cephalothorax, enlarged two diameters.

Madeira.

This species is closely related to the *P. squilla*, if not identical with

it. In our single specimen, the first or outer tooth of the lower margin of the beak is directly beneath the first of the upper margin. The hand of the second pair is full three times as long as that of the first pair. Length of body, one and one-fourth inches.

PALÆMON CONCINNUS.

Rostrum gracillimum, squamâ antennali vix longius, basi antennarum internarum multo longius, ensiforme, fere rectum, apice bifidum vel trifidum dorsoque non altius, infra remotè minutèque 5-dentatum, supra 5-6-dentatum, dente 1mo vel externo a extremitate rostri remoto, penultimo inter oculos. Maxillipedes externi apicem basis antennarum externarum paulo superantes, hirsuti. Pedes 1mi apicem squamæ antennalis fere attingentes. Pedes duo postici prælongi, tenuissimi, articulo 4to apicem maxillipedis externi fere attingente.

Beak very slender, hardly longer than basal scale of outer antennæ, much longer than base of inner antennæ, ensiform, nearly straight, its apex bifid or trifid, and not raised above line of back, remotely and minutely five-toothed below, 5-6-toothed above, the first tooth remote from extremity, and the penultimate situated between the eyes. Outer maxillipeds reaching a little beyond apex of base of outer antennæ, hirsute. First pair of feet extending forward nearly to apex of antennary scale. Posterior feet very long, and slender, apex of fourth joint reaching nearly to apex of outer maxillipeds.

Plate 38, fig. 10 *a*, cephalothorax, enlarged two diameters; *b*, beak, enlarged, from a larger specimen.

Feejee Islands.

Length, one and one-fourth to one and three-fourths inches. Form slender, the sides of cephalothorax closely approximating along the venter. The fourth of the teeth on lower margin of the beak situated nearly below the second of those on the margin, or below a point between the first and second. Hand of anterior pairs with the fingers half the length of the hand.

PALÆMON NATATOR, *Edwards*.

Plate 38, fig. 11, mandible, enlarged.

Gulf-weed, Atlantic Ocean. September, 1838.

Beak lanceolate, both margins arcuate; teeth of upper margin of beak ten to twelve in number. Below there are four teeth, but they are often nearly or wholly concealed by the hairs of this margin, so as to be detected with some difficulty. The body is nearly pellucid along the medial line, and is brownish red or yellow either side, giving the animal a peculiar appearance in the water. Length, three-fourths of an inch. Maxillipeds lax hirsute. The two flagella of inner antennæ united only for a very short distance.

EDWARDS, *Crust.*, ii. 393; GOODSIR, *Ann. Mag. Nat. Hist.* 1845, xv. 74.

Leander erraticus, DESMAREST, *Ann. Entomol. Soc. de France*, 1849, p. 87; and GUERIN'S *Mag. de Zool.*

2. *Carapax margine antico infra oculum spinâ unâ armatus, et pone hanc alterâ minore.*

PALÆMON GRANDIMANUS (*Randall*).

Plate 38, fig. 12 *a*, cephalothorax, natural size; *b*, smaller hand of second pair, natural size.

Sandwich Islands.

Rostrum lance-shaped, not reflexed or scarcely so, as long as scale of antennæ, teeth above running regularly to apex, fourteen or fifteen in number, below four. Flagellum of outer antennæ pubescent (pubescence seen only when in a liquid). Outer maxillipeds short, reaching but little beyond apex of base of outer antennæ. Anterior legs very slender, not half as long as next pair; second pair large, very unequal, the longer very long, with the hand very stout, and two-thirds as long as the body, nearly three times as long as carpus, scabrous,

partly pubescent, fingers slender, half as long as hand, not meeting along their inner margins when closed, acutely dentate, of which one tooth is stouter than the others, the left or right may either of them be the larger hand; smaller hand having the fingers somewhat gaping, long, densely hirsute within. Following legs very slender, unarmed, a few thin hairs, which are rather short but most numerous on the fifth joint.

Length, two and a half to three inches; length of larger hand, one and three-fourths inches.

In a younger specimen, about two inches long, the fingers of the smaller hand (the right) are nearly in contact, though very hairy within, the beak is very slightly reflexed and there are fourteen teeth to upper margin of beak and four below.

Flagella of inner antennæ all slender and disunited nearly to base.

P. grandimanus, RANDALL, Jour. Acad. Nat. Sci. Philad., viii. 142.

PALEMON LANCEIFRONS.

Rostrum lanceolatum, supra multum arcuatum et 12-dentatum, apice vix recurvatum, infra 3-dentatum, squamam antennalem longitudine non superans. Pedes antici gracillimi, carpo plus duplo longiore quam manus. Pedes 2di longissimi (corpore longiores), fere cylindrici, manu graciliore et non breviora quam carpus, scaberculâ, digitis brevibus, superiore hirsuto. Pedes postici si prorsum porrecti apicem rostri superantes.

Beak lanceolate, much arcuate above, and twelve-dentate, with the tips only slightly reflexed, three-dentate below, not longer than the basal scale of outer antennæ. Anterior feet very slender, carpus more than twice as long as hand. Second pair very long (longer than body) nearly cylindrical, hand more slender and not shorter than carpus, somewhat scabrous, fingers short, the superior hirsute. Posterior feet, when thrown forward, reaching beyond apex of beak.

Plate 38, fig. 13 *a*, cephalothorax, natural size; *b*, beak, enlarged.

Manilla, Island of Luzon, one of the Philippine Islands.

Length of body, two inches. The teeth of beak range along its whole upper margin, and are nearly equidistant throughout; those below are very short. The fingers of the hands of second pair are about two-fifths whole length of hand; the carpus is nearly twice as long as the arm.

PALÆMON ACUTIROSTRIS.

Rostrum lanceolatum, apice non recurvatum, squamâ antennali non longius, supra 14-16-dentatum, dentibus confertis, usque ad apicem continuatis, infra 4-5-dentatum. Maxillipedes externi mediocres. Pedes antici gracillimi, manu dimidii carpi longitudine. Pedes 2di longi, tenues, omnino bene scabri, manu parce crassiore et duplo longiore quam carpus, digitis dimidio manus brevioribus, apice carpi rostrum paulo superante. Pedes sequentes inermes.

Beak lanceolate, not reflexed at apex, not longer than basal scale of outer antennæ, fourteen to sixteen teeth above, teeth crowded and continued quite to extremity, four to five teeth below. Outer maxillipeds of moderate length. Anterior feet very slender, hand half as long as carpus. Second pair long, slender, strongly scabrous throughout, hand but little stouter and twice longer than carpus, fingers not half as long as hand, apex of carpus reaching a little beyond extremity of beak. Following legs unarmed.

Plate 39, fig. 1 *a, a'*, cephalothorax of different specimens, natural size; *b*, eye, base of inner antennæ, and part of anterior margin of carapax, and lower margin of beak.

Sandwich Islands.

Length of body, two and a half to three inches. Teeth of beak covering whole upper margin, and second upper tooth (counting from extremity) situated over first lower; the last upper tooth one-third the length of the cephalothorax, back of the line of the eyes. Flagellum of outer antennæ naked and not pubescent as in the *P. grandimanus*. The hands of the second pair of legs are very closely scabrous even to the tips of the fingers, and have but few hairs in any

part; the fingers are parallel and nearly in contact when closed; in both hands they are alike scabrous, and nearly naked. The basal scale of the outer antennæ is very slightly longer than the beak. The beak in the larger specimens is somewhat arcuate above, but in younger it is nearly straight, and with only four teeth below.

PALÆMON EQUIDENS.

Rostrum rectè ensiforme, verticaliter sat latum, apice parce reflexum, squamâ antennali non brevius, supra rectiusculum et 10-11-dentatum, dentibus inter se fere æque remotis, et supra tertiam partem dorsi carapacis continuatis, duobus terminalibus minoribus et fere apicalibus; infra arcuatum et 6-dentatum. Pedes 1mi rostrum multo superantes. Pedes 2di longi, subcylindrici, subtilissimè spinulosi, brachii apice apicem rostri attingente.

Beak straight ensiform, and vertically rather broad, very slightly reflexed at apex, not shorter than basal scale of outer antennæ, above nearly straight and ten or eleven-toothed, teeth about equally spaced, and continued over one-third of the back of the carapax; last two teeth smaller and nearly apical, below six-toothed. Anterior feet extending much beyond the beak; second pair long, subcylindrical, very minutely spinulous, extremity of arm just reaching to apex of beak.

Plate 39, fig. 2 *a*, outline of beak, natural size; *b*, arm.

Singapore.

Length of body to extremity of beak, four and two-thirds inches. The specimen is mutilated in its second pair of feet, and we cannot give the characters of the hands. The species belongs to the division of the genus in which the carapax has but one spine on the anterior margin either side below the eye, with a second more posterior, and is near the *P. forceps*.

PALÆMON CARCINUS (*Fabr.*)

Singapore, East Indies.

Smaller specimen, six inches long, including beak. Colour, grayish and greenish brown, or blue; long arms, dark olive; carpus, blue; eye, black. Larger specimen, nine inches long. Colour, mostly olive-green; extremity of abdomen, dark blue; long arms, blue-black, with some parts near the joints and along outer side smalt-blue.

3. *Carapax margine antico infra oculum spinâ unâ armatus, pone hanc non alterâ.*

PALÆMON GAUDICHAUDII (*Edwards*).

Valparaiso, Chili.

EDWARDS, Crustacés, ii. 400; D'Orbigny's S. A. Crustacea, pl. 17, f. 2.

GENUS HYMENOCERA, *Latreille*.

Rostrum mediocre. Oculi oblongi. Antennæ internæ bifidæ, ramis brevibus, uno foliaceo. Pedes antici tenues, manu elongato-subulatâ, digitis minutis. Pedes secundi lati, manu latissimè foliaceâ. Maxillipedes foliacei.

Rostrum of moderate length. Eyes oblong. Inner antennæ bifid, branches short, one foliaceous. Feet of anterior pair slender, having a slender subulate hand, fingers minute at apex. Second feet with a very broad foliaceous hand. Six remaining feet vergiform, unguiculate. Maxillipeds foliaceous.

This genus was established by Latreille, but has been but imperfectly described, as the specimen is not to be found in the collections at Paris. The description of the Paumotu species and the figure were made from the living animal, and supply some additional infor-

mation respecting this peculiar genus; but we have to regret the loss of the specimen by the disastrous wreck of the Peacock, in consequence of which we are prevented from giving minuter details.

The slender anterior pair of feet and stout second pair, with broad, equal hands, show a close relation to *Pontonia*; and this relation is farther seen in the foliaceous form of the outer maxillipeds, a characteristic observed to some extent in *Pontonia*, and more complete in *Gnathophyllum*. The abdomen is flexed after the third segment nearly as in *Hippolyte*, and is somewhat abruptly narrower posterior to this segment.

HYMENOCERA PICTA.

Rostrum longiusculum, in carapacem posticè productum, serratum. Segmentum abdominis tertium posticè obtuso-triangulatum. Antennæ anticae breves, basi parce longiore quam rostrum, flagellis dimidio basis brevioribus, flagello foliaceo breviter spatulato, altero tenuissimo, breviorè. Antennæ externæ corpore longiores, laminâ basali rostro longiore. Manus pedis secundi trapezoidalis, lata, oblonga, apice latior et truncata, dorso recta, angulis rotundata, digito brevi, extus serrulato. Maxillipedes externi oblongi, articulo secundo oblongo, tertio lato, trapezoidali, vix oblongo.

Beak rather long, continued in a crest on carapax. Third abdominal segment obtuso-angular behind. Inner antennæ short, base slightly longer than beak, branches not half as long as base, the foliaceous one short spatulate, the other shorter and very slender; second pair longer than body, basal scale longer than beak. Hand of second feet broad, oblong trapezoidal, broadest at apex and truncate, dorsal margin straight, angles rounded, finger short, serrulate without. Exterior maxillipeds oblong, second joint oblong, third broad trapezoidal, hardly oblong.

Plate 39, fig. 3 *a*, animal, natural size, *b*, main branch of exterior maxillipeds, enlarged; *c*, extremity of first legs, magnified four diameters.

Coral reefs of Raraka, one of the Paumotu Islands.

Length, about two inches. Colour, a light pink, with large purple spots generally bordered by yellow; several of these spots on the foliaceous hand. The carapax curves inward below, so as to cover the space quite to the exterior maxillipeds; there is a spine on the carapax just below the eye. Caudal segment oblong tapering; a few short hairs at apex and two spines either side. Caudal lamellæ rounded at apex and furnished with short hairs; the outer two-jointed. Eyes on oblong cylindrical pedicels. Outer maxillipeds cover closely the mouth, the first three joints of the two lying in contact; the following portion, which is foliaceous, is bent downward. The second joint is subcylindrical; the third is widened outwardly into a broad trapezoidal joint, broadest below, which in under view conceals from sight the base of the outer antennæ. The foliaceous portion has a small lamellar joint at apex. Legs all naked. The hand of the first pair is slender subulate, and the finger is not more than one-eighth of the hand in length. Foliaceous hand of second pair membranous, excepting outer margin. Finger about one-third the length of the hand. The carpus is much shorter than the finger, and has two acute teeth at apex; the arm is two-thirds as long as the hand, and has two teeth at apex. The following feet are slender and similar, the third pair is the shortest, the fifth the longest. The claw is very short and minute.

GENUS CRYPHIOPS, *Dana*.

Oculi sub carapace profundè celati. Rostrum et carapax uti in Pontoniâ. Antennæ internæ flagellis tribus confectæ. Mandibulæ palpo 3-articulato instructæ. Maxillipedes externi subtenuæ, longitudine mediocres.

Eyes concealed deeply under the carapax. Beak and carapax as in *Pontoniâ*. Inner antennæ with three flagella. Mandibles having a three-jointed palpus. Outer maxillipeds rather slender, of medium length.

This genus is the only one, hitherto discovered among the Palæmoninæ, in which the eyes are concealed under the carapax. They are much more deeply covered than in *Alpheus*, and the carapax has no swelling above, and no translucency; so that the animal can only

see out between the carapax and the bases of the antennæ, a very narrow space, that may be opened a little by the depression of the antennæ. The body is somewhat depressed, as in *Pontonia* and *Ædipus*, and the beak is rather short, and in form is oblong-triangular, with a keel above, which is dentate. The outer antennæ are situated mostly below the inner. The scale is large, and one-third or more of its length is beneath the carapax. The terminal process of the mandible has three strong triangular teeth, and the palpus is rather long and slender, with the joints subequal. The outer maxillipeds are narrow, with the penult joint a little more than half the preceding in length, and hardly one-half longer than the last joint. The abdomen is rather broad, and terminates in a narrow segment, the sides of which (in our dried specimen) are curved downwards, so as to make nearly a cylinder. The abdominal appendages have an oblong base, which is calcareous externally like the carapax. The legs are nearly as in other *Palæmoninæ*. The first pair is slender and about as long as the second; the second is rather stout, with an oblong hand; the fingers are similarly acuminate, but still are spoon-excavate as seen under a magnifier.

The name of the genus alludes to the concealed eyes, and is from *κρυφίος*, *concealed*, and *ὄψ*, *eye* or *sight*,

The only species seen was found in fresh-water streams.

CRYPHIOPS SPINULOSO-MANUS.

Rostrum triangulatum, squamâ antennali brevius, basin antennarum internarum superans, supra œque 7-dentatum, infra prope apicem unidentatum. Pedes 2di 1mos vix superantes, minute spinulosi, manu plus duplo longiore quam carpus, digitis dimidio manus longioribus, apice minutè cochleari-excavatis. Pedes antici nudiusculi, manu infra hirsutâ. Pedes 6 postici quoque nudiusculi, articulo 5to infra parce armato, tarsis unguiculatis.

Beak triangular, shorter than antennary scale, extending beyond base of inner antennæ, above regularly seven-toothed, below a single tooth near tip. Feet of second pair hardly reaching beyond the first, minutely spinulous, hand more than twice as long as carpus, fingers longer than half the hand, minute spoon-excavate at tip.

Anterior feet nearly naked, hand hirsute below. Six posterior pairs nearly naked, penult joint somewhat armed below, tarsi unguiculate.

Plate 39, fig. 4 *a*, animal (female), natural size, with antennæ in part mutilated, and part of the carapax removed, so as to show the eye and base of inner antennæ; *b*, under view, showing mandibles in natural position and base of outer antennæ, magnified two and a half diameters; *c*, second pair of maxillipeds, enlarged five diameters (palpus, *p*, and branchiæ, *b*, mutilated); *d*, outer or third pair, *ibid.*; *e*, base of first pair of legs; *f*, extremity of moveable finger of second pair of legs; *g*, part of third flagellum of inner antennæ, enlarged; *h*, profile of beak, natural size.

Fresh-water streams, Chili, fifty to one hundred miles from the sea.

Length of body, three and three-fourths inches. Colour, olive-green. Carapax smooth and naked; a spine on front margin, half way between beak and outer angle. Fingers of hand of second pair subcylindrical. Hand of first pair nearly half shorter than carpus. Penult abdominal segment half longer than the preceding, and below triangulate and acute behind at middle, the extremity of the triangle being prolonged into a slender and hardly acute spine. Abdominal appendages calcareous, outer lobe of base nearly rounded or subacute, and minute hirsute at margin, outer scale with the transverse suture triangulate, and having a small D-shape areolet in the bottom of the triangle, which the suture includes.

SUBFAMILY OPLOPHORINÆ.

The species of this family observed by us constitute the new genus *Regulus*, and are brilliantly phosphorescent. They have the second pair of feet stoutly chelate, as in *Palæmon*, also a serrated beak; and the mandibles bipartite above and palpigerous. They, therefore, appeared to be of that family. But, as in *Oplophorus*, the basal scale of the outer antennæ is long and narrows to a sharp point, a character not found among other *Macroura*, and the outer margin of this scale is dentate or spini-dentate; moreover, a segment of the abdomen is

produced backward into a long spine on the dorsum, a peculiarity which suggested the name *Oplophorus*, given by Edwards. *Regulus* differs from *Oplophorus* in having no palpi to the legs, and also, in having no chelæ to the anterior feet.

The species are nearly transparent, and live in the open ocean.

GENUS REGULUS, Dana.

Corpus vix compressum. Rostrum elongatum, dentatum. Segmentum abdominis 3tium dorso postice instar spinæ productum. Squama antennarum acuminata, extus pauci-dentata. Pedes non palpigeri; antici graciles, parvi, articulo ultimo styliformi; 2di crasse chelati; 3tii 4ti 5tique longi, graciles. Antennæ internæ flagellis duobus connectæ.

Body hardly compressed. Beak elongate, dentate. Third segment of abdomen produced behind on the back into a spine. Basal scale of outer antennæ few-toothed on outer margin. Feet without palpi; first pair small and slender, last joint styliform; second pair stout chelate; third, fourth, and fifth pairs long and slender.

The animal in swimming shows only its three posterior pairs of legs (as in fig. 5, pl. 39), the anterior being thrown forward directly under the body. The beak is broad as it approaches its base, and forms an arched cavity over the eyes. The abdominal segments are more or less pointed at the lateral margin, and also ciliate. The two processes of the mandible are quite narrow; the palpus is three-jointed and rather long, the joints nearly equal. The second pair of maxillipeds has the terminal segment at the lower extremity of the preceding. The outer pair is slender and long (exceeding the first pair of feet in length); the third joint is not half as long as the following, and this, the last, is subterete and acuminate; the palpus is a little longer than the second joint. The hands in both species have the fingers short and gaping. The fifth pair of legs is shorter than either of the two preceding.

Both species also have a supra-orbital tooth, which is situated at the termination of the lateral margin of the beak.

REGULUS LUCIDUS.

Rostrum prælongum, recurvatum, acuminatum, versus basin horizontaliter sensim latius deinde lateribus subparallelum, supra 8-9-dentatum, infra 3-dentatum. Squama antennalis perangusta, rostro paulo brevior, dentibus tribus externis parvulis. Pedes 2di crassi, manu oblongâ, digitis dimidio manus brevioribus, parce hiantibus. Pedes 6 postici sparsim laxèque pubescentes.

Beak very long, recurved, long acuminate, gradually broader towards base, then having the sides nearly parallel over the eyes, above eight or nine-toothed, below three-toothed. Antennary scale very narrow, a little shorter than beak, the three teeth of outer margin very small. Feet of second pair stout, hand oblong, fingers not half as long as hand, sparingly gaping. Six posterior feet sparsely lax pubescent.

Plate 39, fig. 5 *a*, female, much enlarged; *b*, outline of beak; *c*, *d*, *e*, the outer maxilliped, foot of first pair, and of second pair, severally, in their relative position as regards one another and the beak; *f*, base of inner antennæ; *f'*, part of the slender flagellum near middle; *g*, scale of outer antennæ; *h*, part of flagellum of outer antennæ; *i*, mandible; *k*, first maxilla; *l*, first maxilliped; *m*, second maxilliped; *n*, outer maxilliped; *o*, outline of back of abdomen; *p*, side of one of abdominal segments; *q*, eggs, natural colour.

Off Assumption Island, one of the Ladrões, thirty miles distant; taken December 30, 1841.

Length, nine lines. Colourless, except faint red in parts of abdominal segments, and deep red internally in thorax; beak and extremities of basal scale of outer antennæ, orange. Very brilliantly phosphorescent. Caudal segment slender tapering, with apex narrow and bearing two minute spines, also two pairs of spines on lateral margin. Outer caudal lamella not jointed, the outer margin ciliated, as well as inner extremity, but hairs short; lamellæ a little shorter than caudal segment. Flagellum of outer antennæ longer than body. Flagellâ

of inner antennæ, each about half as long as other antennæ, the slender branch the longer, the larger rather stout towards base, and furnished on the outer side with a short even row of hairs curved at apex. Eggs, grass-green. Margin of segments of abdomen set with minute spinules.

REGULUS CRINITUS.

Rostrum longiusculum, non recurvatum, supra 9-10-dentatum, infra prope apicem 2-dentatum, versus basin super oculos subito valde latior deinde posterius parce angustans. Squama antennalis rostro non brevior, paulo lata, dentibus tribus externis prominentibus. Pedes 2di crassè chelati, manu oblongâ, digitis brevibus, hiantibus. Pedes 6 postici laxè criniti, articulo 3tio parium 3tii 4tique infra 3-4-serrato.

Beak moderately long, not recurved, nine to ten-toothed above, below near apex two-toothed, towards base over eyes abruptly much broader, then narrowing a little. Antennary scale much broader than in *R. lucidus*, not shorter than beak, three teeth of outer margin rather prominent. Feet of second pair stout chelate, hand oblong, fingers short, much gaping. Six posterior feet lax crinite; third joint of third and fourth pairs with three or four serratures below.

Plate 39, fig. 6 *a*, animal, enlarged; *b*, upper view of beak; *c*, basal scale of outer antennæ; *d*, extremity of outer maxillipeds, inner view; *e*, row of spines on same; *f*, extremity of first pair of legs; *g*, hand; *h*, extremity of foot of third or fourth pair.

Sooloo Sea.

Length of body, ten lines. The dorsal line of the cephalothorax curves downward at the commencement of the beak, so that the extremity of the beak is at much the lowest level; the teeth of the beak are rather close, the apex of each one reaching usually to base of next. Of the two below, the second is under the first of those above (counting from apex). The fingers of the hand bear short tufts of hairs; the tarsus is armed with a few minute spinules.

SUBTRIBE IV. PENÆIDEA.

WHILE many acknowledged species of the subtribe Penæidea (or "Tribu des Penécens") have no palpus attached to the legs, there are other species, that have none of the true characteristics of the group, excepting the uncertain one, of having this palpus. De Haan first perceived the true relations of these supposed Penæan genera, and transferred them to the other divisions, where their affinities place them. The several reasons for the limits we have adopted for this group have been mentioned on a preceding page. It marks a degradation in rank among the Macrourea, which degradation is exhibited in two ways. In the *higher* species of the group, the functions of the first and second pairs of legs are divided with the third pair, this last pair being didactyle, like the second, and of much greater size. In the *lower* species, the legs all become slender, and none are stout didactyle; and often the second pair of maxillipeds, or even the first pair, is elongated and pediform, while also the posterior legs become rudimentary, as a result, evidently, of a greater prostration of the forces of life. It is this diffusion of the forces which in the superior Macrourea are subcephalic, along the range of the cephalothorax, that characterizes the species of the Penæus division. Another character distinguishing the Penæoids, and apparently another mark of degradation, is the fact that the third abdominal segment, instead of having the peculiar condition of overlapping laterally the segment either side, for the greater compactness of the whole, is but one of the common series, being laterally overlapped like the following, by the segment preceding it.

The mandible in this group is peculiar in having a simple dentate summit, and generally the organ is placed very obliquely, instead of having the summit at all flexed inward. All the species, as far as examined, have a palpus to the mandible, which is either short and stout, or slender in form.

The Penæidea include three families, distinguished by the character of the legs and the second and third pairs of maxillipeds. They are as follows:—

Fam. I. PENÆIDÆ.—Pedes 6 antici chelati, 3tiis longiores et plus minusve validiores.

Fam. II. SERGESTIDÆ.—Pedes toti debiles, 2di 3tisque consimiles, sive vergiformes sive obsoletè didactyli. Maxillipedes externi tenues.

Fam. III. EUCOPIDÆ.—Pedes toti debiles, 2di 3tisque non chelati, 1mi et maxillipedisque externi monodactyli et subprehensiles.

In the single species of Eucopidæ examined, the second pair of maxillipeds is subprehensile and similar in its monodactyle character to the third pair. These three pairs of monodactyle feet, anterior to the four posterior thoracic pairs, approximate the species of Eucopidæ to the Squillidea.

The following are the genera of living species in these families :

FAM. I. PENÆIDÆ.

- G. 1. SICYONIA, *Edw.*—Pedes 6 antichi lineares, 4 postici non annulati. Carapax breviter rostratus, semicalcareus, dorso carinato. Pedes abdominales laminâ unâ instructi. Maxillipedes 2di 3tisque non palpigeri. Antennæ internæ perbreves.
- G. 2. PENÆUS, *Latr.**—Pedes 6 antichi lineares, 4 postici non annulati. Carapax elongato-rostratus, rostro ensiformi. Pedes abdominales laminis duabus instructi. Maxillipedes externi bene palpigeri.
- G. 3. STENOPUS, *Latr.*—Pedes 6 antichi lineares, 4 postici longi, annulati. Rostrum longitudine mediocre. Maxillipedes externi brevissimè palpigeri.
- G. 4. SPONGICOLA, *De Haan.†*—Pedes 4 antichi filiformes, 2 sequentes unus vel ambo crassissimi; 4 postici non annulati. Carapax bene rostratus, rostro subensiformi. Maxillipedes externi non palpigeri.

FAM. II. SERGESTIDÆ.

- G. 1. SERGESTES, *Edw.*—Carapax brevissime rostratus. Pedes thoracis non palpigeri, 2di 3tisque obsoletè didactyli, 5ti parvuli.
- G. 2. ACETES, *Edw.*—Carapax minute rostratus. Pedes thoracis non palpigeri, 2di 3tisque obsoletè didactyli, 5ti obsoleti.
- G. 3. EUPHEMA, *Edw.*—Carapax bene rostratus. Pedes thoracis elongato-palpi-

* It is doubtful if *Aristeus* of Duvernoy (*Ann. des Sci. Nat.*, xv. 1841, pl. 4) should be separated from *Penæus*, with which it agrees in form, legs, antennæ, &c. The form of the branchiæ is somewhat peculiar, but they are not essentially different in structure from those of the *Penæi*.

† *Faun. Japon. Crust.*, p. 189, tab. 46, f. 9.

geri, 6 antici didaetyli, manubus parvulis, 4 postici filiformes, ciliati, non annulati. Branchiæ foliosæ. Abdomen dorso uni-spinosum.—An hujus sedis est?

FAM. III. EUCOPIDÆ.

G. EUCOPIA, *Dana*. — Carapax non rostratus, fronte integro. Pedes thoracici elongato-palpigeri, palpis natatoriis. Maxillipedes 2di 3tii et pedes 1mi monodactyli et subprehensiles.

SICYONIA CARINATA, *Edwards*.

Plate 40, fig. 1, animal, natural size.

Harbour of Rio Janeiro; common.

Length, three to four inches. Colour, olive-green clouded with white; sides of abdominal segments with elevated parts whitish; outer caudal lamellæ having a large bright smalt-blue spot; thoracic legs, flesh-red; second antennæ, with alternate bands of yellow or flesh-red and dark brown, about ten oblong bands in all. Shell nearly calcareous. Beak very short and reflexed, bifid at tip, and having two teeth a short distance from the apex; also, on carina, two teeth near middle of back, and one on posterior third. Thoracic legs quite slender.

EDWARDS, *Ann. des Sci. Nat.*, xix. 344, pl. 9, f. 44; *Crust.*, ii. 410.

PENÆUS CARINATUS.

P. setifero affinis. Rostrum squamâ antennali parce longius, paulo sinuosum, extremitate styliforme, parce recurvatum, apice vix altius quam dorsum, supra 7-8-dentatum, infra 3-dentatum. Flagella antennarum internarum articulis duobus precedentibus non longiora. Pedes 5ti 4tis non graciliores.

Near *P. setiferus*. Beak slightly longer than the basal scale of outer antennæ, somewhat sinuous, styliform at extremity, apex hardly

above level of back, above seven or eight-toothed, below three-toothed. Flagella of inner antennæ not longer than two preceding joints. Posterior thoracic legs not notably more slender than those of preceding pair.

Plate 40, fig. 2, outline of carapax, natural size.

Singapore.

Length to extremity of beak, seven inches; of abdomen alone, four and a half inches. This species has the long eyes, carinate back of carapax, and most other characters of the *setiferus*, a West India species. It differs, in having three teeth on the under side of the beak, instead of two.

PENÆUS AVIROSTRIS.

Rostrum rectum, extremitate anguste styliforme et non dentatum, non recurvatum, basi supra prominenter dilatatum et 6-dentatum, infra rectissimum, integrum, squamam antennalem longitudine non superans. Carapax dorso postico non carinatus nec sulcatus. Flagella antenarum internarum articulis duobus precedentibus non longiora. Oculi breves. Pedes 5ti 4tis multo graciliores.

Beak straight, extremity narrow styliform and toothless, not recurved, at base on upper side prominently dilated and six-toothed, below quite straight and entire, whole length not exceeding that of basal scale of outer antenna. Carapax in posterior part not carinate nor sulcate. Flagella of inner antennæ not longer than two preceding joints. Eyes short. Two posterior feet much more slender than those of the preceding pair.

Plate 40, fig. 3, outline of carapax, with leg of third pair, natural size.

Singapore.

Length of body, five inches. The beak is without teeth on either

margin in its outer half, and in this part is very straight and subulate, and on a level with the back of the carapax; three of the teeth above are posterior to the base of the eyes. The spine below the eyes, and that on the lateral surface, a little distance back, are very small. The last abdominal segment is acute, without lateral spinules.

PENÆUS VELUTINUS.

Carapax abdomenque omnino breviter velutini. Rostrum rectum, bene lanceolatum, e basi ascendens, usque ad apicem supra denticulatum, dentibus septem œque dispositis, altero paulo posteriore, infra integrum, ciliatum, rectum. Dorsi carapacis dimidium posticum non carinatum nec sulcatum. Pedes 2di 3tiique subœqui. Maxillipedes externi longi, pubescentes. Segmentum caudale utrinque minutè armatum. Flagella antennarum internarum brevissima, articulum ultimum parce superantia.

Carapax and abdomen covered throughout with a very short velvety coat. Beak straight, lanceolate, somewhat ascending from its base, dentate to apex, seven teeth equidistant, and one more posterior, below entire, straight, ciliate. Beak of carapax not carinate nor sulcate in posterior half. Feet of second and third pairs subequal. Outer maxillipeds long, pubescent. Caudal segment armed with minute spinules either side. Flagella of inner antennæ very short, but little longer than last basal joint.

Plate 40, fig. 4, animal, twice the natural size.

Dredged at Lahaina, Sandwich Islands.

Length, one and three-fourths inches. The eyes are quite large, but have a short base. The outer maxillipeds reach to apex of basal scale of outer antennæ.

PENÆUS INDICUS, *Edwards.*

Singapore.

Penæus indicus, EDWARDS, Crust., ii. 415.

P E N Æ U S M O N O C E R O S, *Fabr.*

Plate 40, fig. 5, outline of carapax, natural size.

Singapore?

Length of body, three and one-eighth inches; of abdomen, two inches.

Penæus monoceros, FABRICIUS, Suppl., 409; EDWARDS, Crust., ii. 415.

P E N Æ U S T E N U I S.

Rostrum supra multidentatum (dentibus novem vel pluribus), parce sinuosum. Carapax dorso postice non carinatus nec sulcatus. Oculi sat longi. Flagella antennarum internarum subœqua, carapace vix breviora.

Beak slightly sinuous, above multidentate (teeth nine or more in number). Carapax not carinate nor sulcate on posterior half of back. Eyes rather long. Flagella of inner antennæ subequal, hardly shorter than carapax.

Plate 40, fig. 6, outline of carapax and inner antennæ, twice the natural size.

Off Rio Negro, Northern Patagonia, in the Atlantic. Taken from the stomach of a fish.

Length, one and one-half inches. The specimens are all mutilated. The beak is broken, and we cannot give the character of the under margin or extremity beyond what is represented in the figure. The fifth and sixth abdominal segments are carinate above; the last is without lateral spines. Fifth pair of legs but little more slender than the preceding pair.

PENÆUS GRACILIS.

Gracillimus. Rostrum rectum, sat breve, oculis vix longius, supra 5-dentatum. Oculi longi, obconici. Antennarum internarum basis tenuis, longissimus, carapacem longitudine æquans. Manus pedum sex anteriorum carpo vix longior, apice parce pubescens; digiti dimidii manus longitudine. Segmentum caudale margine tri-spinulosum; lamella externa non articulata.

Very slender. Beak straight, rather short, a little shorter than the eyes, five dentate above. Eyes long, obconical. Base of first antennæ slender, very long, as long as carapax. Hand of six anterior feet rather longer than carpus, and finger half as long as hand, a few short hairs at tip; three spinules on either margin of caudal segment; outer caudal lamella not jointed.

Plate 40, fig. 7 *a*, animal, enlarged; *b*, caudal extremity.

Sooloo Sea, twenty-five miles east of Panay. Collected, January, 27, 1842. Some sea-weed was seen floating by during the day.

Length, eight to nine lines. Nearly colourless; a little reddish about the mouth, and the bases of the thoracic and abdominal legs. Two of the five rostral teeth are on the carapax, back of the base of the beak. The eyes were directed straight forward in the specimen examined. The antennæ were mutilated, and the length of the flagella, therefore, was not ascertained. Second and third joints of base of inner pair together about as long as first joint, and third joint but little shorter than second.

Penult abdominal segment as long as two preceding, and having a few minute spines on the back of it. Last segment ligulate; apex obtuse. Outer caudal lamella a little longer than inner. Six anterior legs naked, except very short hairs on tips of hands; third pair about twice as long as first. The fifth pair was mutilated.

STENOPUS HISPIDUS, *Latr.*

Plate 40, fig. 8, animal, natural size (from Raraka).

Coral reef of Raraka, one of the Paumotu Islands; also, Balabac Passage, north of Borneo.

Length, three inches. Body, colourless, excepting bright crimson in the head, and in two broad bands across the abdomen, one covering the greater part of the second and third segments, and the other in the penult segment; also, scarlet crimson in four broad spots across the third pair of legs, one of which is at the base of the fingers; antennæ, white, and placed widespread, as in the figure, when the animal is swimming, one of the long branches of the inner pair being directed nearly upward, the other branch, forward, while the outer pair is directed outward. Outer antennæ two and a half times as long as the body. Basal scale of outer antennæ twice as long as base of inner. The legs of the first and second pairs, and of the fourth and fifth are colourless; and they are extremely slender, much more so than in the drawings hitherto given of the *hispidus*; the third pair is about one-fourth longer than the body, fourth joint of second pair nearly twice as long as hand; fourth joint of fourth pair, twelve-jointed; and fifth joint, seven-jointed; tarsus minute.

The loss of the Raraka specimens, from which the drawing was taken, prevents our making a direct comparison between the Balabac specimens and those of the Paumotu Archipelago.

SEBA, Mus., iii. pl. 21, f. 6, 7.

Stenopus hispidus, LATREILLE, Règne An. de Cuv. [2], iv. 93; EDWARDS, Crust., ii. 407, and Cuv. illust., pl. 50, f. 2; A. WHITE, Crust. of the Samarang, p. 61, pl. 12, f. 6.

STENOPUS ENSIFERUS.

Carapax partim lævis, 2-3 sulcis obliquis intersecatus, uno validiore e dorsi medio fere ad angulum antero-lateralem producto et margine spinuloso, superficie carapacis antero-laterali spinulis armatâ; rostro ensiformi, paulo longiore quam basis antennarum internarum, fere

recto, apicem vix recurvato, supra 10-dentato, infra 3-dentato. Abdomen inerme.

Carapax mostly smooth, crossed obliquely by two or three sulci, the strongest of which extends from middle of back nearly to antero-lateral angle, the margin of it spinulous; antero-lateral surface of carapax armed with spinules; beak ensiform, a little longer than base of inner antennæ, and hardly shorter than antennary scale, nearly straight, scarcely recurved at apex, ten-dentate above, three-dentate below. Abdomen unarmed.

Plate 40, fig. 9, animal, enlarged five diameters.

Feejee Islands.

Length, about half an inch. This species, like the *spinosus*, has the outer maxillipeds quite long pediform, and with only an obsolescent palpus; the body not compressed, abdomen not at all carinated, the tarsus short and bifid. The third pair of legs is broken from the specimen, and also part of the flagella of the antennæ, as shown in the figure. There is a spinule on the back, just behind the more prominent sulcus. The teeth of the beak are small and regular, being nearly equidistant, except that the posterior is a little more remote from the preceding, and the first of the teeth below is farther from the second than the second from the third. The abdominal segments near the lateral margin, have the surface a little uneven.

FAMILY SERGESTIDÆ.

ACETES INDICUS, Edwards.

Singapore.

A. indicus, EDWARDS, Ann. des Sci. Nat., xix. 350, pl. 11; Crust., ii. 430.

FAMILY EUCOPIDÆ.

GENUS EUCOPIA (*Dana*).

Pedes quatuordecim (maxillipedibus 2dis 3tiisque pediformibus inclusis) totis palpo natatorio maximo instructis, ramo parium trium anticorum pediformi monodactylo et prehensili, parium quatuor reliquorum tenuiter vergiformi. Carapax non rostratus. Antennæ longæ, primæ flagellis duobus confectæ, et secundæ laminâ basali. Lamina caudalis externa prope apicem articulata. Oculi breviter pedunculati.

Feet fourteen in number, the second and third pairs of maxillipeds being pediform, all furnished with a long natatory palpus; pediform branch of anterior six monodactyl and prehensile; of the following eight, vergiform. Carapax not rostrate. Antennæ long, first pair with two flagella, second with a basal lamina. Outer caudal lamella jointed near apex. Eyes on short peduncles.

The species of this genus have the habit of a Schizopod. Yet, three of the pairs of feet (corresponding normally to two pairs of maxillipeds and one pair of feet) are subcheliform. They might be arranged with the Anomobranchiata, were it not that they have the completeness of structure of the true Macroura, and differ only in the palpiform natatory appendage of the thoracic legs. There are distinct branchiæ under the carapax, and the outer caudal lamella is jointed, which characters are not found in the true Anomobranchiates.

The other generic characters may be stated under the description of the following species.

EUCOPIA AUSTRALIS.

Carapax fronte truncato-rotundatus, margine postico profunde excavatus. Segmentum abdominis penultimum ultimo longius, ultimum subulatum, lamellis caudalibus vix longius. Antennæ internæ externis paulo breviores, dimidii corporis longitudine, flagello uno brevi; externarum squama basalis basi internarum multo longior. Maxillipedes 2di et

3tii et pedes 1mi formâ consimiles, sensim incretentes, articulo penultimo angustè oblongo, digito plus dimidio breviorè quàm articulus præcedens. Pedes reliqui gracillimi, criniti, palpo longo, natatorio.

Carapax low rounded in front, posterior margin profoundly excavate. Penult segment of abdomen longer than the last, the last subulate, hardly longer than caudal laminae, which are equal. Inner antennae a little shorter than outer, half as long as body, one flagellum quite short (about one-third the longer); basal scale of outer antennae much longer than base of inner antennae. Second and third pairs of maxillipeds and first pair of feet enlarging regularly, and terminating alike in a narrow oblong monodactyl hand, the finger unguiform, not half as long as hand. Following feet very slender, crinite, palpus long and natatory.

Plate 40, fig. 10 *a*, animal, enlarged; *b*, inner antennae; *c*, outer antennae; *d*, under view of mouth; *e*, mandible; *f*, first pair of maxillae; *g*, second maxillae; *h*, first legs (or second pair of maxillipeds); *i*, second legs; *k*, third pair; *l*, one of posterior pairs of legs; *m*, first pair of abdominal appendages.

Antarctic Seas, latitude 66° 12' south, longitude 149° 44' east, south of New Holland; taken from the stomach of a Penguin.

Length, one inch. Carapax without a trace of a beak, but nearly semicircular in front, the semicircle terminating either side over the bases of the eyes. The sides behind are much prolonged and rounded, extending nearly to second abdominal segment, while the deep dorsal excavation exposes to view the last thoracic segment and part of the preceding. Thorax scarcely compressed. Fourth abdominal segment longer than the one preceding or following; sixth as long as fourth and fifth, and longer than seventh; seventh narrow, and gradually narrowing to a point, entire, lateral appendages of same length, inner lanceolate and obtuse, outer rounded at apex, margins ciliate, except outer margin of outer lamella.

Eyes with cylindrical pedicels, rather small.

Base of superior antennae three-jointed, rather stout, hairy on inner side, the second joint quite short, third with inner apex a little prolonged, and bearing from this apex a very slender short flagellum, consisting of oblong joints. The fourth joint, which may be con-

sidered the first of the larger flagellum, though different and distinct from any following, is quite short, and nearly as broad as the preceding. The longer flagellum is rather stout below. Scale of outer antennæ pointed, but not acute, long ciliæ on inner and apical margin, last three basal joints very slender (fig. 10 c).

The mouth organs are a pair of mandibles, two pairs of maxillæ, and one of maxillipeds. The mandibles narrow towards a dentate apex; they have a long palpus which is somewhat hairy; the last joint obtuse and hairy, and besides short pectinate, with spinules on inner side. The first maxillæ have a stout base and are narrow above, and with a tuft of short setæ at apex. The second maxillæ are broad foliaceous in several lobes, with the margin hairy. The maxillipeds have an oblong transverse base narrowing outward, bearing towards outer extremity an oblong ciliate cultriform lamella, and at inner apex a five-jointed termination, broad and compressed, the third of these five joints largest, the last narrow and acuminate; the two leave a broad oval space between them, the tips being in contact and so also the bases.

The six anterior legs have a long and narrow imperfect hand, the terminating claw folding on outer half of inner surface. Joint preceding the hand longer than the hand; this branch of the legs hairy on inner side. Natatory branch about two-thirds as long as the other, consists of an oblong basal joint, and a flexible multiarticulate extremity, which is hairy. Following four pairs very slender and long [they were partly broken in the specimen]. Branchiæ attached to base of thoracic legs irregularly foliaceous in many folds.

ORDER II.

CRUSTACEA ANOMOBRANCHIATA.

THE Macrourea have been described as divided into two prominent series,—one, the *Thalassina* series, which ranges up to the Paguridea, and another, the Shrimp or Caridoid series, whose highest grade is presented in the Astacoidea. Each of these series passes, by successive steps of degradation, into the Anomobranchiates; consequently, there are two corresponding series among the Anomobranchiates, The *first*, or *Thalassina* series, includes the Squillæ and their congeners; the *second*, or *Caridoid* series, embraces Mysis and other related genera.

The degradations in the species, to which we here allude, are apparent in several ways.

1. The carapax in the Anomobranchiates is never covered either side behind by the sides of the first abdominal segment, this peculiarity indicating a looser and less perfected structure in the body.
2. The two outer pairs of maxillipeds, and sometimes the three pairs, are pediform, and often are not distinguishable from the following pairs of true legs,—results of the less concentrated nervous system.
3. The branchiæ beneath the carapax are wanting; and there are either branchiiform appendages hanging externally at the base of the thoracic legs (*Euphausiidae*), or, in some cases, at the base of the abdominal legs (*Cythinæ* and *Squilloidea*); or else, there are no branchiæ, the general surface of the body performing the function of aeration (as in the *Mysinae*, *Sceletininae*, and *Luciferidae*).

4. The legs have generally a largely developed palpus. These palpi have a natatory form, being fringed with hairs or setæ; yet, their most important function is probably that of keeping the water in currents over the body, in order to compensate for the want of true branchiæ.

5. One or two posterior pairs of thoracic legs are at times wanting, either wholly (as in the *Luciferidæ*), or with only the branchiæ pertaining to them present (as in the *Euphausidæ*). In some species, the two posterior pairs of legs have at base a large curved plate, of which a sac or cavity is formed under the thorax for carrying the eggs (*Mysinæ*).

6. The abdominal appendages may be of the full Macroural size and number. Yet very often they are obsolete, excepting the caudal pair. This caudal pair differs from those of the Macroural type in wanting the articulation in the outer lamella; and, moreover, the two lamellæ are often very unequal, and sometimes much shorter than the caudal segment.

The above are some of the points in which the Anomobranchiates exhibit their inferiority to the Macroura.

Besides these peculiarities, there is a tendency to abnormal forms, and to a separation of a true antennary segment, and sometimes both antennary and ophthalmic segments, anterior to the thorax. In one group (*Luciferidæ*), an antennary segment forms a slender neck-like prolongation anterior to the mouth. In another (*Phyllosoma*), it is expanded into a broad leaf-like plate, and behind, it partially overlies the part of the cephalothorax which follows it. In the Squilloids, the ophthalmic and two antennary segments are distinctly marked.

We have alluded to two series of forms among the Anomobranchiates,—the one Caridoid or shrimp-like, and the other more related to *Thalassina* or *Callianassa*. In arranging the genera, these series are of prominent importance.

In the Caridoid series, there are two groups of nearly equal value; one the *Mysidoid*, including *Mysis* and related genera, in which the general form is shrimp-like, the body being subcylindrical, or more or less compressed, the legs and their palpi, when present, being mainly of the normal type, the palpus arising from the legs near the body; the other, the *Amphionoid*, having the body depressed or subfoliaceous, and the thoracic legs long, with the palpus arising remote from the body.

In the other series, there is only a single type, the *Squilloid*, divisible into two families upon the existence or not of a rostral segment independent of the carapax (those having this segment being of a higher grade), and the presence of large branchial appendages to the abdominal members or their obsolescence. The Amphionoid species in the first series, are analogous in depressed form to the Squilloidea.

We thus make three prime divisions or tribes of the Anomobranchiates:

- I. SQUILLOIDEA.—Pedes antici octo vel decim prehensiles, juxta aream buccalem insiti; 6 postici debiles. Corpus depressum.
- II. MYSIDEA.—Pedes nulli prehensiles, graciles, sæpius palpigeri, palpo prope corpus insito. Corpus non depressum.
- III. AMPHIONIDEA.—Pedes nulli prehensiles, graciles, longi, sæpius palpigeri, palpo corpore remoto. Corpus depressum, plus minusve foliaceum.

Among the *Mysidea*, the Lucifers have a very long, slender, antennary segment, as already stated. The species, moreover, have no palpus to the legs or but a trace of one, and in this respect, also, they show that they are an aberrant type in the tribe Mysidea.

TRIBE I. SQUILLOIDEA.

THE Squilloidea embrace two families, *Squillidæ* and *Erichthidæ*, the former having the beak pertaining to a distinct segment of the body, separated by a suture from the carapax, and the latter, having it a part of the carapax. The former have abdominal branchial

appendages largely developed; and the latter have them small or wanting. The accepted genera are as follows:

FAM. I. SQUILLIDÆ.

Rostrum suturâ a carapace disjunctum.

- G. 1. *LYSIOSQUILLA*, *Dana*.—Corpus laxè articulatum. Carapax lævis, antice vix angustior, perbrevis, segmentis cephalothoracis fere quinque posticis carapace non tectis. Abdomen latitudine e basi sensim increscens superficie non costatum. Segmentum caudale parce transversum, spinis duabus mobilibus posticè non armatum. Segmentum antennale partim nudum, testâ parvâ. Chelæ maximæ digitus spinis longis armatus.
- G. 2. *SQUILLA*.—Corpus sat laxè articulatum. Carapax sæpissimè costatus, subobcordatus, antice multo angustior, angulis anticis sæpius acutis, segmentis cephalothoracis fere quinque posticis carapace non tectis. Abdomen latitudine e basi fere ad medium sensim increscens, lateribus deinde sæpius parallelis, segmento postico parce transverso, spinis duabus mobilibus postice non armato. Segmentum antennale testâ raro omnino tectum. Chelæ maximæ digitus spinis longis armatus.
- G. 3. *PSEUDOSQUILLA* (*Guérin*, in *Collect.*)*—Corpus strictè articulatum. Carapax lævis, valde convexus, segmentis cephalothoracis tribus posticis carapace non tectis. Abdominis segmenta parte anteriore lævia, lateribus subparallelis, segmento postico oblongo vel parce transverso, spinis duabus mobilibus armato. Segmentum antennale testâ sæpe omnino tectum. Chelæ maximæ digitus spinis longis armatis.
- G. 4. *CORONIS*.—*Pseudosquillæ* affinis. Segmentum caudale breve, valde transversum. Antennæ internæ quoad basin breviores.
- G. 5. *GONODACTYLUS*.—Digitus chelæ maximæ basi tumidus, spinis brevissimis vel nullis armatus; carpus supra obsolete denticulatus et denticulis tenuibus non pectinatè armatus.

FAM. II. ERICHTHIDÆ.

Rostrum carapacis frons productus et non disjunctus.

- G. 1. *SQUILLERICHTRUS*, *Edw.*—*Erichtho* affinis. Appendices branchiales abdominis grandes. Digitus chelæ maximæ intus dentatus vel spinosus
- G. 2. *ERICHTHUS*, *Lamarck*.—Appendices branchiales sive parvi sive obsoleti.

* We have seen only a figure of a species of the genus *Chloridus* of Eydoux and Souleyet (*Voy. de la Bonite*, pl. 5, f. 2, C. Latreillii), the description not being published. We suspect from the figure, that the group may correspond to the "Squilles Trapues" of Edwards, or the *Squillæ Parallelæ* of De Haan, *Pseudosquillæ*, above; but we wait for published statements before recognising it as a synonyme or otherwise.

Digitus chelæ maximæ non armatus. Pars cephalothoracis antica os precedens parte subsequente brevior. Carapax thoracem sæpius omnino tegens.

G. 3. ALIMA, *Leach*.—Appendices branchiales obsoleti. Digitus chelæ maximæ non armatus. Pars cephalothoracis antica os precedens parte sequente longior. Carapax thoracem sæpius omnino non tegens.

FAMILY I. SQUILLIDÆ.

GENUS LYSIOSQUILLA, *Dana*.

THIS division of the old genus *Squilla* is quite distinct in its habit from the rest of the group. In the species allied to *S. mantis* (our genus *Squilla*), the carapax is subovate, narrowing much anteriorly, with acute anterior angles, and the abdomen has its sides through the posterior two-thirds nearly or quite parallel, with the segments all more or less costate. But in this group, besides the very lax articulation of the body, the carapax is broad and short, hardly narrower anteriorly, with the angles rounded before and behind, and the abdomen widens gradually from its base, besides having the surface of the four or five anterior segments smooth. The antennary segment is but partly covered by the scale above, and in this respect the species are like the *mantis* section, and unlike the third section or *Pseudo-squilla*.

The *Squilla maculata*, *S. vittata*, and *S. scabricanda* (Edwards, *Crust.*, ii. 518, 519) belong to this genus.

LYSIOSQUILLA INORNATA.

Carapax vix oblongus, lateribus arcuatis. Segmentum antennale late obovatum, acutum. Oculi grandes, basi extus unidentato. Abdomen longum, segmentis antepenultimo ad marginem posticum penultimoque ad margines anticum et posticum breviter spinulosus, segmento caudali paulo transverso, medio dorsi longitudinaliter gibboso, margine postico semicirculari, dentato, dentibus numerosis (plus viginti) et valde inæquis, margine laterali recto, minute denticulato. Digitus chelæ maximæ 9-10-spini-dentatus. Appendicum caudalium rami duo fermè æquales.

Carapax but little oblong, sides arcuate. Antennary segment broad obovate, acute. Eyes large, base externally unidentate. Abdomen long, posterior margin of fifth segment, and both anterior and posterior of sixth, short spinous, last segment having a broad longitudinal prominence along the middle, and the posterior margin semicircular and dentate, with the teeth very numerous (more than twenty) and very unequal, lateral margin straight, minutely denticulate. Finger of large chela bearing nine or ten spines (the terminal included). The branches of caudal appendages subequal.

Plate 41, fig. 1 *a*, outline of animal, natural size; *b*, mouth; *c*, mandible, enlarged; *d*, outline of abdomen; *e*, nervous cord.

Rio Janeiro.

Length, nine or ten inches. The carapax is about as broad as long; the front is nearly transverse, but slightly excavate either side of the middle, with the middle obtuse and not more advanced than the outer angles; the posterior angles are rounded. The caudal segment has the sides parallel for half an inch and small denticulate; and then the margin regularly curves and is dentate; there are, first, three rounded emarginations, separated by acute or denticulated teeth, and then the posterior margin, which is two-thirds of an inch long, is unequally and rather crowdedly narrow dentate, with the interval between the two median teeth rounded and a little larger than the intervals near by on either side.

The buccal area is oblong triangular. The mandibles have a slenderly dentate edge, which is situated vertically just below the posterior margin of the buccal area, and also a long, narrow, triangular prolongation, which is acute and acutely serrulate. The palpus consists of three oblong joints, subequal, the second joint a little the longest. The entrance to the mouth is partly closed by an upper lip, which hangs like a curtain in front of the mandibles. The form of the nervous cord is shown in figure *e*, the figure is placed parallel to the drawing of the animal, so that corresponding parts are in the same line. The first ganglion is situated in the anterior cephalic segment, and sends one pair of nerves to the eyes, and one to each pair of antennæ. The two main cords leaving this ganglion to pass to the next, give off each a

slender nerve, just behind the first ganglion; also, two others, before reaching the second ganglion. The second ganglion consists of six distinct ganglions in close contact, and occupies a position between the five pairs of legs. Each of the component ganglions gives off a pair of cords for each of the members below, and the anterior, two pairs which pass to the mouth. There is a ganglion in each of the following segments, excepting the last, as in *Astacus*; and from each ganglion but the last, three nerves pass out on either side, one forward and outward, one upward, and one backward and outward; the first is very small, the second the largest. The last ganglion is similar to the same in *Astacus*.

This species is near *S. scabricauda*.

GENUS SQUILLA.

We restrict the genus *Squilla* to the species that have the abdomen more or less costate, and the carapax much narrowed anteriorly, with acute anterior angles. The carapax, moreover, is shorter than in *Pseudosquilla*; the body more lax in its articulation; the scale covering the antennary segment much smaller in proportion to the joint; the eyes longer and more salient.

In De Haan, the species of this division of the genus *Squilla* are called *Mantides* (Faun. Japon., p. 221).

SQUILLA RUBRO-LINEATA.

Segmentum antennale supra planum, paulo oblongum, antice rotundatum, latere externo spinâ armatum. Oculi parvuli subreniformes, pedunculo subcylindrico. Carapax quinque costis ornatus, angulis anticis acutis parce productis. Margines laterales segmentorum thoracis 3 posteriorum integri, segmento precedente utrinque acuto. Digitus chelæ maximæ 6-spinosus. Abdomen superficie 8-costatum, costis segmentorum 4 anticorum postice nullis acute productis, segmentorum 5ti 6ti que costis lateralibus postice acutis, segmenti 6ti totis posticè acutis. Segmentum caudale medio acute carinatum, superficie nec sulcatâ nec punctatâ, spinis marginum octo longioribus acutis, inter duas medianas

4-6 *dentibus obtusis, inter has et proximas quatuor rotundatis. Appendix caudalis dorso 5-spinosus.*

Antennary segment above a little oblong and rounded in front, outer side with a prominent spine. Eyes small, subreniform, peduncle subcylindrical, with a prominent spine on outer side of base. Carapax with five costæ, anterior angles acute but not much produced. Lateral margins of three posterior segments of thorax entire, preceding segment acute on either side. Finger of larger chela six-spinous (terminal spine included). Abdomen with eight costæ; the costæ of the four anterior segments not acute behind, six of the fifth segment acute, and all of the sixth segment. Caudal segment with a median acute ridge, and surface either side neither sulcate nor punctate. Margin with eight prominent acute spines, and between the two median, four to six rounded teeth; between those and the next, four rounded teeth. Caudal appendage with five spines on dorsal margin (the apical included).

Plate 41, fig. 2 *a*, animal, natural size; *b*, part of hand of larger pair.

Rio Janeiro.

Length, six inches. Colour, green, more or less clouded with yellow and passing into blue; margin of abdomen either side, white; linear ridges of carapax and abdomen, carmine; extremity of large hand, blue, and basal joints, green. Of the five costæ of the carapax the inner and two outer are nearly as long as the carapax; the latter are near the lateral margin of the carapax; the middle one is not distinctly furcate near the front. The inner of the spines of the finger is hardly half as long as the next. The hand has three moveable spines near its base, the median half as long as either of the others; the upper edge is evenly denticulate; the carpus has a short obtusish tooth at apex; the arm is obtuse and rectangulate at lower apex. The eyes are rather shorter than the first of the basal joints of the inner antennæ; and the last of these basal joints is the longest. The small epimeral piece of the first abdominal segment is flat and has its surface nearly bisected obliquely by a straight slender ridge.

This species is near *Squilla dubia*.

SQUILLA PRASINO-LINEATA.

Segmentum antennale parce oblongum et antice rotundatum, partim supra carinatum, extus laminâ integrâ instructum. Oculi grandes, et pedunculi valde compressi. Carapax 5-costatus, angulis anticis breviter acutis. Margines laterales segmentorum thoracis 3 posteriorum integri. Digitus chelæ maximæ 5-spinosus. Abdomen superficie 8-9-costatum, costâ medianâ partim obsoletâ, costis externis totis postice acutis, proximis segmentorum 2di et sequentium postice acutis, 5ti 6tique totis postice acutis. Segmentum caudale medio acute carinatum, superficie sulcis obsolete ornatâ, marginibus prominenter 8-spinosis, inter spinas medianas 4-rotundato-lobatis, inter has et proximas 6-8-acuto-dentatis, dentibus basi valde gibbosis. Appendix caudalis dorso 9-spinosus.

Antennary segment sparingly oblong and rounded in front, in part carinate above, either side furnished with a lamina having an entire margin. Eyes large and peduncles very broadly compressed. Carapax 5-costate, the anterior angles short acute. Lateral margins of three posterior segments of thorax entire. Finger of large chela 5-spinous. Abdomen with eight to nine costæ, median costa in part obsolete, outer costæ throughout acute behind, the next acute behind in all the segments except the first, and on the fifth and sixth segments all the costæ acute behind. Caudal segment acute carinate along middle, surface either side faint sulcate, margin with eight prominent spines, between the two median four rounded lobes, between the median and the next spines, six to eight acute teeth, the teeth being prominently gibbous above at base. Outer margin of caudal appendage nine-spinous (apical spine included).

Plate 41, fig. 3 *a*, part of abdomen; 3 *b*, eye; 3 *c*, part of hand.

Rio Janeiro.

Length, four and a half inches. Colour, green; of ridges, bluish-green. The middle costa of the carapax is not distinctly furcate near the front, but towards posterior margin opens for a short distance.

The denticulations of the hand are very even; the carpus is without a tooth at apex, and the preceding joint, or arm, is obtuse, and not prominent at lower apex.

SQUILLA ORATORIA, *De Haan*.

Singapore.

Length of body, five inches. De Haan states as a prominent distinction between this species and the *M. mantis*, that the two segments of the thorax preceding the last have either lateral margin strongly bilobate, while they are entire in the Mediterranean species. The preceding segment is bispinous either side, the two spines in nearly the same plane, and the anterior long and flexed directly forward. The outer costæ of all the abdominal segments are spini-acute behind, the next either side are acute on all but the first segment, and the next on all but the first two, while the median pair are acute behind on all but the first three. The punctate sulci on the surface of the caudal segment are quite decided; the denticles between the spines of the margin are rounded at apex, the median are six in number, three either side of a median incision, the next series eight to nine, and gibbous above at base. The finger of the large chela has six spines, the hand is evenly denticulate on margin; the carpus has two short obtusish teeth on outer margin; the preceding joint or arm is acutely produced at lower apex. The antennary segment has a lamina with entire margin on its outer side, and not a spine. The dorsal margin of either caudal appendage has nine moveable spines. The inner branch is shorter than the long furcate spine of the base.

Squilla mantis auctorum, partim.

Squilla oratoria, DE HAAN, Faun. Japon., 223, pl. 51, f. 2.

Squilla affinis, BERTHOLD, Rept. aus Neu Grenada und Crustaceen aus China. Göttingen, 1846, p. 26, pl. 3, f. 1, 2.

GENUS PSEUDOSQUILLA.

Besides the stiffer body, smooth abdomen (excepting two or three posterior abdominal segments), longer carapax, less narrowed before

and less acute at the anterior angles, and smoother and more even in surface than in *Squilla*; the eyes are but little salient beyond the antennary segment, and this segment is well covered by the scale appertaining to it. Moreover, the sides of the abdomen are nearly parallel. The last segment is either slightly oblong or slightly transverse, and not as short as in *Coronis*. In the smoothness of the body the species resemble those of *Lysiosquilla*; but the articulation is less lax, the shell of the antennary segment is very much larger, it quite covering the segment, the eyes have much shorter peduncles, being but little exsert.

The species of this genus have two moveable spines on the posterior margin of the caudal segment. There are some, however, as the *Squilla empusa* of De Haan (Faun. Japon., 224, pl. 51, f. 6; not *S. empusa* of Say), in which the moveable spines are wanting, and which may, therefore, properly form a distinct genus or, at least, subgenus.

The *Pseudosquillæ* have the general habit of the *Gonodactyli*, and form the transition between the *Squillæ* and that group.

PSEUDOSQUILLA LESSONII (*Guérin*), *D.*

Callao Roads.

Length, five inches. The number of spines on the dorsal margin and apex of the penult joint of the caudal appendages is ten; the apical is twice as long as the next preceding, and nearly as long as the last joint. The antennary plate covers entirely the joint, and the eyes are but little exsert beyond it.

Squilla Lessonii, GUÉRIN, Voy. de la Coquille, pl. 4, f. 1.

Squilla monoceros, EDWARDS, Crust., ii. 526.

PSEUDOSQUILLA STYLIFERA.

Plate 41, fig. 4 *a*, animal, natural size; *b*, *c*, antenna; *d*, larger hand; *e*, hand of second pair.

Sandwich Islands; Feejee Islands, about coral reefs of Vanua Lebu.

Colour, grass-green; eyes, brownish. Length, three inches. The specimens here referred have five prominent costæ on the caudal segment, besides two less distinct adjoining the median one. Just inside of the base of the outer of these costæ, between it and the next, there is a small tubercle. The moveable spines of the posterior margin of this segment are slender; and between these spines and the next spines, as well as between these last and the next, there are two unequal lobes, the outer quite small and tooth-like. The outer margin of the caudal appendage bears seven or eight moveable spines, besides a long apical one, which is but little shorter than the oval plate which forms the extremity of these organs.

The hand has the inner margin fine denticulate, and armed with three moveable spines. The anterior pair of feet terminates in a hand, with a small finger.

We suspect that this species is identical with Owen's *S. ciliata* (Voy. Blossom, pl. 27, fig. 5); although, in his description, he makes the anterior feet "terminate in a flattened oval plate, *unarmed* and ciliated."

GENUS GONODACTYLUS.

GONODACTYLUS TRISPINOSUS, *White*.

Feejee Islands.

Length, one and a half inches. A longitudinally corrugate penult abdominal joint,—a slightly oblong caudal segment, having three rounded prominences, and the surface corrugate towards the posterior margin, which margin is but sparingly lobed,—and the three spines of the antennary plate, one at middle, and one at either angle, are characteristics readily distinguishing this species.

G. trispinosus, A. WHITE, Voyage of Erebus and Terror, pl. 5.

GONODACTYLUS CHIRAGRA (*Fabr.*), *Latr.*

Plate 41, fig. 5 *a*, specimen from Tongatabu; 5 *b*, hand.

Tongatabu; Feejee Islands; Balabac Straits, north of Borneo.

Largest specimen in the collections, three and a half inches in length. The colour is pale yellowish, with veinings and blotches of bright green.

Squilla chiragra, FABR., DESMAREST, Crust., 251, pl. 43.

G. chiragra, LATR., Encyc. Meth., x. 473, pl. 325, f. 2; EDWARDS, Crust., ii. 528.

FAMILY II. ERICHTHIDÆ.

GENUS ERICHTHUS.

THE prominent distinction laid down by Milne Edwards for distinguishing *Alima* and *Erichthus*, is the different length of the carapax; in the former, the carapax covering only part of the thorax, while in the latter, it covers the whole thorax and one or more abdominal segments. But both this character and that based upon whether the ophthalmic and antennary segments are under the beak or not, afford no good distinction. The third species of *Erichthus* here described (*E. spiniger*) has the carapax shorter than the thorax, and, therefore, is an *Alima*, according to the accepted characteristic. Yet it more closely approaches *Erichthus* in its general stout form. Moreover, it has the anterior part of the cephalothorax preceding the mouth shorter than the following portion, quite unlike the true *Alimæ*. We have therefore based our characteristic more upon the length of the anterior portion of the cephalothorax, which is certainly of more importance than the length of the carapax,—an appendage that varies much in length in many genera, and especially in the tribe under consideration. The form of the anterior part of the cephalothorax is very long and slender in *Alima*, and short in *Erichthus*,—much longer than the part posterior to the mouth in the former, and much shorter in the latter. We believe this course more true to nature, than the instituting a new genus "*Alimerichthus*."

The species of *Erichthus* differ much with respect to the spines of the carapax. The following is a list of those known:

1. *Species with a medio-dorsal spine, either on the posterior margin or more or less remote from it.*
- a. Having a large medio-lateral spine.
1. Medio-post. spine stout, carapax short. 1. *E. ACULEATUS, Edw.*
 2. Medio-post. spine stout, carapax long (to fifth joint of abdomen). 2. *E. TECTUS, Edw.*
 3. Medio-post. spine small, very remote from posterior margin. 3. *E. EDWARDSII, E. & S.*
- b. Having a small medio-lateral spine.
1. Medio-post. spine small, marginal. 4. *E. VITREUS, Desm.*
 2. Medio-post. spine small, distant from margin. 5. *E. LEACHII, E. & S.*
- c. Having no medio-lateral spine.
1. Medio-post. spine stout; post. margin straight.
 - * Post. margin of carapax over fourth abdominal segment. 6. *E. TRIANGULARIS, Edw.*
 - ** Post. margin hardly reaching abdomen. 7. *E. SPINIGER, Dana.*
 2. Medio-post. spine stout; post. margin at middle excavate. 8. *E. ARMATUS, Leach.*
 3. Medio-post. spine small; post. margin straight.
 - * Latero-post. spines divergent, long. 9. *E. 6-SPINOSUS, E. & S.*
 - ** Latero-post. spines parallel; carapax to fifth abdominal segment. 10. *E. ARMATUS, E. & S.*
 11. *E. VESTITUS, Dana.*
2. *Species without a medio-dorsal spine.*
- a. Having a posterior medio-dorsal tubercle near or on margin.
1. Rostrum more than twice as long as inner antennæ. 12. *E. LONGICORNIS, Edw.*
 2. Rostrum very short, not longer than inner antennæ. 13. *E. DUVAUCELLII, Guér.*
- b. Without a medio-dorsal tubercle.
1. Latero-anterior spines large. 14. *E. PYRAMIDATUS, Edw.*
 2. Latero-anterior spines small [sides of carapax nearly parallel].
 - * Carapax not covering any abdominal segments; caudal segment oblong. 15. *E. NARWAL, Guér.*
 - ** Carapax covering first abdominal segment; caudal segment not oblong.
 - † Penult abdominal segment with two small teeth. 16. *E. LATREILLII, Guér.*
 - †† Penult abdominal segment without teeth. 17. *E. GUERINII, E. & S.*
 - *** Carapax covering more than two abdominal segments. 18. *E. PALLIATUS, Dana.*

ERICHTHUS PALLIATUS.

Carapax latus, ad segmenti abdominis 3tiii medium productus posticè non latior, lateribus subito deflexus, dorso paululo convexus, fere planus, angulis anticis acutis, posticis longè productis ad usque segmentum caudalem et acutis; margine inferiore integro, ad medium breviter uni-spinigero, posticè acuto, margine postico inermi, recto, rostro tenui, antennis internis paululo longiore. Abdomen 6-articulatum. Segmentum abdominis posticum paulo transversum, posticè latè truncatum, emarginatum, spinulis pectinatum, angulis acutè productum, lateribus acutè bi-dentatum. Branchiæ parvulæ.

Carapax broad, reaching to middle of third abdominal segment, not broader behind, sides bent downward; back a little convex, nearly flat; anterior angles acute; posterior angles produced, even as far as caudal segment, acute; lower margin entire, at middle a small spine, and posteriorly acute; posterior margin unarmed, nearly straight; beak slender, slightly longer than inner antennæ. Abdomen with six segments; last a little transverse, broad truncate behind, emarginate at middle and angles produced, slender acute, sides with two teeth. Branchiæ small.

Plate 41, fig. 6 *a*, animal, enlarged; *b*, dorsal view, natural size; *c*, buccal area and organs; *d*, last joint of first pair of feet; *e*, hand of one of the short cheliferous legs.

Atlantic, latitude 6° south, longitude 24° west. Collected at 4 A. M. November 8, 1838.

Length, one and one-eighth of an inch; breadth of carapax, one-third of an inch. Colourless, excepting on the edges of some of the segments and joints of some of the legs, which had a blue tinge. Perfectly transparent.

The posterior margin of the carapax is without spine or tubercle, and the surface anterior to the margin is unarmed. The ophthalmic and two antennary segments are each distinctly separated by a suture, and are situated beneath the general carapax. Abdomen broad, gra-

dually widening to the last segment, about one-third as long as broad, excepting last, which is a little shorter than its breadth. This caudal segment corresponds to two normal segments, and a suture near its base marks the separation.

Eyes large, obconical. The inner antennæ have a three-jointed base bearing three branches, one of which branches arises from the basal portion of the shortest and stoutest branch. This short branch is not as long as the common base; it is furnished with hairs on one side; the other branches are a little longer than the base, but do not extend beyond the apex of the beak. First joint of base longer than the other two. Second antennæ three-jointed; the last an oval ciliate plate. Branch very slender, appended to basal joint; consists of two joints and a multiarticulate extremity. Mouth small. Epistome subtriangular with strongly arcuate sides. Maxillipeds consist of a basal joint bearing three joints; the first of which is broad, and but little longer than the breadth, the last quite narrow, and all setose on the inner margin. Mandible coarsely dentate.

First pair of legs slender; second joint longest, about equal to last three; last shortest and ending in a short claw. Second pair with the third joint longer than second. Finger long, nearly straight, extending nearly to base of hand, inner margin entire. Hand of next three pairs rhombic. Lamellæ at base of these and the two pairs preceding nearly circular, largest on anterior pair, and smallest on the posterior. No appendage to fourth thoracic segment. Those to fifth, sixth, and seventh segments very slender and imperfect, and attached to the segments on their sides or quite laterally.

Abdominal legs five pairs. Both lamellæ two-jointed. A minute lobed appendage, branchial in character, near inner base of outer lamella, and a short slender appendage to inner base of second joint of interior lamella.

This species is near the *E. Guerinii* of Eydoux and Souleyet (Voy. de la Bonite, pl. 5, fig. 32).

ERICHTHUS VESTITUS.

E. palliato affinis, carapace segmentoque caudali similis. Carapax usque ad segmentum abdominis penultimum productus, posticè non latius, angulis posticis longè acutèque productus, margine postico recto, ad medium spinâ parvâ acuto, margine inferiore medium inermi, an-

gulis anticis rotundatis et non acutis. Segmentum abdominis posticum latere tridentatum.

Near *palliatus* in general form of carapax and caudal segment. Carapax prolonged to penult segment of abdomen, not broader behind, posterior angles long and acutely produced, hinder margin straight and transverse, and armed at middle with an acute spinule; lower margin unarmed at middle; anterior angles rounded and not acute. Caudal segment with three teeth on either side.

Plate 41, fig. 7 *a*, animal, enlarged, dorsal view (young and but partly matured); *b*, first pair of antennæ, immature; *c*, second pair, ditto; *d*, one of the three posterior pairs of legs.

South Atlantic, latitude 25° south, longitude 44° west. Collected, January 10, 1839.

Length, one-tenth of an inch. Colourless. The specimen is a young, immature individual, and it is uncertain, therefore, how far the existing characters are those of the mature animal. In the three teeth on the sides of the caudal segment, the spinule of the posterior margin of the back, and other characters, it differs from the *palliatus*. The absence of a medio-lateral spine distinguishes it from the *Guerinii* and *Edwardsii*. The beak is long and straight. The carapax is slightly convex on the back, but bends down either side, and has nearly the same form as in the *palliatus*. Its posterior margin passes over the fifth abdominal segment, and the prolonged angles behind reach nearly to middle of caudal segment; but the segments of the abdomen are but partly developed, and its appendages below are wanting, excepting a rudimentary fifth pair, whence we may infer that in the adult, the abdomen may extend farther behind the carapax. The caudal segment is widest posterior to middle, and the apical margin (which is transverse and spinulous) is much longer than the basal. The anterior thoracic legs are not developed. There are five successive pairs of legs, nearly similar in form, the last three pairs of which are quite similar, consisting of a two-jointed base with a furcate termination, the branches equal, one-jointed, setose. The pair preceding these has one branch much the larger, though scarcely longer.

The anterior antennæ are thrown forward, but only the terminal setæ are seen in a back view. Three cylindrical joints were observed, the last longest and somewhat clavate, and terminating in several longish hairs. The posterior antennæ are cylindrical, three-jointed, and terminate in a few hairs. Segments to which the eyes and antennæ belong, not distinctly separate.

The animal frequently throws its abdomen forward along its venter towards the head, and shows that the body is not attached to the carapax, except near its head.

ERICHTHUS SPINIGER.

Carapax posticè latior, convexus, segmentum thoracis posticum non omnino tegens; angulis posticis longissimè productis et latè divaricatis, infra ad processus basin spinulâ acutis; margine postico rectiusculo, simplicissimè arcuato, ad medium spinâ crassâ valde elongatâ armato; margine laterali medio inermi; angulis anticis spinâ breviter acutis; rostro elongato, antennis anticis longiore. Segmenta abdominis 5 antica subæquâ, lateraliter et medio dorsi spinulâ armata; sextum dimidio brevius, medium dorsi spinulis duabus armatum; ultimum paulo transversum, posticè latè truncatum et minutè spinulosum, emarginatum, angulis productis acutis, lateribus tridentatis. Appendices caudales longi, parte furcatâ attenuatâ, longiore quam cauda, furcis valde inæquis.

Carapax broader behind, convex, extending to middle of last segment of thorax; posterior angles long produced, and widely divaricate, and below base of process, a small spine or spinous process; posterior margin simply arcuate across, and bearing at middle a stout and very long spine; lateral margin without a medial spine; anterior angles prominently acute; beak long, longer than inner antennæ. Five anterior abdominal segments subequal, armed with a small spinous process on either side, and another at middle of back; sixth segment separate, half shorter than preceding and having two spines on back; last segment a little transverse, posteriorly wide truncate, minutely spinulous, emarginate at centre, and angles acutely produced, on the sides three small teeth. Caudal

appendages as long as segment, or exceeding it in length, furcate part attenuate, the two processes very unequal.

Plate 42, fig. 1 *a*, animal, enlarged; *b*, young of same; *c*, caudal segment of young individual.

South Atlantic, between Rio Janeiro and Rio Negro. Collected, January, 1839, at 5 A. M.

Length, five-eighths of an inch. Colourless; but two small greenish spots in abdomen near its extremity. Carapax not half as long as body; posterior medial spine long and stout; none between this and those of the posterior angles, which are long and divergent. Beak with a few minute spinules below. In the denticulations on lateral margin of caudal segment there is a minute spine. Antennæ much shorter than the beak; inner branch five-jointed and a little the longest. Second or largest pair of legs with finger very nearly as long as hand. The hand has a stout spine on the margin quite near its base, and then an emargination into which the extremity of the finger closes; the palm is set with minute spinules. Eyes short obconical; bright green reflections from the pigment within.

Figure 1 *b*, represents a half-grown individual, probably of the same species. The carapax is very similar in form and in its spinous processes. The abdomen has the row of dorsal spines, but they are obtuse and appressed to the back, and the lateral spine is wanting. The beak is not spinulous below. The caudal segment is broadest posterior to the middle, instead of anterior to the same, and thus has a similar mark of immaturity with our specimen of *E. vestitus*. This segment is deeply triangulato-excavate posteriorly, and has the posterior margin pectinate with spinules; on each side there are three denticulations, but they are obsolescent. The third, fourth, and fifth pairs of feet are rudimentary; they consist of a short cylindrical joint. The three posterior thoracic pairs are also rudimentary. The abdominal appendages are full grown, excepting the caudal pair, which consist of the basal portion alone, and this is a little shorter than the caudal segment. Eyes with bright green reflections; not as conical in the pedicels as the adult. Length, one-fifth of an inch. Colourless.

Found with the preceding.

GENUS ALIMA, *Leach.*

ALIMA ANGUSTA.

Corpus angustissimum. Pars cephalothoracis antica parte sequente plus duplo longior. Abdomen gracillimum, segmentis valde oblongis, ultimo triplo longiore quam latiore, posticè angustiore, dentibus posticis quatuor approximatis et uno laterali; appendicibus caudalibus brevissimis segmento quadruplo brevioribus. Carapax fere linearis, ad segmentum thoracis antepenultimum productus, posticè paululo latior, angulis posticis tenuissimè productis ad abdominem non prolongatis, margine postico bene transverso; médium rotundatè emarginato non reflexo nec spinulâ armato, spinulâ mediâ margine paulo remotâ; angulis anticis spinâ acutis; margine laterali spinulis minutis seriatis infra armato. Segmenta abdominis lateraliter spinâ armata. Basis antennarum internarum rostro valde longior, ramis tenuissimis, uno longiore quam basis.

Body very narrow elongate. Anterior part of cephalothorax more than twice as long as following part. Abdomen very slender, segments much oblong, the posterior three times as long as broad, narrower posteriorly, four posterior teeth approximate, and one on either side. Caudal appendages very short, four times shorter than the segment. Carapax nearly linear, slightly broader posteriorly, extending to antepenult thoracic segment; posterior angles very slenderly produced, but not prolonged to line of abdomen; posterior margin directly transverse, with a rounded emargination at centre, but not flexed upward nor armed with a spinule, the median spinule being a short distance from the margin; anterior angles slender spini-acute; segments of abdomen with a spine on either side. Base of first antennæ much longer than beak, branches very slender, the longer exceeding the base in length.

Plate 42, fig. 2 *a*, animal, enlarged; *b*, under view of mouth and feet about it; *c*, maxilliped; *d*, termination of one of the short feet near the mouth; *e*, one of the six posterior thoracic feet; *f*, one of the abdominal feet.

Atlantic; latitude $2\frac{1}{2}^{\circ}$ north, longitude $17\frac{1}{4}^{\circ}$ west. Collected, October 29, 1838, at 4 o'clock, A. M.

Length, one and three-eighths inches; breadth of carapax, one-fifth of an inch. Whole body pellucid and colourless, except a reddish tinge on posterior margin of last segment of body, and two or three spots about the segments of the abdomen. Beak of carapax slender and naked. Spinous process of anterior and posterior angles very slender, appearing to be a continuation of the corneous edge of the carapax; a few short spines on these processes. Posterior margin of carapax very nearly straight transverse, excepting the emargination at centre. The breadth of the emargination is slightly greater than that of the segment below, or about one-quarter that of the whole margin itself. Median spinule situated as far from the margin as the breadth of the emargination.

The ophthalmic segment is separated from the antennary by a distinct suture, and the two antennary are also distinct. The eyes have very slender peduncles, a little curving, with spheroidal or obconical extremities. The pigment is dark green, nearly black. The anterior antennæ have a three-jointed base; first joint a little the longest. Of the three branches, one, the largest in diameter, has longish ciliæ on one side, and is shorter than the base of the antennæ; the others are very slender and longer than the base. The intermediate branch consists of seven joints, which are rather long excepting the last, which is quite short. The second antennæ have a slender jointed appendage at base of second joint. The oval plate terminating the organ is narrow elliptical and ciliated; it is longer than the two preceding joints together.

The maxillipeds consist of three joints on a short base, the first two broad, the last narrow, and all edged within with hairs or setæ. Mandibles brownish red and corneous, toothed at extremity.

First pair of legs very slender, extending forward nearly to base of second antennæ, five-jointed. Basal joint short. Second pair of legs with a long narrow hand, broadest a short distance from apex and gradually narrowing to a slender base. An emargination on the outer side, about one-third the distance from the base to the apex, into which the extremity of the finger shuts; and two spines just above this emargination. Minute spinules or denticulations on the inner margin of the finger. Following three pairs of legs

small, the posterior smallest. Hand broad and finger as long as hand. Last three pairs of thoracic feet rudimentary, consisting of a basal joint and a bifid extremity, which is naked and hardly appears to be articulate. The segments of the body to which these organs severally pertain were all distinct, excepting those belonging to the mouth organs and first pair of feet, which appeared to be united in one. The last four segments of the thorax are very slender, the diameter being less than one-third the length.

Abdominal segments all narrow oblong, gradually enlarging posteriorly; a spine from posterior part of each, laterally. Last abdominal segment lamellar, distinctly composed of two segments, a suture near its base marking the junction of the two. This segment is broadest at middle and anteriorly; the two lateral teeth are just below the middle, the other four teeth are all on the posterior margin, and are quite near together, and the margin intervening is minutely denticulate. The abdominal feet consist of two oblong lamellæ on a common base, each plate jointed, one near base, the other below middle, and both are ciliate. No branchial appendages were observed.

This species is near the *hyalina*. But according to Leach's figure (Voy. of Capt. Tuckey to the River Zaire), the *hyalina* has the abdominal segments hardly oblong, while in our species they are more than twice as long as broad, and the medial posterior spine of the carapax is marginal, and this margin is bent upward, which is not the fact with the *angusta*. The proportions vary correspondingly in other respects. The base of the superior antennæ, moreover, is sparingly longer than the beak in the *hyalina*.

It differs from the *gracilis* in having the medio-dorsal spine just back of the posterior margin instead of on the margin, in its more slender filiform arms, its spinule on the spinous prolongation of the posterior angles of the carapax (see Edwards's figure, in Cuv. Règne An., pl. 57, f. 3).

APPENDIX TO SQUILLOIDEA.

WE append here a description of a few young individuals, which probably belong in this group, among the Schizopoda.

ERICHTHINA DEMISSA.

Carapax latus, latitudine paulo longior, posticè paulo angustior, rostro longo et crasso, deorsum valde inflexo, nudo, margine carapacis postico sinuoso, medium spinâ brevi acuto, angulis posticis breviter acutis, margine antero-laterali rotundato, non acuto, laterali integro.

Carapax broad, a little oblong, a little narrower behind, beak long and stout, flexed very much downwards, naked, posterior margin of carapax sinuous, at middle acute with a short spine, posterior angles short acute, antero-lateral margin rounded, not acute, lateral margin entire.

Plate 42, fig. 3 *a, b, c*, different views, enlarged; *d*, still younger individual of the same.

Near eastern entrance of Straits of Sunda. Collected, March 3, 1842.

Length of individual represented in figures *a, b, c*, about one-sixteenth of an inch; of that of fig. *d*, one-twenty-fourth of an inch. The legs are only partly developed, and none are cheliform. The first antennæ in the largest specimens, simple, consisting of a short basal joint, a second joint rather long, and three short apical ending in a few setæ. The second pair are two-branched, one branch multiarticulate and setigerous, the other two-jointed. The legs of the last thoracic segment were not at all developed, of the five pairs next preceding rudimentary, the posterior largest; two preceding pairs bifid and subnatatory; the branches two-jointed and furnished with a few setæ. Preceding these, two pairs appear to correspond to maxillæ and maxillipeds. The eyes were large and compound, but were wholly covered by the shell. The abdomen was long linear seven-jointed, the sixth a little longer than preceding, the seventh twice as long as sixth and short bilobate behind, with a number of divergent setæ on the margin. Caudal appendages about as long as caudal segment.

In the younger state (fig. 3 *c*), the segments of the abdomen were distinctly separated; there were no compound eyes and only a minute

central point near the front, as in the Caligi; the mandibles, maxillæ, maxillipeds, and two pairs of bifid legs were distinct, but no rudiments of those posterior, neither of any abdominal appendages.

The four antennæ were nearly as in the preceding, except that the first pair were three-jointed, the last not being subdivided, and the multiarticulate branch of the second pair consisted of but four joints.

TRIBE II. MYSIDEA.

A SHRIMP-LIKE form and habit is strongly retained through all the genera of Mysidea. There is, however, a slight prolongation of the head in the Sceletininae, and a constriction of the carapax, across just anterior to the mouth; and this aberrant feature is excessively developed in Lucifer, where a long, slender segment precedes the mouth, reminding us of the same in Alima. The species of Lucifer still retain much of the Caridoid habit in the thorax and legs, and are Mysidean; while those of Alima, true Squilloids, besides having a carapax over the whole cephalothorax, are characterized by the prehensile legs of the Squillæ and Erichthi.

There is a wide range among the species as to the legs, although they are never prehensile, and also as to the branchiæ. The thoracic legs are either bifid, with a long ciliated outer branch, or they are simple or undivided; they are either complete in the normal number, or one or two posterior pairs are obsolete. The first, second, and third pairs of maxillipeds are more or less pediform, and they may be either like the following legs, or the third alone may be thus similar to the legs in form and direction.

The differences in the branchial function are of a striking character. In the higher species, approaching most nearly to the Macroura, there are thoracic branchial appendages, uncovered by the sides of the carapax, hanging in branching tufts or clusters of closed vessels from the outer side of the base of several of the legs. In the greater part of the species, such branchial appendages fail entirely, and this func-

tion is performed by the general surface of the body; in a few species only, certain abdominal appendages appear to take part.

The existence or non-existence of thoracic branchial appendages marks the higher and lower grades of Mysidea, and this characteristic is, therefore, a proper basis for family distinctions. Moreover, the aberrant structure in *Lucifer*, removes these species widely from the other Mysidea, the great length of the antennary segment being connected with a very short thorax and simple thoracic legs, without a natatory appendage, or only an obsolescent palpus.

There are, hence, three prominent groups or families among the Mysidea :—

Fam. I. EUPHAUSIDÆ.—Cephalothoracis Caridoideus. Pedes thoracici bifidi, appendicibus branchialibus instructi.

Fam. II. MYSIDÆ.—Cephalothoracis Caridoideus. Pedes thoracici bifidi, appendicibus branchialibus carentes.

Fam. III. LUCIFERIDÆ. — Segmentum antennale valde elongatum, carapace per suturam fere discretum. Pedes simplices.

The *Luciferidæ* are the transition species connecting the Mysidea with the *Amphionidea*, the antennary segment in the latter being expanded to an unusual size, and separated by some appearance of a suture from the following part of the cephalothorax.

The *Euphausidæ* and *Luciferidæ*, as far as at present investigated, appear to form but a single group each. The species of the former, in all cases examined by the writer, have a naked setæ either side of the extremity of the caudal segment, which often gives it a barbed extremity, with the barbs reversed. This character has not been observed in other Mysidea.

The Mysidæ include three groups :—

The *first* (*Cynthinæ*) with abdominal branchial appendages, in the form of a coiled membrane or plate, and the inner antennæ two-branched.

The *second* (*Mysinæ*), without branchial appendages, but with the inner antennæ two-branched.

The *third* (*Sceletininae*), without branchial appendages, and with the inner antennæ simple, and the outer two-branched without a proper basal scale.

The *Mysinæ* have a cavity formed beneath the posterior part of the cephalothorax by plates from the bases of the legs for carrying the eggs before they are fully developed.

The known genera and subdivisions of the Mysidea, are as follows:

FAM. I. EUPHAUSIDÆ.

- G. 1. *NOCTICULA*, *Thompson*.*—Oculi symmetrici, breves. Pedes thoracis quatuordecim, duobus posticis obsoletis branchiis exceptis. Flagella duo antennarum internarum elongata.
- G. 2. *EUPHAUSIA*, *Dana*.—Oculi symmetrici, breves. Pedes thoracis non unguiculati, numero duodecim, quatuor posticis obsoletis branchiis exceptis. Flagella duo antennarum internarum elongata. Segmentum abdominis posticum acuminatum.
- G. 3. *CYRTOPIA*, *Dana*.—Oculi paulo oblongi, apice externo obliquè gibbosi, lenticulis totis in gibbositatem versis. Articulus antennarum internarum primus apice *inferiore* productus. Segmentum abdominis posticum obtusum aut truncatum.

FAM. II. MYSIDÆ.

SUBFAM. 1. *CYNTHINÆ*.—Pedes abdominis appendicibus branchialibus instructi. Antennæ internæ biramæ, externæ squamâ basali instructæ.

G. *CYNTHIA*, *Thompson*.†—Pedes thoracis quatuordecim, biramei; maxillipedes quatuor. Oculi breves symmetrici.

SUBFAM. 2. *MYSINÆ*.—Pedes abdominis appendicibus branchialibus carentes. Antennæ internæ biramæ, externæ squamâ basali instructæ.

* *Thysanopoda* of M. Edwards. The genus *Nocticula* of Thompson (*Zool. Researches*, p. 52, pl. 5, f. 1) is identical either with *Thysanopoda* or *Euphausia*, and, as he states the number of pairs of thoracic legs to be eight, it must be identical with the former. The specimens were obtained in the northern Atlantic.

† *Zoological Researches*, 55, pl. 6.

1. *Pedum rami ambo thoracorum extremitate multiarticulati.*

G. 1. *MYSIS*, Latreille.—Pedes thoracis duodecim, maxillipedes numero sex. Antennæ internæ flagellis duobus confectæ. Pedes abdominis parvuli, debiles.

2. *Pedum ramus internus thoracorum non multiarticulatus, bene unguiculatus. Oculi symmetrici.*

G. 2. *PROMYSIS*, Dana.—Pedes thoracis duodecim, maxillipedes sex. Antennæ internæ flagellis duobus laminâque oblongâ confectæ. Pedes abdominis oblongi, natatorii, longitudinem fere æqui. [Segmentum abdominis posticum emarginatum vel bilobatum.]

G. 3. *MACROMYSIS*, White.*—Pedes thoracis sexdecim, inter sese similes, toti bene palpigeri. Antennæ internæ flagellis duobus laminâque oblongâ confectæ. Pedes abdominis quarti valde elongati; (an discrimen sexuales tantum.) [Segmentum abdominis posticum emarginatum vel bilobatum.]

G. 4. *SIRIELLA*, Dana.—Pedes thoracis sexdecim, toti bene palpigeri, posticorum duodecim ramo pediformi apicem setis brevibus mobilibus (instar digitorum) juxta unguem instructo. Antennæ internæ flagellis duobus confectæ, laminâ carentes. Pedes abdominis toti rudimentarii. [Rostrum brevissimum. Segmentum abdominis posticum apice rotundatum et spinulis ornatum.]

3. *Oculi e latere pedicelli externo obliquè spectantes, lenticulis totis parce obliquè versis.*

G. 5. *LOXOPIS*, Dana.—Oculi elongati. Antennæ internæ flagellis duobus confectæ, laminâ carentes. Appendices abdominis rudimentarii. [Segmentum abdominis posticum truncatum vel obtusum, extremitate spinuloso.]

SUBFAM. 3. *SCELETININÆ*.—Pedes abdominis appendicibus branchiiformibus carentes. Antennæ internæ simplices, externæ birameæ squamâ basali carentes.

G. 1. *SCELETINA*, Dana.—Carapax anticè acuto-tricuspidatus, paulo pone frontem instar colli constrictus, deinde ovatus posticè angustans. Oculi prælongi, obconici. Pedes thoracis elongati duodecim, biramei, ramo pediformi 4–5 articulato.

G. 2. *RACHITIA*, Dana.—Carapax anticè acuto-tricuspidatus, pone frontem non constrictus. Oculi longi, obconici. Segmentum abdominis sextum valde elongatum [segmentis in specie scrutatâ anticis simul sumtis non longioribus quam sextum, utroque spinam longam dorsalem gerente]. Antennæ internæ flagello longo tenuissimo confectæ.

* *Themisto*, Goodsir, Jameson's Ed. J., xxxiii. 174, pl. 2; *Macromysis*, A. White, Cat. Crust. Brit. Mus., 1847, p. 81; *Mysidium*, Dana, Amer. Jour. Sci. [2], ix. 129, 1850.

The new genera of Mysidea, by the author, are described in the volume of the American Journal of Science here referred to.

G. 3. MYTO.*—Pedes thoracis quatuordecim, primi secundi tertii quartique palpigeri, quinti sexti septimi simplices. Appendices caudales segmentoque caudali connati, ideoque cauda latè triangulata, margine postico longo. Flagella antenarum internarum non articulata.

FAM. III. LUCIFERIDÆ.

G. LUCIFER, *Thompson*.—Antennæ internæ simplices, externæ squamâ basali instructæ. Pedes thoracis quatuor postici (ad segmenta normalia pertinentes xiii. xiv.), obsoleti; octo precedentes (ix. x. xi. xii.), elongati, setigeri; deinde duo anteriori (viii.), instar maxillipedum flexi. Maxillipedes duo (vii.); maxillæ quatuor (v. vi.); mandibulæ (iv.) duæ non palpigeræ.

APPENDIX TO THE MYSIDEA.

The following genera are retained provisionally for certain immature forms, which may be young of *Macroura*:—

G. PODOPSIS, *Thompson* (*Zoological Researches*, i. 59, tab. 59, fig. 1). Oculi longissimi. Antennæ internæ fere obsoletæ; secundæ laminâ instructæ. Pedes duo longissimi, articulo tenui annulato confecti; reliqui breves. Pedes abdominis natatorii.

G. FURCILIA, *Dana*.—Carapax plus minusve rostratus. Oculi aperti. Pedes abdominis bene natatorii. Antennæ internæ furcatæ, ramis (immaturis?) subæquis 1-2 articulatæ; segmentum abdominis posticum truncatum, extremitate sæpius spinulosum. Animalia in mari alto lecta.

G. CALYPTOPIS, *Dana*.—Carapax non rostratus, oculos omnino tegens. Antennæ internæ birameæ, ramis (immaturis?) subæquis, 1-2 articulatis. Segmentum abdominis posticum truncatum, extremitate sæpius spinuloso.

FAMILY I. EUPHAUSIDÆ.

GENUS EUPHAUSIA, *Dana*.

Oculi breves, orbiculati. Antennæ internæ flagellis duobus confectæ, externæ squamâ basali instructæ. Pedes thoracici numero duodecim, quatuor posticis obsoletis branchiis eorum exceptis, 6-articulati, tenues,

* Krøyer, *Tids. N. R.*, i. 470.

non unguiculati, ciliati, palpo breviorē. Branchiæ multipartitæ aut ramosæ. Pedes abdominales mediocres, basi oblongo, lamellis ciliatis. Segmentum abdominis posticum elongatum, acuminatum, utrinque barbâ nudâ prope apicem armatum.

Eyes short, orbiculate. Inner antennæ ending in two flagella, outer having an oblong ciliate scale at base. Thoracic feet six pairs, the two posterior wanting, except the branchiæ; legs six-jointed, slender, not unguiculate, ciliate, palpus shorter. Branchiæ much divided or ramose. Abdominal feet moderately large, consisting of an oblong base and ciliate lamellæ. Last segment of abdomen oblong, acuminate, armed on either side near apex with a naked barb.

Carapax in front with a very short beak. Peduncle of the first antennæ long, projecting far beyond the eye, and bearing two long slender flagella, of nearly equal length. Two posterior thoracic legs absent excepting the branchiæ, which are larger than the others more anterior. The pairs of branchial appendages seven in number.

Palpus of mandible three-jointed, inserted near summit; extremity of mandible with a prominent denticulate edge around the summit.

The caudal appendages consist each of two oblong plates, nearly equal in length, and but little shorter than the caudal abdominal segment. The inner is slender acuminate and ciliate on both sides. The outer is obtuse at apex and ciliate within. The two setæ near apex of last abdominal segment give it nearly a trifurcate appearance, the setæ projecting beyond the point between.

The thoracic legs are usually carried as in the figures, while the palpi or outer branches act as oars in swimming. The legs are furnished with long ciliæ, which are short thin plumose. There are five long slender joints, the last three bent downward; the next preceding is short and stout, has a transverse position, it bears the palpus near one end, and the continuation of the leg at the other. This transverse joint proceeds from another short joint which bears the branchiæ.

The *Euphausiæ* are brilliantly phosphorescent, and hence the name of the genus; the phosphorescence proceeds from a part of the cephalothorax.

The species sometimes have a minute red globule near the base of four of the abdominal legs either side, and also two other pairs in the

cephalothorax near base of second and sixth pairs of legs (see figure of *E. pellucida*). They appear glassy under a lens, as if an eye; but we have been unable to assure ourselves of the true nature of the organ.

EUPHAUSIA PELLUCIDA.

Gracilis. Carapax brevissime rostratus. Articulus antennarum internarum primus apice non productus. Squama basalis antennarum externarum basi paululo longior. Pedes tenuissimi, articulo ultimo brevissimo, tribus ultimis simul sumtis precedente fere duplo brevioribus, palpo fere triplo brevioribus quam pes. Segmentum abdominis ultimum acutum, lamellis caudalibus paululo longius, barbibus subapicalibus salientibus. Branchiæ posticæ subdigitatæ.

Very slender. Carapax very short rostrate. First basal joint of inner antennæ not produced at apex. Basal scale of outer antennæ a little longer than base. Feet very slender, last joint very short, the last three together nearly twice as short as the preceding joint, palpus about one-third the length of the leg. Last abdominal segment slender acute, slightly longer than caudal lamellæ, the two naked subapical setæ salient. Posterior branchiæ subdigitate.

Plate 42, fig. 4 *a*, animal, enlarged; *a'*, same, natural size; *b*, eye and base of first antennæ; *c*, base of second antennæ; *c'*, part of flagellum of same; *d*, mandible; *e*, maxillæ or maxilliped; *f*, maxilla; *g*, posterior thoracic leg; *h*, extremity of abdomen; *i*, abdominal leg, with red spherical gland between the two of a pair; *k*, posterior branchiæ; *l*, ovaries dissected out, partly mutilated, together with two red spherical glands in posterior part of thorax (seen in figure *a*); *l'*, part of same, natural size; *m*, *m'*, eggs from the ovary, much more enlarged.

Pacific, near northern Kingsmill Islands; April, 1841.

Length, half an inch. Colourless, or nearly so.

This is a very slender species. The carapax is not higher behind than at middle. The margins of the anterior four abdominal segments are arcuate alike. Eyes nearly orbicular. The inner antennæ

are about two-thirds as long as the body; the two flagella are subequal, the basal joints have a few short hairs at apex; the second and third joints are nearly equal. Flagellum of outer pair about as long as in first pair.

The legs have the last three joints together about half the length of joint next preceding, and the last joint is not half the penult in length. The branchiæ consist of five to eight simple narrow bursæ attached to one or two pedicels.

Mandibles subcylindrical, with apex dentate and lower side of summit prominent and denticulate, with a grinding surface. The palpus has three joints, and is furnished with a few rather long scattered hairs; the second joint is about twice as long as either of the others, and the last is obtuse. The maxilliped consists of three lamellar joints, set with spinulous setæ on the inner side.

Two ovarian bags were extruded from posterior part of thorax on pressure, which had an ear-drop shape, diminishing above to a tubular form; the tube was broken in the dissection, and not farther traced; a small globular mass of similar ovarian character lay near the head of each bag, and above, the drawing represents another large ovarian bag, which was detached and broken.

The animal contains, like another species, several pairs of minute, ruby-red spherules, as shown in the drawing, one pair near base of second thoracic feet, another in posterior part of thorax (above alluded to), and another in each of the four anterior abdominal segments. They have no connexion with the ovarian apparatus. Figure *i* represents one in a prominence at the base of an abdominal leg.

Pigment of eye, black; a deep red spot in the pedicel, a short distance back of the pigment.

EUPHAUSIA SPLENDENS.

Carapax brevissimè rostratus. Articulus antennarum internarum primus apice productus. Squama basalis antennarum externarum basin non superans. Pedes tenuissimi, articulis tribus ultimis subæquis, simul sumtis vix brevioribus quam articulus precedens, setis longis breviter plumosis, palpo plus duplo brevior. Segmentum abdominis posticum lamellis caudalibus longius, barbibus subapicalibus salientibus, 6tum 5to fere duplo longius. Branchiæ posticæ ramosæ.

Carapax very short rostrate. First joint of inner antennæ oblong and produced at apex. Basal scale of outer antennæ shorter than base. Feet very slender, last three joints subequal, and together but little shorter than preceding joint, setæ long, short plumose, palpus not half as long as leg. Last segment of abdomen longer than caudal lamellæ, the two subapical barbs salient, sixth segment about twice as long as fifth. Posterior branchiæ ramose.

Plate 42, fig. 5 *a*, animal, enlarged; *b*, extremity of abdomen; *c*, fourth pair of legs; *d*, sixth pair; *e*, posterior pair of branchiæ; *f*, first pair of abdominal legs; *g*, second pair, ditto; *h*, third pair, ditto.

Abundant in the Atlantic in latitude 2° north, longitude 17° west. October 29, 1838, at 4 A. M. There were many *Pyrosomas* floating by at the time, and few *Cyclopidæ*. Found none on the afternoon of the same day, and the morning of the day following.

Length, about half an inch. Colour, reddish about ventral parts. Carapax a little compressed, not toothed, and vertical height not much less anteriorly than posteriorly. Sixth joint of abdomen about as long as two preceding. The inner antennæ have a three-jointed base about three times as long as the eye. The flagella of both pairs of antennæ were broken in all the specimens (some fifteen or twenty) collected, so that the full length was not ascertained—they are probably not very much longer than the carapax. The ciliæ of the oblong scale of the outer antennæ are curled at apex. The branchiæ of the anterior legs consist of a cluster of small vessels, while the posterior are larger and branched, main branches three or four in number; none were observed on the first pair. The palpus or natatory branch of the legs is longest upon the anterior pairs. The main stem of these legs appears to have little lateral motion. The last three joints have a row of long plumose ciliæ on the inner side, while the preceding have two or three rows of similar ciliæ or hairs.

The two anterior pairs of abdominal legs are peculiar in form. The outer branch of the first pair is large, and has a gibbosity on the inner side, and is consequently obliquely excavate under the acute apex; the other branch is lanceolate and ciliated. The second pair somewhat resembles the first, but is more slender; there appeared to be a scale

articulated with the obliquely truncate apical margin, just under the apex, which is acute. The branches of the third pair are similar to one another though unequal in size.

At the base of each of the anterior four abdominal legs, between the two legs of each pair, there was a ruby-red, shining globule; also, one on each side at base of sixth and second pairs of thoracic legs; also a large red, or brownish red spot in the back, not far from the eyes. Several individuals were observed to emit light, and it was seen to come from the anterior part of the cephalothorax. The light was intense and had a greenish tinge.

EUPHAUSIA GRACILIS.

Carapax brevissimè rostratus. Articulus antennarum internarum primus ad apicem parce productus et acutus. Squama basalis antennarum externarum basin multo superans. Pedes tenuissimi, articulis tribus ultimis subæquis simulque sumtis precedente vix brevioribus, setis longiusculis, palpo parvulo, quadruplo brevior. Segmentum abdominis posticum lamellis caudalibus non longius, 6tum 5to fere duplo longius. Branchiæ posticæ ramosæ.

Carapax very short rostrate. First joint of inner antennæ sparingly produced and acute at apex. Basal scale of outer antennæ longer than base. Feet very slender, last three joints subequal, and together but little shorter than preceding joint, setæ longish, palpus quite small, about one-fourth as long as leg. Last abdominal segment not longer than caudal lamellæ, sixth segment about twice as long as fifth. Posterior branchiæ ramose.

Plate 42, fig. 6 *a*, animal, enlarged; *b*, extremity of abdomen (setules of apex probably lost by mutilation); *c*, posterior branchia.

Pacific, latitude 15° 23' south, longitude 148° 23' west. Caught one individual during a calm at 4 A. M., September 10, 1839.

Length, half an inch. Colour, reddish along the venter and in the legs. Scale of second antennæ extends beyond apex of base about as far as length of penult joint of base. The last abdominal segment

was without the two subapical naked setæ, which in other species give a barbed appearance to the extremity; but it may be that this was owing to mutilation; on the sides of this segment there were two remote minute spines. The carapax is considerably higher posteriorly than anteriorly.

EUPHAUSIA SUPERBA.

Carapax brevissimè acutèque rostratus. Segmentum abdominis 6tum 5to vix longius. Articulus antennarum 1marum primus apice productus et obtusus. Squama basalis antennarum 2darum basi vix brevior. Articulus pedum ultimus pertenuis, penultimo multo brevior. Segmentum abdominis posticum laminâ caudali proximâ paululo brevius. Branchiæ ramulis setiformibus instructæ, posteriores ad basin involutæ, ramis radiatis arcuiformibus instar rotæ cum ramulis prælongis subradiatim ciliatis.

Carapax with a very short and acute beak. Sixth segment of abdomen hardly longer than fifth. First joint of inner antennæ produced at apex and obtuse. Basal lamina of outer antennæ very slightly shorter than base. Last joint of feet very slender, much shorter than penult. Last abdominal segment slightly shorter than adjoining caudal lamina. Branchiæ furnished with setiform branchlets; the posterior pair involuted at base, and having branches radiating around somewhat wheel-like, branches curving, and furnished on outer (posterior or inferior side) with long setiform branchlets, subradiate or spiral in position.

Plate 43, fig. 1 *a*, animal, enlarged two diameters; *b*, upper view of beak, eyes, and base of first antennæ; *c*, caudal extremity; *d*, under view of mouth, showing maxillipeds and extremity of mandibular palpi; *e*, mandible; *f*, maxilla; *g*, languette; *h*, shorter branch of first pair of abdominal legs; *h'*, basal portion of same pair of legs; *h''*, a process of shorter branch, more enlarged; *h'''*, ciliated natatory lamina of same; *i*, second pair of abdominal legs; *l*, basal portion of third pair of thoracic legs, with branchia and natatory branch; *l*, stomach, profile or side view; *m*, stomach, opened longitudinally above, and showing inside—the view as seen by transmitted light, the dark

parts thickest; *n*, liver and duct; *n'*, section of same; *o*, posterior branchia; *o'*, extremity of setiform branchlet, more enlarged.

Antarctic Seas, south of Van Diemen's Land, latitude, 66° 05' south, longitude 157° east, where it was obtained by Lieutenant Totten, U. S. Ship Porpoise.

Length, two inches. Colour, as noted and sketched by Lieutenant Totten, red, spotted with whitish. Body compressed, smooth, naked. Eyes large, globular, on short peduncles. Base of inner antennæ longer than base of outer; third joint shorter a little than second; flagella about half as long as the body, shorter than flagellum of outer antennæ; third joint of base of outer antennæ longer than fourth (or last); flagellum slender, naked, more than half the length of the body. Hairs of legs, as in other Euphausiæ, extremely slender.

Branchiæ attached to all the legs excepting first pair. The anterior consist of a lunate plate attached by a pedicel, proceeding from the concave side of the truncate plate at the base of the legs. The two posterior pairs of branchiæ (the legs corresponding to which are wanting) have the basal plate spirally curved (fig. *o*), and the circumference bears a series of radii, which are themselves incurved at apex, and bear each a series of slender setæ, increasing in length from behind forward. On the anterior side of the basal portion, near its insertion, there is a long slender branch, which bears branches on its sides, and these branches are furnished with a row of setiform branchlets like the others.

The first two pairs of abdominal legs are unlike the following and dissimilar. The outer branch has the usual form; the inner and smaller of first pair consists of three portions, as in figure *h*, which are generally folded together; the inner portion has the ordinary character of this branch, being an oblong ciliate lamella; the next has a short, stout hook below the apex; the third has an oblong curved process a short distance from the apex, and at the apex it bears a stout, oblong, slender organ, which appears to be tubular.

The mandibles have a denticulate apex, and a three-jointed palpus inserted near the summit. The maxillæ are broad lamellar in form, and consist of three plates, the basal largest, the whole together looking like a lobed leaf. The maxillipeds consist of four lamellar joints, and are somewhat oblong triangular in form; on the outer side

there is a narrow oblong palpus. The stomach has the form represented in figure 7, the natural size of which is given below the figure. The interior of the stomach was without teeth, but was provided with longitudinal cartilaginous ridges or plates, and had a villous surface.

GENUS CYRTOPIA, Dana.

Carapax plus minusve rostratus. Oculi paulo oblongi, obliquè gibbosi lenticulis totis in gibbositate versis. Pedes abdominales bene natatorii. Segmentum abdominis posticum apice obtusum vel truncatum et minutè spinulosum, prope apicem barbâ nudâ utrinque armatum.

Carapax more or less beaked. Eyes somewhat oblong, obliquely gibbous, the lenses being directed in a cluster obliquely outward into the gibbosity. Abdominal feet natatory. Last abdominal segment obtuse or truncate at apex, and minutely spinulous, armed on either side near apex with a naked oblong barb.

This genus, like Euphausia, has branchiæ attached to the bases of the thoracic legs, and the last abdominal segment has the same kind of naked setæ either side of apex. But this caudal segment is truncate at apex, and, what is of more importance, the eyes, instead of being orbicular and covered with facets, have all the facets directed in a cluster obliquely outward. The pedicels of the eyes extend straight forward parallel with the medial line, and at the same time the eye looks laterally and only so.

Two species were obtained, but the specimens of neither were adult. The inner antennæ have a long basal portion, and two flagella [the flagella were broken off near the base]. The outer were apparently rudimentary, and consisted of a rather short, three-jointed base, and two short branches.

The mandibles terminate in a dentate apex. The legs are furnished with small branchiæ; in the specimens they were more or less rudimentary or imperfect; the two posterior pairs of legs were wholly wanting excepting the branchiæ, as in Euphausia.

CYRTOPIA ROSTRATA.

Carapax bene acutèque rostratus, rostro oculis non breviorè, margine carapacis infero-laterali acutè uni-dentigero, postico rotundato. Segmentum abdominis ultimum extremitate subito angustatum apiceque rotundatum et minutè spinulosum, ad basin setarum subapicalium spinâ armatum; setis (vel barbibus) longis apicem valde superantibus, divaricatis. Lamellæ caudales subæquæ, segmento caudali valde breviores.

Carapax with an acute beak rather long (as long as the eyes), bearing an acute tooth somewhat posteriorly on the lateral margin, rounded behind. Last abdominal segment abruptly narrowed at extremity, and the small apex rounded and set divergently with spinules; a spine also at outer base of subapical setæ; these subapical setæ extending much beyond the apex of the caudal segment and divergent. Caudal lamellæ subequal, very much shorter than the caudal segment.

Plate 43, fig. 2 *a*, animal, enlarged; *b*, caudal extremity.

Pacific, Kingsmills Group, near Pitt's Island. Collected, April 30, 1841.

Length, one-third of an inch. Colourless. The beak is quite long and acute. The carapax is not excavate behind across the dorsum. The caudal lamellæ are about three-fourths as long as caudal segment, and the setæ projecting and divergent give it a sagittate appearance. These setæ or setiform processes extend full half their length beyond the apex of the segment; and there is a spine on each side of the segment just exterior to base of setæ. The eyes are gibbous and look as if a mass had been protruded laterally by pressure. The legs were imperfect; only one pair was elongated, as seen in the figure.

The base of the inner antennæ is about three times as long as the eyes. First joint nearly two-thirds the length of the whole; third joint a little longer than the second. Apex of first joint prolonged as far as apex of next segment; only a few short hairs on these basal joints. At apex of base two one-jointed branches, as long each as third joint of base; and also one or two long plumose processes on under side, which are three times as long as the branch.

CYRTOPIA DETRUNCATA.

Carapax breviter rostratus (rostro oculis valde brevior), marginibus integer, anticè posticeque angulis rotundatus. Segmentum abdominis posticum lamellis caudalibus parce longius, apice truncatum et spinulis minutis æquis armatum, barbâ apicem non superantibus.

Carapax short rostrate (beak being much shorter than the eyes), margin entire and angles before and behind rounded. Last abdominal segment slightly longer than caudal lamellæ, truncate at apex and armed with minute equal spinules, subapical barb not extending beyond apex of segment.

Plate 43, fig. 3 *a*, animal, immature; *b*, eyes and inner antennæ; *c*, caudal extremity; *d*, outer antennæ; *e*, extremity of mandible; *f*, *g*, maxillæ; *h*, antepenult leg; *i*, penult leg; *k*, posterior pair; *l*, part of liver.

Pacific, off south end of Hopper Island, near the equator, in longitude 173° east. Collected, at 4 A. M., April 16, 1841.

Length, one-third of an inch. Colourless. Body slender. Carapax deeply excavate behind. Inner pair of antennæ with the base more than twice as long as the eyes; first joint longer than the two following together; the lower or outer apex of this joint prolonged nearly to apex of following joint; second and third joints (or two last of base) subequal.

The mandibles appeared to have no palpus (but this requires farther examination); they are dentated at apex, and have a stout molar process on one side. Maxillæ lamellar, as in figures *f*, *g*.

As the animal was immature, there were but three pairs of legs very distinct; the second and third had furcate branchiæ at base; besides these, there are two pairs of branchiæ posterior to the legs, they were small bi-digitate sacs, attached by a short pedicel of the same size. The second pair of legs was the longest, and both the second and third had a short branch or palpus, but not so developed as to be used as an

organ of motion. The legs terminate in a few setules, without a claw.

Segments of abdomen naked. Last segment narrowing a very little towards apex. The seta-like processes either side of extremity are close appressed to the segment, and do not project beyond the short apical spinules. Caudal lamellæ a little shorter than the segment, the outer not jointed. Base of the caudal appendages a little spinose on the margin; long hairs on inner side and end of outer, and on both margins of inner.

Liver many-lobed, somewhat botryoidal. Abdominal natatory appendages nearly as in the Euphausiæ.

FAMILY II. MYSIDÆ.

SUBFAMILY I. MYSINÆ.

THE genera here included differ most obviously in the presence or absence of a scale at apex of base of inner antennæ; in the number of thoracic feet, some of the anterior sometimes acting as maxillipeds and differing from the following, in the character of the articulation of these legs; in the greater or less development of the abdominal appendages; in the caudal segment and lamellæ. The posterior thoracic legs are never wanting, as in the Euphausiæ, and when the number of pairs is but six, it arises from the pairs anterior being small and properly maxillipeds in character. In the genus *Mysis* the pediform branch of the thoracic legs has the tarsus indistinctly multiarticulate, a peculiarity not yet observed in other genera.

GENUS PROMYSIS.

Antennæ internæ flagellis duobus laminâque oblongâ confectæ. Oculi symmetrici, breves. Pedes thoracis duodecim et tarso simplice, unguiculato. Maxillipedes quatuor pediformes, pare secundo et paribus pedum

totis palpo natatorio extus instructis. Pedes abdominis natatorii, subæqui. [Segmentum abdominis in specie scrutatâ posticum emarginatum vel bilobatum.]

Near *Mysis*. First antennæ having two flagella and an oblong scale at apex of base. Eyes symmetrical, short. Thoracic feet twelve, tarsus not jointed, unguiculate; four pediform maxillipeds; second pair of maxillipeds and all the feet with a natatory palpus. Abdominal feet natatory, subequal. [Last segment of abdomen in the known species emarginate or bilobate behind.]

This genus is closely allied to *Mysis*, from which it differs in not having the tarsus many-jointed. The abdominal feet are all well developed and natatory. The first antennæ have an oblong lamella at apex of basal portion, as well as two long multiarticulate flagella; one of the flagella (the upper) commonly is slightly stouter at base, and hairy in this part on one side.

Seven pairs of pediform organs have similar natatory palpi: but the first of these pairs is shorter than the following, and is thrown forward with the extremity downward, while the others are flexed outward and forward; it is, therefore, properly a pair of maxillipeds. Anterior to these organs, there is another pair of maxillipeds slightly stouter than the second pair, and having a similar position.

The inner caudal lamellæ have a small, transparent, globular gland in the basal portion, like *Mysis*.

PROMYSIS ORIENTALIS.

Carapax breviter rostratus, rostro oculis multo brevior. Antennæ internæ apice basis valdè crassæ, articulo tertio vix oblongo. Pedes thoracis gracillimi, breviter et sparsim ciliati, ungue oblongo, tenuissimo, pulpo multo brevior quam ramus pediformis. Segmentum abdominis posticum supra longitudinaliter concavum, lamellis caudalibus valde brevius, basi latius et crassius, apice paulo furcatum et acutum, marginibus breviter spinulosis. Lamella caudalis externa internâ multo longior, extus intusque ciliata.

Carapax short beaked, beak much shorter than the eyes. Interior an-

tennæ very stout at apex of base, the last joint of base being hardly oblong. Thoracic feet very slender, short and sparsely ciliate, claw oblong and very slender, palpus much shorter than pediform branch. Last abdominal segment longitudinally deeply concave above, nearly half shorter than outer caudal lamella, broadest at base, short furcate at apex and acute, sides short spinulous. Outer caudal lamella much longer than inner, ciliate on both margins.

Plate 43, fig. 4 *a*, animal, enlarged; *b*, caudal lamellæ, enlarged, the caudal segment removed; *c*, caudal segment, enlarged to correspond; *c'*, same, in oblique side view.

China Sea, four hundred and fifty miles from Singapore, to the northeast. Collected, February 16, 1842.

Length, two-fifths of an inch. A little reddish yellow along the venter. The carapax has a slight depression dorsally, not far from the front, as if indicating the separation of a cephalic portion; and another just back of beak. The beak is acute. The last abdominal segment is longitudinally deep concave, and ends in two acute points separated by a rounded emargination. The segment narrows from its base with a curve, the narrowing scarcely perceptible near apex. The last joint of base of first antennæ is very stout, nearly as broad as long. Penult joint of base of outer antennæ three times as long as last joint of base. Flagella of antennæ were mutilated; but enough remained to show that they were quite long and very slender. The upper of first pair is stouter and hairy at base.

The abdominal appendages all well developed, being of full length, and consisting of a base and two oblong ciliate lamellæ. The setæ were short.

GENUS MACROMYSIS, *White*.

Carapax plus minusve rostratus. Antennæ internæ flagellis duobus laminâque oblongâ confectæ. Oculi symmetrici, breviusculi. Pedes thoracis sexdecim, toti palpo natatorio multiarticulato instructi, tarso simplice, unguiculato. Pedes abdominis plerumque parvuli, quarti valde elongati. [Segmentum abdominis posticum bilobatum vel emarginatum.]

Carapax more or less rostrate. Inner antennæ having two flagella and an oblong scale at apex of base. Eyes symmetrical, rather short. Thoracic feet sixteen, all having a natatory palpus, which is multiarticulate, tarsus of pediform branch not jointed, unguiculate. Abdominal feet mostly small and imperfect, fourth pair very much elongate. [Last abdominal segment bilobate or emarginate behind.]

The elongate form of the fourth pair of abdominal legs may be only sexual and possibly occurs in other genera. The sixteen thoracic feet, and the imperfect character of the larger part of the abdominal feet distinguish this genus from *Promysis*. The inner caudal lamellæ have the transparent globule at base, characteristic of *Mysis*. The females have the usual pouch under the posterior part of the thorax.

Themisto, GOODSIR, Edinburgh New Phil. Jour., xxxiii. 176, pl. 2, f. 4; Goodsir's *T. brevispinosa* corresponds well with our species in general form; but his figure of the *T. longispinosa* is quite another thing in its legs, which to us are unintelligible.

Macromysis, A. WHITE, Cat. Crust. Brit. Mus., 1847, 81, and 1850, 45.

Mysidium, DANA, Am. J. Sci. [2], ix. 130, 1850.

MACROMYSIS GRACILIS.

Carapax brevissimè rostratus, segmentum thoracis septimum non tegens, posticè quoad dorsum profundè excavatus et latere rotundatus. Basis antennarum internarum tenuis; flagella valde inæqua, superiore fere duplo longiore et dimidium corporis longitudine valde superante. Antennæ externæ fere corporis longitudine, squamâ basali lanceolatâ. Segmentum abdominis posticum apice obsolete rotundato-bilobatum et spinulis ciliatum, lamellâ caudali externâ plus dimidio brevius; hæc lamellâ extus spinulosâ, valde longiore quam interna.

Carapax very short rostrate, not covering last thoracic segment, behind over the back profoundly excavate and laterally rounded. Base of inner antennæ slender, flagella very unequal, the superior nearly twice the longest, and much longer than half the body. Outer antennæ almost as long as the body, basal scale lanceolate. Last abdominal segment obsoletely rounded bilobate at apex and

ciliated with spinules, more than half shorter than outer caudal lamella; this lamella spinulose on outer side, and much longer than inner lamellæ.

Plate 43, fig. 5 *a*, animal, enlarged; *b*, caudal extremity; *b'*, inner caudal lamellæ; *c*, base of interior antennæ; *d*, base of exterior antennæ; *e*, one of the thoracic legs; *f*, one of the scales of the ovarian pouch; *g*, *h*, *i*, *k*, *l*, *m*, young, in different successive states.

Harbour of Rio de Janeiro. Collected in vast numbers, December, 1838.

Length, four to six lines. A cephalic portion of the carapax is partly separated by a suture from the rest. Beak but slightly projecting. Segments of abdomen nearly as long as broad, sixth nearly twice its breadth in length. Outer caudal lamella quite long, one-third longer than inner lamella, truncate at extremity, and rather stout spinulose; inner lamellæ nearly twice as long as caudal segment. Caudal segment of nearly equal width throughout. Eyes with a large pedicel, stout and little oblong; facets very minute. Superior antennæ with second joint of base shortest, first longest. Upper flagellum about two-thirds the length of the whole body, lower about half as long as the upper. The upper is often thrown back, the two having the position in the figure. The oblong scale at apex of base of these antennæ is stout, obtuse, and close ciliate. Inferior antennæ full three-fourths as long as body. The basal scale extends half its length or more beyond apex of base, and gradually narrows to an obtuse point; it is long ciliate on both sides.

Eight pairs of thoracic legs of nearly equal length and similar structure; the anterior pair a little the smallest, and increasing from this to the seventh, eighth smaller than seventh. First joint of leg compressed, broad triangular, second joint (or first of pediform branch) very short, following three oblong, nearly equal, the last of the three most slender and longest, all setose within in two ranges; at extremity a distinct claw. Palpus much shorter than other branch, extending a little beyond the apex of its penult joint, first joint nearly round obovate, the rest of the organ slender and multiarticulate, consisting of ten short joints. Plates of ovarian pouch in females concave lunate, with the margin ciliate. The largest number of young seen at any one time in this pouch was six, and they were in all states of

maturity, from the undeveloped egg, to the young with jointed members. The different states observed are represented in figures *g* to *m*. On the 11th of December, these young were found abundantly, and nearly all the specimens obtained were females. On the 24th of the same month, no gravid females could be found, and at the same locality not more than six adults out of a hundred specimens. They were in general about half grown, being one-tenth of an inch long, instead of one-third, the usual adult size, and none had ovarian pouches. In adult males, the scales of the ovarian pouch are replaced by very short organs situated nearly between the bases of the preceding pairs.

Abdominal appendages of first three segments, short, and close appressed to the venter; of fourth segment, long and slender, consisting of a two-jointed basal portion, with which is articulated a slender extremity, having two small joints towards its extremity and terminating in two unequal setæ. This organ reaches back a little beyond the extremity of the body.

GENUS SIRIELLA, Dana.

Carapax vix rostratus. Pedes thoracici numero sexdecim, toti biramei; palpo elongato basi valde lato flagelloque multiarticulato; ramo pediformi unguiculato, 5-articulato (ungue incluso). Oculi fere orbiculati. Antennæ internæ birameæ, externæ flagello confectæ laminâque oblongâ basali. Appendices abdominales rudimentarii. Segmentum abdominis postremum apice rotundatum et spinulis ciliatum.

Carapax hardly rostrate. Thoracic feet eight pairs, all two-branched, the palpus elongate, and consisting of a very broad basal joint and a multiarticulate extremity, the main branch unguiculate, five-jointed (claw included). Eyes nearly orbicular. Inner antennæ two-branched; outer ending in a flagellum and having an oblong scale at base. Abdominal appendages all rudimentary. Posterior segment of abdomen rounded at apex, and ciliate with minute spinules.

These species have a pouch for the young, under the posterior part of the thorax, like those of Mysis. Yet they differ, in having eight pairs of feet, and all unguiculate. The last abdominal segment is

alike, in the several species discovered, in being rounded behind and set around with spinules. Besides the claw terminating the thoracic legs, there is a number of short setæ, about as long as the claw, or somewhat exceeding it in length. The mandible has a rather small molar extremity, and bears a three-jointed palpus. The inner maxillæ are oblong lamellar; they bear a tuft of setæ at apex, and also a lateral branch, which is short and furnished with a few setæ. The outer maxillæ or maxillipeds consist of a short basal joint, hardly distinct; a broad lamellar joint, which narrows upward; and a third joint, which is oblong, and in one species appeared to be three-jointed. The second joint of the organ has two lobes or plates on its inner side, and just exterior to it, there is an oblong lamella, which proceeds from the first or basal joint of the organ. The eyes are large globular, with a short pedicel. One of the flagella of the first antennæ is stoutish and pubescent at base. The inner caudal lamella contains near base a small oval, transparent gland. The palpus of the thoracic legs has a very broad, oblique, round-obovate basal joint.

In two species, an oblong oval gland was observed in the thorax (see fig. 6, pl. 43, and fig. 1, pl. 44), which was very large in females, and probably, is ovarian in function.

SIRIELLA VITREA.

Carapax fronte obsolete triangulatus, angulo infero-antico acutus sed non productus, infero-postico rotundatus. Oculi maximi orbiculati. Segmentum abdominis posticum spinulis æquè circumdatum, laminam caudalem externam fere æquans, internâ multo brevius. Antennarum basis externarum basi internarum valde brevior. Pedum rami thoracicorum inæqui.

Carapax very low triangular in front, acute but not prolonged at lower anterior angle, rounded behind. Eyes very large orbicular. Last abdominal segment set around evenly with spines, the segment about as long as outer caudal lamina and much shorter than the inner. Base of outer antennæ very much shorter than that of inner. Branches of thoracic feet unequal.

Plate 43, fig. 6 *a*, animal, enlarged; *b*, lateral view, more enlarged;

c, c', mandible in different positions; *d*, first maxilla; *e*, second maxilla; *f*, lower lip; *g*, inner antennæ; *h*, outer antennæ; *i*, first feet; *k*, second feet; *l*, one of six posterior pairs; *m*, extremity of last pair.

Pacific; latitude 18° to 18° 30' south, longitude 124° to 136° west. Caught two individuals August 7th, 1839, and one August 13th.

Length, one-eighth of an inch. Colourless and transparent; one specimen purplish along the under side of abdomen and reddish along the sides of the thorax; eyes black, with some blue reflections; the pigment, probably blue-black. Eyes very large globular, the sphere rather shorter than broad, and standing on a short, slender peduncle. Facets in quadrate order. Inner antennæ with base oblong cylindrical, three-jointed, second joint very short, the others oblong, the first longer than third. [The length of the two flagella uncertain, as they were broken in the specimens seen.] Outer antennæ with a four-jointed base, which bears an oblong scale at apex of second joint; the scale has outer apex acute and is ciliated on the inner and apical margin; first two joints of base more than twice the diameter of the following two.

Mandibles moderately stout, having a few blunt teeth at apex. Palpus with the first joint very short, second oblong subovate, the more convex side minutely setulose; last joint rather slender and acuminate. A stout spine at the base of the mandible, but its exact position was not ascertained; the figures represent different positions after dissection. The maxillæ are narrow oblong, with a few somewhat divergent setæ at apex, a small short joint attached near middle of inner side. The outer pair of maxillipeds have the second joint subtriangular, narrowing above, longer than palpus alongside. The third joint is oblong and set on the apical and inner margin with short setæ. There are two lamellar lobes on inner side of second joint. Lower lip as in figure *f*.

Thoracic feet of two anterior pairs much shorter than posterior, and pediform branch not as long as palpus; also no cluster of setæ at apex of penult joint, adjoining the claw, as in the following pairs; this pediform branch of the two anterior pairs is not usually in sight in the ordinary motions of the animal, as they are thrown forward near the mouth. Penult joint (or that with which the claw is articulated) cylindrical in the six posterior pairs. The setæ at apex about as long

as the claw, and they may be separated at will, like fingers. Palpus of these legs has the basal joint nearly or quite as broad as long, narrowest below, and rounded at apex, excepting in first pair, in which it is subacute on the more prominent side. Posterior legs shorter than the five pairs preceding. At base of last pair in a female, a pair of large lunate, concave plates, as in *Mysis*, forming together a pouch, within which the immature young are confined.

Within the thorax, extending through three or four segments preceding the last, there is a pair of oblong glandular masses, of a deep blue colour, pearly by reflected light. They are very large, and occupy more than half the length of the thorax. The stomach was just anterior to these glands; it was membranous, and in folds above. The liver was situated above the stomach, as appeared through the shell.

First five segments of abdomen subequal, together about as long as the carapax; sixth segment as long as fourth and fifth; seventh segment a little shorter than sixth, narrowing a little to a rounded entire apex, which is furnished with a few short spines, and another series of still shorter spines. Caudal lamellæ longer than segment, the outer but slightly longer and furnished within with hairs as long as the lamella; the inner much longer but not ciliate, both rounded at apex.

These animals move with rapidity and very gracefully.

SIRIELLA GRACILIS.

Carapax fronte paulo triangulatus. Segmentum abdominis posticum spinulis circumdatum, spinulis duabus longioribus, laminâ caudali externâ paulo brevius et internâ multo brevius. Oculi mediocres. Flagella antennarum internarum valde inæqua, majore longitudine thoracem superante; externarum flagellum dimidio corporis longius. Pedum rami thoracicorum inæqui.

Carapax low triangulate in front. Last abdominal segment edged with spinules, two spinules longer than the rest, length, a little less than that of outer caudal lamina, much less than that of the inner. Eyes rather small. Flagella of inner antennæ very unequal, the larger longer than thorax. Flagellum of outer antennæ two-thirds as long as the body. Branches of feet unequal.

Plate 44, fig. 1 *a*, male, enlarged; *b*, posterior part of thorax of female, more enlarged; *c*, extremity of abdomen; *d*, first maxilla; *e*, maxilliped; *f*, first pair of legs; *f'*, fouette, attached at base; *g*, one of posterior legs.

Pacific, near St. Augustine's Island; also, near Pitt's Island, Kings-mills Group. Collected, March 25, 1841, and April 30, 1841; also, latitude 15° north, longitude 180° west, December 9, 1841.

Length, two and a half lines. Colourless. The last abdominal segment is but little shorter than caudal lamella adjoining, and the eyes are much smaller than in the *vitrea*. The outer caudal lamella is hardly shorter than the inner. The hairs extend back some distance on outer side, and rapidly diminish in length, the last being the shortest and quite minute; hairs at extremity are nearly half the length of the lamella. The inner lamella has a stout, longish spine at apex, besides hairs on the margins. Diameter of eyes scarcely more than half the breadth of the abdomen at its base. Basal scale of outer antennæ reaches a little beyond apex of base, and the base extends half its length beyond the eyes. Hairs on under side of flagellum few and not longer than diameter of joints. Shorter flagellum of first antennæ have on basal half two distant minute spines.

An ensiform lamella (fouette, fig. *f'*) attached to base of first pair of legs and kept in constant vibration under the carapax. Reniform gland in thorax small in male (see figure), but very large oblong in female; it was nearly as long as thorax and two-thirds as broad.

A specimen of *Siriella* collected in the Sooloo Sea (Plate 42, fig. 2 *a*, *b*, *c*), has the general characters of the *gracilis*, the eyes (fig. *a*) a little larger, the caudal lamellæ (fig. *b*) equal, and the caudal segment as in the *gracilis*, the hairs of the lamellæ quite long, and extending up on outer side of outer lamella some distance from extremity, with the last of the hairs short like spinules, and the very last one the shortest of all; the front prominent triangular; the basal scale of outer antennæ extending as far forward as the base of inner antennæ. The specimen is a male, and has a prominent tooth or spine on the lower side of the sixth abdominal segment (fig. *c*), a character not observed by us in the male of the *gracilis*.

SIRIELLA BREVIPES.

Carapax fronte prominulè triangulatus. Segmentum abdominis posticum spinulis æque circumdatum; lamellæ caudales paululo inæquales, segmento caudali longiores, ambæ longè ciliatæ. Oculi pergrandes. Pedum rami thoracicorum fere æqui. Flagellum antennæ secundæ thorace paulo longius.

Carapax low triangular in front. Last abdominal segment evenly margined with spinules. Caudal lamellæ but little unequal, longer than caudal segment, both long ciliate. Eyes quite large. Branches of thoracic feet nearly equal. Flagellum of second antennæ rather longer than thorax.

Plate 44, fig. 3 *a*, animal, enlarged; *b*, extremity of abdomen.

Pacific, south of the Kingsmills, near Sherson's Island, March 24, 1841.

Length, one-tenth of an inch. Colour, slightly reddish or flesh-red. Body, nearly cylindrical. Last two abdominal segments of nearly equal length. Hairs of caudal lamellæ shorter than the lamella. Eyes nearly as large in diameter as the abdomen at base, on short pedicels. [Antennæ were broken in the specimen examined, excepting the outer or second pair.] Joints of flagellum of second pair of antennæ oblong, a short hair or two on each. Only the short apical joint of the base of these antennæ extends beyond the eyes; this last character and the much larger eyes, nearly equal branches to legs as well as abdomen, distinguish this species from the *gracilis*; and the same characters, excepting the size of the eyes, remove it from the *vitrea*. The legs are shorter than usual. The infero-anterior angle of the carapax is hardly acute.

GENUS LOXOPIS.

Carapax rostratus. Oculi elongato-ovati, lateraliter spectantes, lenticulis totis externi-lateralibus parce obliquis. Antennæ externæ squamâ

basali instructæ; internæ bifidæ. Pedes sex prominentes, duo postici obsoleti (?). Appendices abdominis rudimentarii. Segmentum abdominis posticum angustum, apice truncatum vel obtusum et spinulis armatum.

Carapax rostrate. Eyes elongate-oval, looking laterally, the lenses all lateral, being directed outward or sparingly oblique. Second antennæ having a scale from the base; first pair bifid. Six prominent pairs of feet, the two posterior obsolete (?). Abdominal appendages rudimentary. Last abdominal segment narrow, truncate or obtuse at apex and armed with spinules.

The eyes have an oblique arrangement on the pedicel, as in *Cyrtopia*, but here the facets are more lateral, covering a large part of the lateral surface, and the pigment is oblong. The abdominal legs may be immature, and so also, the thoracic; yet we doubt somewhat on this point, since the specimen was nearly half an inch in length.

LOXOPIS TRIDENS.

Carapax acutè rostratus (rostro oculis valde breviorè) juxta rostrum spinâ utrinque armatus, ad medium dorsum regionis gastrici dente triangulato instructus. Oculi oblongi, obliquè ovati. Segmentum abdominis posticum basi parce latius, apice truncatum et spinulis ciliatum, spinulis duâbus externis plus duplo longioribus. Lamellæ caudales segmento caudali vix breviores. Pedes mediocres; palpo cylindrico uni-articulato, setis brevibus paucis apicalibus; ramo altero etiam uni-articulato (an pedes maturi?) non longiore.

Carapax with an acute beak much shorter than the eyes, and having a spiniform tooth either side, also a triangular tooth on the back of gastric region. Eyes oblong, obliquely ovate. Last segment of abdomen a little broader at base, truncate at apex, and ciliate with spinules, the two outer spinules more than twice as long as the others. Caudal lamellæ hardly shorter than caudal segment. Feet of moderate size, palpus oblong cylindrical, one-jointed, having a few short setæ at apex; other branch also one-jointed (feet perhaps not mature), and not longer than the palpus.

Plate 44, fig. 4 *a*, animal enlarged; *b*, head, upper view; *c*, caudal extremity.

Sooloo Archipelago. Collected, February 2, 1842.

Length, five lines. Colourless. There appears to be a small pair of legs near the mouth, then six pairs subequal, the first and last a little smaller than the others, then a mere tubercle or process corresponding to a posterior pair. The branches are not jointed, and this is the only reason for thinking the animal immature; the large size of the individual, five lines, seems to show that it is mature, unless it may prove to be young of some Macroural Crustacean. The palpus of the two posterior pairs was a little longer than the other branch, but of the other pairs about the same in length as this branch. The beak is about half as long as the eyes. The abdominal appendages are all imperfect. The last segment has a longish spinule at either angle of apex, and several quite short and equal between these. The caudal lamellæ are about as long as the caudal segment, and are furnished with setæ. The outer is not jointed.

The antennæ were mutilated. The inner pair was provided with two short setaceous branches.

SUBFAMILY II. SCELETININÆ.

The only species of this group observed have the front of the carapax deeply tridentate, the middle acute process being a long beak.

GENUS SCELETINA, Dana.

Carapax ovatus, anticè transversim constrictus instar colli, et fronte tricuspidatus. Abdomen tenuissimum. Oculi longi, obconici. Segmentum abdominis posticum truncatum et spinulis inæquis armatum. Pedes thoracici elongati duodecim, biramei, ramo pediformi 4-5-articulato, altero (palpo) setis paucis instructo. Pedes alii quatuor antici parvuli. Appendices abdominis rudimentarii.

Carapax ovate, with a constriction across anteriorly like a neck, tri-

cuspidate in front. Eyes long, obconical. Abdomen very slender. Posterior segment truncate and armed with minute unequal spinules. Thoracic feet twelve, two-branched, pediform branch four or five-jointed, the other (or palpus) furnished with a few setæ; other four feet anterior to these quite small. Abdominal appendages rudimentary.

This species, as it swims, with its very slender body, its extended legs, and thorax of peculiar form, has much the aspect of a skeleton, the legs corresponding to the ribs. The front is acute and rather long rostrate; and either side there is a divaricate acute projection, shorter than the beak. The neck is quite narrow in some species, being less than half the greatest breadth of the thorax; and sometimes there is a stout spine on what may be called the shoulders. The penult abdominal segment has a spine at apex, and the last segment is nearly linear, with a truncate or excavate apex, and a regular arrangement of spinules, one at either angle larger than the intermediate. The caudal lamellæ are very slender and short ciliate. The eyes are rather long conical, with the summit rounded. The abdomen is extremely slender, the joints all oblong. The appendages are short and naked.

The inner antennæ appear to be simple, few-jointed, but rather long. The outer have a short base and two flagella. No basal scale was observed. The joints of the flagella were quite long.

The posterior pair of thoracic legs is the smallest. The preceding five pairs are similar, and the last of them rather the longest.

SCELETINA ARMATA.

Carapax anticè valde constrictus, cuspidibus lateralibus valde divaricatis collo angusto et humeris spinâ crassâ armatis. Segmenta abdominis 5 antica spinâ acutâ infra utrinque armata, ultimo lineari, truncato. Antennæ internæ thorace paululo breviores, 5-articulatæ, cylindricæ, articulo ultimo longiore.

Carapax with the neck-like constriction deep, making the neck narrow, acute angles in front strongly divaricate, and shoulders back of constriction armed with a stout spine. Five anterior abdominal

segments armed laterally or below with an acute spine, last segment linear, truncate at apex. First antennæ a little shorter than thorax, five-jointed, cylindrical, last joint longest.

Plate 44, fig. 5, animal, enlarged.

Atlantic, latitude $0^{\circ} 30'$ south, longitude $17^{\circ} 30'$ west. Caught one individual, November 3, 1838.

Length, one-seventh of an inch. Colourless. At the front angles the carapax is very much broader than at the constriction; behind the constriction it widens and bears a spine either side, then gradually narrows, and at its posterior extremity is not wider than the slender abdomen. The beak is rather longer than the eyes. The sixth and seventh abdominal segments are about equal in length. Outer caudal lamella not jointed. Inner antennæ simple, cylindrical, only five joints observed, the second and last longest. A few rather long hairs on inner margin. The outer pair has two cylindrical branches or flagella on a short base, of which only one joint was distinguished. The branches were broken at their extremities; the part remaining consisted of long joints, and not of short ones like the flagella of other genera; first joint of the two branches of about the same length, second of inner branch about half the first joint.

Posterior legs considerably the shortest. The palpus is cylindrical, few-jointed, and not multiarticulate at extremity. The abdominal legs are small and naked.

SCELETINA LATICEPS.

Carapax longè rostratus, latissimus, parce constrictus, cuspidibus lateralibus paululo divaricatis, collo latissimo, humeris non armatis. Abdomen tenuissimum; segmento postremo lineari, apice emarginato. lateribus medio spinulam minutam ferentibus. Antennæ intermedienues, articulo primo oculis duplo longiore. Pedes postici precedentibus dimidio fere breviores, palpo 2-articulato.

Carapax long rostrate, very broad anteriorly, sparingly constricted, neck therefore very broad, and anterior angles of carapax but little

divergent, shoulders not armed. Abdomen very slender; caudal segment linear, emarginate at apex, and having a minute spine near middle of sides. First antennæ slender, first joint twice longer than the eyes. Posterior feet nearly half shorter than next preceding, palpus two-jointed.

Plate 44, fig. 6, animal, enlarged.

Pacific, thirty miles west of Assumption Island, one of the Ladrões. Collected, December 30, 1841.

Length, one-eighth of an inch. Colourless. The carapax is very much broader than in the *armata*, and but little contracted anteriorly, and, moreover, the front angles are slightly divergent; length of carapax, not twice its greatest breadth. The emargination at apex of last abdominal segment is rounded; each side of the same segment has a minute spine near middle, and quite near the apex there is a second lateral spinule; at apex there appeared to be six spinules. The branches of the thoracic legs are few-jointed;—only two or three joints are given in the drawing made from the living animal, and they are furnished with a few setæ. The outer antennæ of the specimen were broken.

SCELETINA ORIENTALIS.

Carapax anticè constrictus, perangustus, cuspidibus lateralibus parce divaricatis, humeris armatis. Segmenta abdominis sex processu acuto infra utrinque armatum; 6tum longum, infra unispinosum; septimum fere lineare, apice truncato et spinulis sex armato, lateribus cum duabus spinulis minutis armatis. Pedum palpus apice minutè articulatus.

Carapax constricted and very narrow in front, anterior acute angles a little divaricate, shoulders armed. Six abdominal segments provided below on either side with an acute process or spiniform tooth; sixth long and with a tooth below; last segment nearly linear, apex truncate and set with six spinules, each lateral margin with two spinules. Palpus of feet having minute joints at apex.

Plate 44, fig. 7 *a*, animal, enlarged; *b*, dorsal view of thorax; *c*, caudal extremity; *d*, palpus of legs.

Sooloo Sea, southwest of Panay. Collected, January 29, 1842.

Length, one-fourth of an inch. Colourless.

This species has smaller eyes and beak, and narrower front, with less divergent angles than the *armata*. The breadth of the front of the carapax is about half its greatest breadth. The beak is very slender, but does not project beyond the eyes when they are extended forward.

GENUS RACHITIA.

Carapax rostratus. *Oculi oblongi, obconici*. *Antennæ internæ non bifidæ, flagello tenui confectæ*. *Antennæ secundæ bifidæ, laminâ basali non instructæ*. *Segmentum abdominis sextum valde elongatum, septimum postice valde latius et bilobatum, rotundatum et setulis longiusculis inæquis instructum*.

Carapax rostrate. Eyes oblong, obconical. Inner antennæ not bifid, ending in a slender flagellum. Outer pair bifid, and without a basal scale. Sixth abdominal segment much elongate; last much broader behind and bilobate, lobes rounded, and set with longish, unequal setæ.

The animal upon which this genus is founded is not mature, and we cannot feel certain that it is not the young of some Decapod, possibly one of the subfamily Oplophorinæ, family Palæmonidæ. Yet, it so nearly approaches a *Sceletina* in its trident front, its obconical eyes, and its antennæ, both first and second pairs, that we are inclined to refer it to the same family with that genus. Moreover, it seems improbable that the caudal segment of *Rachitia* could belong to any of the Palæmonidæ. The abdomen of the only species known has along the back a long spine to each segment, except the two last, and the sixth segment is as long as the four preceding. The caudal extremity is evidently immature; the caudal lamellæ are quite small. The thoracic legs are only partly developed. Only three pairs were jointed, these were bifid, and the outer branch corresponding to the palpus was multiarticulate. The abdominal legs were altogether wanting.

RACHITIA SPINALIS.

Carapax antice acutè et longe tricuspidatus, spinâ mediâ (vel rostro) longiore (oculis duplo longiore), lateralibus ascendentibus, posticè angustus, transversus, marginibus lateralibus integris. Segmenta abdominalis quinque spinâ longâ acutâ dorso armata; segmentum sextum segmentis quatuor precedentibus simul sumtis fere longius.

Carapax long and acute tricuspidate in front, middle spine (or beak) longest (twice as long as the eyes), lateral flexed upward; posteriorly narrow and margin transverse, lateral margins entire. Five abdominal segments having a long acute spine on the back, sixth segment hardly shorter than the four preceding together.

Plate 44, fig. 8 *a, b*, different views of animal, enlarged; *c*, caudal extremity.

Atlantic, off the harbour of Rio de Janeiro. Collected, January 7, 1838.

Length, one-eighth of an inch. Colourless. The beak is straight and horizontal, while the spines either side are bent upward, as seen in a lateral view. The carapax, in a vertical view, is widest just anterior to middle, then narrows regularly till it becomes as narrow as abdomen at its posterior part. The first five abdominal segments are not oblong, and the dorsal spine is rather longer than the segment; the spine is directed backward and upward. These five segments are about as long as carapax, the last slightly longer than preceding. The sixth segment is nearly as long as preceding five. In the movements of the animal, the body is often flexed at the articulation preceding this segment. There is a spine on the under side of fifth segment, near the articulation with the sixth segment. The last segment of the body is somewhat triangular, narrowest at base, and terminates in two rounded lobes, each of which is nearly as broad as the segment at base; the sinus between the lobes is rounded. Three or four setæ at the extremity of each lobe are as long as the segment; besides these there are two or three shorter on inner side, and one on outer margin of lobe.

The inner antennæ consist of a long cylindrical, three-jointed, basal portion, a little longer than the beak of the carapax; the first two joints nearly equal, the third short and smaller. Flagellum very slender, whole length more than one-half the length of the body.

Three pairs of legs developed; all two-branched, branches unequal, the outer consisting of five joints, with a pencil of hairs at the extremity; the second of the three pairs largest. Posterior to these three pairs there were tubercles or rudiments of four more pairs.

FAMILY III. LUCIFERIDÆ.

GENUS LUCIFER, *Thompson.*

Corpus valde attenuatum, segmento antennali elongato, tenui. Antennæ totæ flagellis longis confectæ; externæ squamâ basali instructæ. Pedes thoracis numero decim, longi, non bifidi, duo antici valde replicati, 8 sequentes prorsum parce flexi; alii quatuor posteriores normales obsoleti. Pedes abdominis bene natatorii.

Body very much attenuated, antennary segment elongate, slender. The four antennæ with long flagella, outer pair with a basal scale. Thoracic feet ten in number, not two-branched, the two anterior each folded back upon itself, the eight following thrown forward; posterior to these, two normal pairs are obsolete. Abdominal feet large and natatory.

The long antennary segment is like a slender neck, and is usually separated from the proper carapax by a suture, more or less distinct. It is without a beak, or has but a short one, and has a spine in front on either side. It bears two pairs of antennæ and long eyes, as above described. The first basal joint of the inner antennæ is not shorter than the eyes; the next two joints are quite short. The base of the outer antennæ is very much shorter than that of the inner. The flagella of both pairs are slender, and consist of long joints. The

small spheroidal organ in the bases of the inner antennæ, shown to correspond to ears, by Huxley, are very distinct.

The carapax following the antennary segment is very small and narrow, and hardly covers the bases of the legs. In a vertical view, it is widest in front, the form being narrow ovate, and on each shoulder there is an acute spine; posteriorly it narrows, so as not to be wider than the abdomen where it meets it, and in this respect the genus is like *Sceletina*. In a lateral view, the portion of the cephalothorax covered by the carapax is widest posteriorly. At its anterior part there is a buccal prominence, containing a pair of mandibles, and followed by two pairs of maxillæ and one of maxillipeds. The mandibles are without palpi, and have a dentate summit. The maxillæ are represented on Plate 44, figures 9*e*, 9*f*. The following organs are five pairs of thoracic legs, the first pair of which might as properly be called maxillipeds, as they are folded back, at the third articulation, upon themselves, and thus differ from the true legs, which are all nearly straight, and project forward when in their natural position. These legs consist of five to six joints, and have two divergent series of shortish setæ ranging along their length; they are without a palpus, or it is obsolescent. The first pair has a fouette, which extends back under the carapax, and is kept in constant rapid motion, and has distinctly six joints; the following three pairs appear to have but five joints, the claw or tarsus being absent; the last pair has a very short claw. The last two pairs are the longest, next the second, and next the third pair, this being much shorter than either of those adjoining.

Counting the cephalothoracic organs that are present in these animals, we find only twelve pairs, as follows:—

1. The eyes.
- 2, 3. The antennæ, two pairs.
4. The mandibles.
- 5, 6. The maxillæ, two pairs.
7. The outer maxillipeds.
- 8, 9, 10, 11, 12. Five pairs of legs.

It appears, therefore, that there are normally two pairs obsolete, no trace of which, either through a tubercle, or any other sign, is present. There is, however, in the posterior part of the thorax in males a glassy, reddish-coloured organ, of an eardrop form, as shown in

figure 9 *b*, at *m*, Plate 44. It may be made to extrude by a little pressure, when it appears as in fig. *h*, at *m'*, the extremity being very glassy and rounded, while above it becomes very slender. It proceeds from or lies in a glandular mass, which curves backward into the first abdominal segment, where it meets another glassy organ, globular anteriorly, but is lost posteriorly in a soft glandular mass; it extends backward towards the first pair of abdominal legs. After being removed from the animal for a short time, the anterior of these glassy organs loses its colour, and the fluids within contract somewhat from the interior walls, as shown in figure *m''*. The uses of this organ we have not made out. We have not found it in females. It is seen a little projecting in Thompson's figure of a Lucifer, and it is this prominence which Edwards has supposed to be a rudiment of a leg of a posterior obsolescent pair.

The abdomen consists of seven oblong segments. The sixth is often much longer than the fifth, and in males, at least, has frequently one or two teeth, or processes, either acute or obtuse on its inferior side. The caudal segment is usually shorter than the caudal lamellæ, and often, instead of being straight below, in *males* it has a rounded protuberance; it is furnished with two setules on the inner margin, and has at apex (which is truncate) some shorter setules, with those at the angles usually the longest. There are five pairs of abdominal appendages besides the caudal pair; they have a long base and two narrow multiarticulate ciliate branches, somewhat shorter than the basal portion. The first of these pairs has a protuberance on the anterior margin of the basal portion, which is rudely triangular in outline; it has an articulation, so that it is fitted for prehension; and its extremity shuts upon a small spine situated on the surface of the leg. The second pair has an oblong, narrow, subfalciform appendage at the apex of its basal portion, in addition to the two branches. The remaining three pairs have the usual form, except that the parts are very narrow; the branches are about ten-jointed. In females, all the five pairs are alike in form and structure.

The alimentary cavity is prolonged forward in the antennary segment, nearly to its extremity, in the form of a slender tube, like the intestine. Glands, consisting of short cylindrical sacs, are clustered along near the intestine, in the posterior half of the cephalothorax, which may be the liver; yet, as we could detect them only in females,

it is more probable that they are ovarian. The particles of the blood are distinct.

Lucifer, THOMPSON, Zoological Researches, Cork, April, 1829, Part ii. p. 58; EDWARDS, Crust., ii. 467.

LUCIFER ACESTRA.

Segmentum antennale non rostratum, carapace multo longius. Oculi prælongi, segmenti antennalis dimidio bene longiores, pedunculo tenuiter cylindrico et globo apicali grandi instructi. Segmentum abdominis sextum 5to fere duplo longius, maris dentibus duobus infra armatum, dente antico acuto, postico obtuso et recurvato. Segmentum caudale laminâ caudali internâ duplo brevius, maris, infra gibbosum, gibbosulâ latâ, non obliquè inclinatâ.

Antennary segment much longer than carapax. Eyes very long, much exceeding half of antennary segment, having a slender cylindrical peduncle and a large globular summit. Sixth segment of abdomen about twice as long as fifth, in *males* having an acute tooth below near middle, and posteriorly an obtuse process which is recurved. Caudal segment one-third as long as outer caudal lamina, and half as long as the inner, below gibbous in males, the prominence broad and not obliquely inclined.

Plate 44, fig. 9 *a*, male, enlarged; *b*, anterior half, more enlarged; *c*, side view of caudal extremity in a male; *c'*, caudal segment, upper view; *d*, mandible; *e*, *f*, first and second maxillæ; *g*, outer maxillipeds; *h*, posterior extremity of thorax, showing glassy eardrop organ at *m'*; *m''*, same organ, as it appeared after a short time detached from the animal; *i*, outline of posterior part of thorax of female.

Pacific Ocean, latitude 6° 30' south, longitude 177° east, near Sher-son's Island. Caught twenty individuals, with twenty-four casts of a hand net, at 7 A. M., March 24, 1841.

Length, five-eighths of an inch. Colourless, excepting a little red-

dish purple along the venter and in the eardrop organ, and also the connected glassy organ in first abdominal segment. Length of antennary segment more than eight times its breadth. Inner caudal lamella a fourth shorter than outer lamella; outer, acute at apex, naked on outer margin, ciliate within.

Base of inner antennæ about as long as antennary segment; flagellum half as long as animal, very slender. Scale of outer antennæ slender, a little longer than base of same; flagellum longer than half the animal.

In females found with this species, and believed to be identical with it, the sixth abdominal segment was entire below, without the two teeth above described.

This species has the long antennary segment of the *Reynaudi*; but the eyes are much longer, being in this respect nearer Thompson's species, from which, however, it differs in the relative lengths of its caudal segment and appendages.

LUCIFER REYNAUDI, *Edwards*.

Plate 45, fig. 1 *a*, female, enlarged; *b*, profile of extremity of abdomen of same; *c*, *ibid.* of male; *d*, profile of cephalothorax of male.

Sooloo Sea, Straits of Banca, East Indies.

Length, five lines. The eyes in this species (as represented by Milne Edwards) are not longer than half the length of the antennary segment. This segment is long and slender, being full half longer than the carapax. There is a spine either side at the base of each abdominal pair of legs, but it is not seen in a lateral view. The carapax has a spine on either shoulder, as in other species.

In *males*, the sixth abdominal segment has two prominent teeth or spines below; the anterior is acute; the posterior is always the longer, and is either acute or obtuse, usually the latter. Besides these, there are two minute setules just posterior to the hinder spine. The last or caudal segment is but little more than half the length of the sixth segment, and about two-thirds the length of the outer caudal lamellæ; on its under surface there is a rounded tubercle, which is isolated and prominent, and inclines somewhat backward. Moreover, the males

have the first and second pairs of abdominal legs, as explained in our remarks on the genus.

In *females*, the sixth abdominal segment is entire below, without teeth or spines, and with only the setules observed in the males. The caudal segment is thin, without any protuberance or gibbosity below.

In *one male, about half grown*, the anterior tooth of the sixth segment of the abdomen was obsolete, and the posterior spine was quite short, although of the same general character as to its extremity as in the full-grown males. This intermediate character in an immature male seems to confirm our inference, drawn from the general identity of character and their frequent association, that the animals described as such are actually male and female.

LUCIFER PACIFICUS.

Segmentum antennale carapace paululo longius, utrinque anticè acutum, oculis paulo longius. Segmentum abdominis sextum duobus precedentibus simul sumtis parce longius et lamellâ caudali externâ paululo longius, infra integrum. Segmentum caudale dimidio precedentis brevius, et dimidio lamellæ externæ paulo longius.

Antennary segment slightly longer than thoracic, acute anteriorly on each side. Anterior angles of thoracic segment bearing an acute spine. Sixth abdominal segment a little longer than two preceding together, and somewhat longer than the outer caudal lamella. Last segment half shorter than preceding, and a little more than half the length of the outer lamella.

Plate 45, fig. 2, animal, enlarged.

Pacific, latitude 15° 20' south, longitude 148° west. Collected at 4 A. M., September 10, 1839.

Length, three-tenths of an inch. Colourless. This species is near the *Reynaudii*, but has not so long and slender a cephalic segment. The eyes are clavate and somewhat longer than the part of the cephalothorax, posterior to the antennary segment. The third of the five pairs of legs, as usual, is much shorter than the second, fourth, or fifth

pair, which are nearly equal. The second joint of the last pair is much shorter than the thoracic segment. The basal scale of the exterior antennæ is longer than the eyes, and of the same length as the first joint of base of the first antennæ. The second joint of the base of these antennæ is quite short, not one-fourth the preceding.

The organs of the mouth observed were the same in number as already stated. None of the legs were furnished with palpi, or even rudiments of them, as far as observed; but the first or second pair had a fouette, which was extended back under the carapax, and was kept in constant motion.

Thompson's figure of his species (Pl. 7, fig. 2, Zool. Res.) represents a female, judging from the abdominal appendages; and yet the sixth abdominal segment has two prominent teeth below. In this respect it differs from the species here described.

LUCIFER ACICULARIS.

Segmentum antennale carapace brevius, acutè rostratum et utrinque acutum. Oculi clavati, segmento antennali paululo breviores. Segmentum abdominis sextum valde elongatum lamellis caudalibus valde longius, feminae infra integrum, segmentum caudale lamellæque totæ longitudine vere æquæ.

Antennary segment shorter than carapax, acutely beaked and acute on either side. Eyes clavate, a little shorter than cephalic segment. Sixth abdominal segment much elongate, considerably longer than caudal lamellæ, entire below in female; caudal segment and lamellæ of nearly equal length.

Plate 45, fig. 3 *a*, animal, enlarged; *b*, side view of extremity of abdomen; *c*, dorsal view; *d*, base of posterior legs, with rudiment of a palpus.

Harbour of Rio Janeiro. Collected one specimen, December 25, 1838.

Length one-eighth of an inch. Colourless or whitish. Thoracic segment, in dorsal view, three times as wide anteriorly as antennary

segment, and the two separated by a suture. Abdomen extremely slender; first five segments subequal, sixth much longer, and constricted laterally just anterior to middle. Caudal segment truncate at apex; four apical spinules observed, and four lateral, the anterior of the lateral about one-third the distance from the base to the apex. Caudal lamellæ subequal, and scarcely longer than caudal segment; the outer having a spine at the outer apex, the inner obtuse, both slender. In a lateral view (fig. 3 *b*), the sixth abdominal segment is seen to have two short spines below near the extremity, and one at the superior apex.

The eyes give green internal reflections. Antennæ in the specimen possibly mutilated; first pair consists of four slender joints, first longer than the eyes, the second and third about equal, and each more than one-fourth the first, the last nearly as long as the first. This last joint may correspond to the flagellum, which, as the individual was quite small, might not have been wholly developed. The outer antennæ have a flagellum; the basal scale is slender oblong, longer than the eyes. The posterior legs have a rudimentary palpus at base (fig. *d*).

APPENDIX TO THE MYSIDEA.

GENUS FURCILIA.

Carapax aut breviter rostratus aut fronte truncatus. Oculi breves, symmetrici, aperti. Antennæ internæ bifidæ, basi elongato, articulo primo longo et ad apicem inferiorem longè producto, processu intus subtilissimè spinuloso. Antennæ externæ laminâ basali carentes. Abdominis pedes natatorii; segmentum posticum truncatum apice barbibus non ornatum, spinulis sæpius armatum. Branchiæ nullæ.

Carapax either short beaked, or truncate in front. Eyes short, sym-

metrical, uncovered by the carapax. Anterior antennæ bifid, base long, and first joint with lower apex much prolonged and the process minutely spinulose within. Second antennæ without a scale at base. Abdominal feet natatory. Last segment of abdomen truncate, without a barb either side of extremity, but set with minute spinules. [Possibly young of some species of Eubranchiata or Decapoda.]

The Furciliæ collected by the author were none of them apparently mature. The thoracic members were but partly developed, and the abdominal in many instances were rudimentary. Yet as we know not where to refer them, they are for the present arranged here. They are alike in the inner antennæ, the base being long, and the lower apex of the first joint prolonged, with an acute process as long as the next joint. In this character, they resemble only the *Cyrtopiæ* among the species described, but unlike them the eyes are symmetrical, and the extremity of the abdomen has not the barb either side which characterizes the *Cyrtopiæ*, *Euphausiæ*, and allied species. The two branches of the inner antennæ, as far as observed, consist each of only one or two joints, often not longer than the apical joint of base; and to this simple furcation of the summit the name of the genus alludes. The spinules upon the truncate apical margin of the last abdominal segment are longer at the angles, and of even length along the middle. The exterior antennæ have also a bifid extremity, the branches being one or two-jointed in the species examined. The thoracic and abdominal appendages are without branchiæ. The latter, when fully developed, have the usual natatory form.

The species were mostly found in the open ocean.

FURCILIA MACROPHALMA.

Carapax acutè rostratus, posticè excavatus et ad angulos rotundatus rostro oculis fere longiore. Oculi permagni, orbiculati, thorace parce angustiores. Basis antennarum internarum prælongus, carapace vix brevior; processus articuli primi articulo proximo brevior. Segmentum abdominis posticum lamellis caudalibus dimidio fere brevius, truncatum, nudum.

Carapax acutely rostrate, behind dorsally excavate and angles rounded, beak rather longer than the eyes. Eyes very large, orbicular, but little narrower than thorax. Base of inner antennæ very long, hardly shorter than carapax, process of first joint shorter than the joint following. Last segment of abdomen nearly half shorter than caudal lamellæ, truncate, naked.

Plate 45, fig. 4 *a*, animal, enlarged; *b*, caudal extremity.

Pacific, among the Kingsmills Group, near Charlotte's Island. Collected, April 21, 1841.

Length, between two and three lines. Colourless. First joint of base of first antennæ half whole length of base, and extends about half its length beyond the eyes. Next two joints equal, oblong, a few short hairs at apex of each. Two branches at apex, rather shorter than preceding joint.

Legs of thorax were not full grown; abdominal appendages perfect, natatory, setæ short. A minute, clear globule in a projection at base of five pairs of abdominal legs. The caudal lamellæ in the specimen appeared to be full grown; they were about equal, and nearly twice as long as caudal segment; they were furnished with setæ, as usual, and there was no spine at apex of inner lamellæ. The caudal segment had *no spinules* at apex.

FURCILLA ABBREVIATA.

Carapax acutè rostratus, posticè super dorsum parce excavatus angulisque rotundatus, rostro oculis brevior. Oculi mediocres. Basis antennarum internarum brevis; processus articuli primi articulo proximo longior. Segmentum abdominis postremum elongatum, truncatum, apice spinulosum, spinulis externis longioribus ad angulos contiguè infixis.

Carapax acutely rostrate, beak shorter than the eyes, posteriorly over back sparingly excavate, at angles rounded. Eyes rather small. Base of inner antennæ short, process of first joint longer than joint

following. Last abdominal segment elongate, truncate, spinulous at apex, outer longer spinules situated close together on the angles.

Plate 45, fig. 5 *a*, animal, enlarged; *b*, caudal extremity.

Pacific, Kingsmills Islands, twenty miles north of Charlottes. Collected, April 21, 1841.

Length, one and a half lines. Colourless.

The individual examined was immature, the thoracic legs being all rudimentary, and not even tubercles apparent as representatives of the abdominal appendages, excepting for the two anterior pairs. The first antennæ were very much shorter than the carapax. The first joint extends a little beyond the eyes; and the process at its apex is one and a half times as long as following joint. The caudal lamellæ are also immature, being but half as long as the caudal segment. This segment has the usual length, and is probably quite as long as the lamellæ when they are mature.

FURCILIA MICROPHTHALMA.

Carapax breviter rostratus, posticè transversus, angulis rotundatus, rostro oculis paulo longiore. Oculi parvuli. Antennæ internæ carapace paulo breviores, basi longo, processu articuli primi vix longiore quam articulus proximus, ramis æquis, articulo precedente plus duplo longioribus. Segmentum abdominis postremum lamellis caudalibus longius, prope extremitatem utrinque subito angustatum, spinulis apicalibus æquis minutis, aliis tribus longioribus pone apicem remotis.

Carapax short rostrate, transverse behind, and angles rounded, beak a little longer than the eyes. Eyes quite small. Inner antennæ a little shorter than the carapax, base long, process of first joint a little longer than next joint, branches equal, much longer than preceding joint. Last abdominal segment longer than caudal lamellæ, narrowed abruptly near the extremity, apical spinules equal, minute, three longer remote from apex.

Plate 45, fig. 6 *a*, animal, enlarged; *b*, caudal extremity; *c*, inner

antennæ; *d*, outer antennæ; *e*, second pair of thoracic legs observed; *f*, third pair; *g*, fourth pair; *h*, fifth pair.

Atlantic, latitude 4° north, longitude 20° west. Collected, October 26, 1838, only one individual.

Length, one-seventh of an inch. Colourless; a little reddish near extremity of last abdominal segment. Body slender, narrow. Last abdominal segment rather longer than sixth, linear, narrowed for a short distance from the apex; the longer spinules, instead of being situated at angles of apex, are at the angle where the narrowing takes place, about as far from the apex as the breadth of the segment.

The branches of the inner antennæ appeared to consist of two equal joints; whole length of these antennæ about three-fourths as great as that of the carapax. Only six legs were seen, and these were not mature. For forms, see figures *e*, *f*, *g*, *h*, and the drawing of the animal, fig. *a*. The abdominal appendages were all mature, being perfect natatories, with short setæ.

FURCILIA GRACILIS.

F. microphthalmæ affinis. *Antennæ internæ carapace valde breviores, processu articuli primi longiore quam articulus proximus. Segmentum abdominis posticum truncatum, et ad angulos etiam paululo truncatum, spinulis apicalibus minutis cæquis et ad angulos utrinque unâ longiore, quoque remotiusculis aliis duabus.*

Near *F. microphthalma*. Inner antennæ much shorter than carapax; process of first joint longer than next joint. Last abdominal segment truncate, and angles also slightly truncate; minute spinules at apex, and at angles either side a longer spinule, also, a little distant, two others.

Plate 45, fig. 7 *a*, animal, enlarged; *b*, caudal extremity; *c*, inner antennæ; *d*, outer antennæ; *e*, *f*, *g*, *h*, thoracic legs, in succession.

Atlantic, latitude 0° 30' north, longitude 17° 30' west. Collected, November 1, 1838, at 5 A. M.

Length one-eighth of an inch. Colourless. All legs in individual examined imperfect. Abdominal appendages without setæ (hence immature), excepting first pair. Caudal lamellæ about half as long as caudal segment, and probably not fully developed. First joint of inner antennæ as long as other two of base, straight and stout; the process at lower apex spinulose or serrulate within, branches little longer than preceding joint.

The last abdominal segment readily distinguishes this species from the *microphthalmæ*, the difference being of a kind not obliterated, in all probability, by growth.

Plate 45, fig. 8 *a, b*, represents specimens collected rather abundantly in the Pacific, about three hundred miles southwest of Valparaiso. The last abdominal segment has the same characters, except that it is a little broader posteriorly. The eyes are rather larger than in the above, and the carapax forms a low point between them. The branches of the inner antennæ are not longer than preceding joint. The carapax covers all the thoracic legs, and is broader than in the *gracilis*.

GENUS CALYPTOPIS, Dana.

Carapax non rostratus, oculos tegens. Antennæ internæ furcatae, articulo primo apice inferiore longè producto. Segmentum abdominis posticum truncatum apice pectinatum et lateraliter spinulam gerens.

Carapax not rostrate, covering the eyes. Inner antennæ furcate, first joint with the lower apex prolonged acute. Last abdominal segment truncate and pectinate at apex, and laterally bearing a spinule.

The specimen examined is an immature individual, and may be Macroural or Mysidean. The thoracic legs were but partly developed, and the abdominal were wholly absent. The first antennæ and the last abdominal segment resemble these parts in the *Furciliæ*; except that this segment has a spine on the side near its middle.

The absence of a palpus from the mandible appears to show that the species cannot be young of any of the Palæmonidæ, as for example, the genera *Alpheus* or *Cryphiops*. The caudal segment has the same general form as in the *Furciliæ*, and is without the moveable setæ, which give a barb-like character to this segment in the *Euphausiæ*.

CALYPTOPIS INTEGRIFRONS.

Carapax anticè integer, transversus, oculos omnino tegens, posticè dorso productus et acutus. Antennæ internæ bifidæ, processu articuli primi duplo longiore quam articulus proximus. Segmentum abdominis postremum truncatum, angulis obtusis, extremitate spinulis pectinato, spinulis tribus angulorum posticorum longioribus, latere ad medium spinulum gerente.

Carapax in front entire, transverse, wholly covering the eyes, behind dorsally much prolonged and acute. Inner antennæ bifid, process of first joint twice longer than next joint. Last abdominal segment truncate, angles obtuse, extremity pectinate with spinules, three on the angles longer, lateral margin at middle bearing a spinule.

Plate 45, fig. 9 *a*, animal, enlarged; *b*, upper view, showing eyes beneath carapax; *c*, caudal extremity; *d*, inner antennæ; *e*, outer antennæ; *f*, mandible; *g*, first pair of legs, *h*, second pair; *i*, third pair.

Pacific, north of island of Upolu, six miles from the coral reef. Collected, February 24, 1841.

Length, two lines. Colourless. The spiniform process of the first joint of the inner antennæ extends to apex of base. The two branches are one-jointed, and are much shorter than preceding joint. The outer antennæ have a one-jointed base, and two one-jointed branches; the branches are more than half the length of the preceding portion and terminate in a few long hairs or setæ. Only three pairs of legs were much developed, the others being rudimentary. Abdominal legs not at all developed. Mandible has a denticulate apex and a spiniform process

near inner angle of apex; it has no palpus. Caudal lamellæ not matured, hardly half as long as caudal segment, the outer longest.

ZOEA ECHINUS.

Carapax brevis, valde convexus, et compressus, longè rostratus, et posticè spinâ longiore quam carapax fere horizontali armatus, latere prope medium spini-acuto. Segmentum caudale profunde et acute furcatum, brachiis divaricatis.

Carapax short and very convex, compressed, a long beak and a spine behind nearly horizontal, longer than the carapax, side near middle with an acute process. Caudal segment acutely furcate, the prongs divaricate.

Plate 45, fig. 10 *a*, animal, enlarged; *b*, vertical view of carapax, (showing at 1, the beak; at 2, the posterior spine; at 3, 4, the lateral spines; at 5, 6, the antennæ); *c*, leg of first pair.

Atlantic, latitude 23° south, longitude 41° 5' west. Collected, November 19, 1838.

Length, one-twentieth of an inch. The carapax is very broad and high for its length. The posterior spine arises from near the posterior margin, and the lateral spines from near the middle of either lateral surface.

The eyes are very large, on short peduncles. Abdomen six-jointed, the joints oblong, apical terminating in two long, curved, divergent prongs, having three parallel hairs within, and one on outer margin. The heart was distinct in upper part of thorax, in advance of the dorsal spine. The particles in the blood were rather large and very distinct.

Two pairs of feet large and similar, the terminal portion two-jointed and nearly as long as basal, against which it is usually folded up; it terminates in a few long hairs. Beside this, there is also another branch, consisting of five joints, which is commonly projected outward.

Other legs anterior to these were not particularly examined. They

were in continual motion. The antennæ were four in number, shorter than beak; the superior short and thick, the inferior slender and acute, nearly as long as beak.

ZOEA RUBELLA (young of an *Erichthus*?)

Rostrum longissimum, corpore fere longius, fere rectum, setulis supra, spinulis infra ornatum. Carapax pubescens, spinâ brevi latere et longâ dorso armatus. Segmentum caudale profundè bilobatum, lobis divaricatis lamellatis, subovatis, obtusis, setis posticè ciliatis et apicem spinâ acutâ.

Beak very long, rather longer than the body, nearly straight, with short hairs above and spinules below. Carapax pubescent, armed with a short lateral spine and a long dorsal. Caudal segment deeply two-lobed, lobes divaricate, lamellar, subovate, obtuse, set with setæ behind, and a spine at each apex.

Plate 45, fig. 11 *a*, caudal extremity; *b*, outer antennæ; *c*, mandible; *d*, maxilliped; *e*, ciliate lobed plates seen just anterior to first pair of legs, and supposed to be attached to their base; *f*, first pair of feet; *g*, second feet; *h*, third pair; *i*, fourth pair; *k*, one of four posterior pairs; *l*, liver.

South Atlantic, latitude 24° 45' south, longitude 44° 20' west. Collected, January 10, 1839.

Length, one-sixth of an inch. Colour, in part reddish. The dorsal spine, probably a large one, was broken off near the body in the specimen seen. The carapax had a ridge of short hairs along the back, and also along the abdomen. Abdomen seven-jointed, one under the carapax. Abdominal appendages below short, naked, one of the lamellæ minute. Last abdominal segment triangular, with a deep triangular excavation separating the two lobes. Outer margin serrulate, a rather stout spine at apex, and slender setæ within. Caudal appendages nearly as long as segment; consist of a short basal joint and an oblong oval plate, which is furnished with long cilia. Eyes

very large, situated a little obliquely, on rather short peduncles. Colour of pigment, black, with bright blue reflections from the surface.

First pair of antennæ very short; consists of three joints, of which the first is the largest and longest, the last the shortest; a few tufts of hairs at apex. There is also a short, slender appendage, articulated with inner apex of second joint. Second pair much longer than first pair, two-branched; one, a slender, oblong lamella, acute, furnished with long ciliæ, the other, a little shorter than the lamella, composed of seven joints, of which two are larger than the others, and may be considered a base to the following portion, a flagellum.

Mouth with a pair of stout mandibles and a pair of maxillæ. The mandibles without a palpus; a broad, coarsely dentate trenchant edge at extremity. Maxillæ four-jointed (possibly another basal), the first and second with the inner margin broadly expanded into oblong oval ciliate plates; third joint short; fourth narrow oblong, and terminating in two or three setæ.

Eight pairs of legs observed. The two anterior large, as in preceding species, and similar, the first pair a little the largest: consist of an oblong two-jointed base and two branches; one of the branches five-jointed, the other, of about the same length, multiarticulate, consisting of a basal joint and of nine smaller joints following it. Third pair of legs five-jointed; a short appendage to apex of first joint; fourth pair bifid; following four pairs not observed to be bifid, six-jointed, and usually flexed at the third articulation. All the six posterior pairs are furnished at their base with oblong, curved, conical sacs, which appeared to be branchial; on second pair, there were two or three of these branchiæ to each leg. A lobed plate near base of first pair (fig. e), which is usually in rapid motion.

ZOEA LONGISPINA (young of an *Erichthus*?)

Carapax sat convexus, fere corporis longitudine, rostro horizontali quadruplo longiore quam corpus, spinis duabus posticis minus dimidio brevioribus, totis horizontalibus. Segmentum caudale latè triangulatum, posticè truncatum et setis longis pectinatum.

Carapax convex, almost as long as body, beak horizontal, and more than four times as long as the body, two spines behind less than

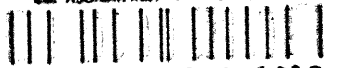
half shorter, all horizontal. Caudal segment broad triangular, truncate behind and pectinate with long setæ.

Plate 45, fig. 12 *a*, animal, enlarged; *a'*, same, natural size; *b*, extremity of superior antennæ; *c*, caudal extremity.

Sooloo Sea, southwest of Mindanao. Collected, February 1, 1842.

The characters of this singular animal, as far as observed, will be gathered from the figures.

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