acute; and when acute, the right side is usually longer than the left, and sometimes inflexed or reflexed. The head is much narrower than the cephalothorax.

The eyes are situated on the anterior angles of a single spot of bright red pigment, which is rather large and nearly square.

The anterior antennæ of the species observed have seventeen to twenty-three joints, and they either curve as they leave the head, and so bend around till the two are in one transverse line; or they pass off straight, but obliquely, then bend abruptly outwards, so as to lie in one line. The tips in one species are a little forward of the general line.

The joints of these organs are short. The second is longer than the first. Generally, after the second, there are four joints (3, 4, 5, 6), nearly equal. Then the antennæ is commonly abruptly smaller, and joints 7, 8, 9, 10, 11, are small and short; 12, 13, 14, 15, 16, 17, gradually increase a little in length; 18, 19 are similar to 17; 20, 21, 22 are a little shorter; and 23, the apical, is longer, or nearly equal to 21 and 22 together. Where the number of joints is less than twenty-three, the order of sequence is of course different; this reduction in the number of joints arises apparently from a coalescence of some of the joints following the second.

In the right male antennæ the geniculating joint precedes the sixth joint from the apex, instead of the fifth, the usual place in the Pontellæ. The two joints next following the articulation are commonly united in one, yet are sometimes separate. The two preceding the articulation are one, and its apical half, or sometimes the whole, has the front margin very minutely pectinate. The four joints next preceding, or joints 12, 13, 14, 15, in the above enumeration, are slightly enlarged and distinct.

The setæ of the antennæ are not over three or four diameters of the organ in length.

The posterior antennæ are two-branched. The shorter branch, as in the Pontellæ, terminates in more than three setæ, and has no setæ on the outer side of the first joint. It is two-jointed, but the second joint is very short. The setæ at the extremity of the longer branch are similar to those of the other Calanidæ.

The mandibular palpus is essentially the same as in the Calani. The maxilla is three-jointed. The second joint is broad, and has a tuft of setæ near its base, and a long pencil at the outer angle. The third joint is small, and terminates in a tuft of setæ.

The maxillipeds are three-jointed, and they are flexed forward between the first and second joints. The second joint is stout and oblong. The third is very short. On the inner side of the third and second there are a few long naked setæ (as long as the first joint), forming together a pencil; and besides, there are on the second joint one or two shorter setæ, a little remote, and one or two still shorter on the inner side of the first joint.

The first pair of feet is small, and as far as examined, straight. They consist of three or four joints with very short setæ on the inner side at apex.

The first four pairs of natatories are similar to those of other Calanidæ.

The fifth pair, or posterior pair of feet, is quite small in females. But in males it is large, and of various forms, adapted more or less perfectly for prehension. The cheliform character is not as distinct as in most Pontellæ. There is usually a curved spine, corneous seta, or stout appendage, proceeding from one side of the main part of the right leg, and as far as observed from the penult joint.

The abdomen has from two to six segments. The first segment (or second, if there are six), has often a spinous process on the right side, projecting outward; but this is not constant for a species. In one individual there was a slender process projecting backward from either side. In some cases this segment or the second is strongly gibbous below.

The caudal stylets are quite short, and have the outer margin arcuate. The setæ form a close pencil, about as long as the abdomen; they are ten in number, and of nearly equal length.

The species of Candace occur within the tropics, and over the different oceans traversed by the Expedition; yet they are not numerous.

Candace, DANA, Amer. Jour. Sci. [2], i. 228; also, Proc. Amer. Acad, ii. 22, 1849, where the following new species are briefly described by the author.

CANDACE ORNATA.

Maris:—*Cephalothorax 5-articulatus, segmentis posticis quatuor, angulis posticis longè acutis, dextro longiore. Antennæ e basi arcuatæ, alioque rectè transversæ, corpore parce breviores, articulo secundo paulum oblongo; setis brevibus, quorum paucis secundo articulo parcè longio-*

ribus, apicali posticâ articuli longitudine, posticâ penultimâ paulo longiore, anticâ penultimâ breviore. Antennarum posticarum ramus minor tenuis, valde brevior. Pes posticus dexter mediocris, articulo ultimo subuncinato, appendice laterali subcorneâ, articulum uncinatum longitudine superante.

Male: — Cephalothorax five-jointed, there being four posterior segments, posterior angles long acute, right one the longer. Basal part of anterior antennæ arcuate, the rest straight, a little shorter than the body, twenty-two or twenty-three-jointed, the second joint a little oblong; setæ short, a few longer than second joint, posterior apical as long as apical joint, posterior penult a little longer, anterior penult shorter. Shorter branch of posterior antennæ slender, and about half as long as the other. Right leg of posterior pair of moderate size, last joint subuncinate, lateral appendage subcorneous, exceeding the uncinate joint in length.

Plate 78, fig. 1 *a*, animal, enlarged; *b*, second pair of antennæ; *c*, palpus of mandible; *d*, maxilla; *e*, maxilliped; *f*, one of the natatories.

Atlantic, latitude 7°–9° north, longitude 21° 40′–24° 15′ west, October 13 and 18, 1838; latitude 6° south, longitude 24° west, November 8, 1838.

The specimens affording the above description, have also the following characters. Last four segments of cephalothorax about two-fifths of the whole length; the first articulation less distinct than the following. Right posterior angle much prolonged and very acute in an upper view. Abdomen four-jointed, last segment shortest. Antennæ a little unlike, the right being slightly incrassate at middle. In many specimens the last eleven joints were black; in one individual only seven were black, and in another only five. The posterior apical seta is about as long as apical joint; the posterior penult is a little longer and the anterior penult shorter. The posterior antennæ have the longer branch broad at base and tapering. Maxillæ furnished at the posterior apex of penult joint with a pencil of setæ half as long as the cephalothorax. Maxillipeds appear to be three-jointed. The first joint nearly twice as long as the second, the third

quite short. The last bears two long naked setæ; a similar seta proceeds from the inner apex of the second joint, and two others from the inner margin of the same joint; there is also one shorter near the inner apex of the first joint. The terminal setæ are about as long as the first joint. Anterior pair of natatory legs the smallest; the fourth pair a little shorter than the third. The longer branch in a natatory leg is three-jointed; there is a short spine at the apex of each joint, and also two on one margin of the last joint, besides minute serratures; the one at the apex is a little curved at its extremity. Shorter branch not half the length of the other, two-jointed. The posterior feet are slender, not longer than the posterior natatory. The last joint is hooked. The second bears at its apex a stout corneous seta, which extends beyond the apical hook.

The body is banded with black at each of the articulations. Besides this, part of the antennæ, the last joint of the longer branch of the natatory legs, and the right posterior angle of the thorax, are black. There were also black lines forming two concentric and nearly triangular figures in the anterior half of the cephalothorax above; and four black spots, two in advance of the lines just referred to, and two near the posterior angles of the anterior cephalothoracic segment. This arrangement of the colour is not constant.

Candace pachydactyla.

Maris:—*Cephalothorax* 4-*articulatus, angulis posticis longè acutis et setâ minutâ extus instructis. Antennæ anticæ fermè corporis longitudine* 23-*articulatæ, e basi arcuatæ, deinde rectè transversæ; dextrâ* 21-*articulatâ, medio incrassulatâ, articulo geniculationem precedente valde elongato, et versus apicem subtilissimè pectinato, sequente non breviore. Antennarum posticarum rami longitudine subæqui. Pes posticus dexter crassus, apice rotundatus, appendice laterali crassè falcatâ, obtusâ.*

Male:—Cephalothorax four-jointed, posterior angles long acute and having a minute seta on the outer side. Anterior antennæ as long as the body, twenty-three-jointed, arcuate from the base, then straight; the right, twenty-one-jointed; joints twelve to fifteen, a little enlarged, the next, or that preceding the geniculation, quite long, very

finely pectinate on the apical half, the following of the same length, the following four short. Branches of the posterior antennæ nearly equal. Right leg of the posterior pair of feet quite stout, rounded at apex, lateral appendage very stout falciform, obtuse.

Plate 78, fig. 2 *a*, animal, enlarged; *b*, right posterior thoracic foot. Fig. 3 *a*, probably female of the same; *b*, extremity of anterior antennæ.

Atlantic, latitude 11° south, longitude 14° west, May 7, 1842; latitude 4½° south, longitude 25° west, May 13, 1842; May 9, latitude 8½° south, longitude 15° west; May 16, latitude 1° south, longitude 30° west; also, China Sea, three hundred miles northeast of Singapore, February 17, 1842.

Length, one-twelfth of an inch. Colour, smoky, with black bands about the cephalothorax; the extremities of the antennæ and some of the natatory legs also black. This species resembles the *ornata*. But the right leg of the posterior pair of the male is very different; the right male antenna differs in the joints either side of the geniculating articulation; the branches of the posterior antennæ are nearly equal. The abdomen is five-jointed; the first segment has a sharp spinous process on the right side.

The figure of the female is drawn from a specimen collected in the China Sea, with which the Atlantic specimens appeared to be identical. This specimen has also the following characters:—Tips of posterior angles of cephalothorax, bent outward a little (they are rather inflexed in the other figure). Posterior joints of cephalothorax four in number. Coloured nearly as the above.

Figure 4 *a*, Plate 78, represents a male specimen, from the Straits of Banca, east of Sumatra (collected, March 1, 1842), which may possibly belong to the same species with the last, and both may be of different species from the specimen first described above. It is rather slender, the abdomen very slender, five-jointed, segments without any lateral process; but first segment a little enlarged on the right side. Antennæ about as long as body, not thrown as far forward as in the female above, with second joint shorter, and not having so large a curvature at base. Apical joint (fig. 4 *b*) not as long as the two preceding.

Colour of specimen smoky, but not black in any part. Joint of anterior antennæ preceding geniculating articulation (fig. 4 *c*) as long as two preceding joints together, and minutely pectinate on apical half; following this, six joints distinct, short, the first and last of the six longest.

CANDACE ETHIOPICA.

Maris:—C. ornatæ *antennis anticis et cephalothorace affinis. Cephalothorax 4-articulatus. Antennæ anticæ e basi arcuatæ, articulo antennæ dextræ articulationem geniculantem precedente omnino subtilissimè pectinato. Antennarum posticarum ramus minor parvus. Pes posticus dexter subclavatus, obtusus, setâ elongatâ, appendice laterali setaceâ, longâ, corneâ, flexâ.*

Male:—Near the *C. ornata* in the anterior antennæ and cephalothorax. Cephalothorax four-jointed. Anterior antennæ about as long as the body, twenty-three-jointed, arcuate from the base, then straight, the right twenty-one-jointed, as in the *pachydactyla*, sixteenth joint (or that preceding the geniculating articulation) throughout very finely pectinate. Branches of the posterior antennæ very unequal. Right foot of posterior pair rather stout subclavate, the last joint elongate, obtuse at apex, seta long, lateral appendage long and slender, setiform, a little sinuous, not acuminate.

Plate 78, fig. 5 *a*, view of animal, enlarged; *a'*, extremity of anterior antennæ; *b*, view of geniculating joint; *c*, eyes and pigment; *d*, maxillipeds; *e*, first pair of legs; *f*, posterior thoracic pair of feet, the right foot in front.

Pacific, latitude 18° south, longitude 124° 15′ west, August 8, 1839.

Length, one-twelfth of an inch. Colour, mostly black; abdomen colourless; natatory legs and anterior antennæ, black, excepting the base; extremity of right posterior angle of cephalothorax, black. The posterior thoracic feet and anterior and posterior antennæ afford decisive distinctive characters for this species, although it is similar to the preceding in most other characters. The abdomen is six-jointed, the

first nearly obsolete. The right posterior angle of the cephalothorax is the longest. The beak has below two rounded prominences. The feet following the maxillipeds are small and slender, three-jointed, the last joint having very short reversed seta.

CANDACE CURTA.

Maris:—C. ornatæ *similis. Cephalothorax* 5-*articulatus, posticè acutus. Antennæ anticæ corpore parce longiores, e basi arcuatæ; articulis* 13, 14, 15, 16, 17 *antennæ dextræ incrassulatis, articulo* 17 *elongato apice prominulo, partim subtilissimè pectinato, sequentibus sex brevibus, et tenuissimis. Pes posticus dexter apice subulatus, appendice laterali curtâ, spiniformi.*

Male:—Near the *C. ornata.* Cephalothorax five-jointed, last segment short, posterior angle long acute. Anterior antennæ a little longer than the body, twenty-two- or twenty-three-jointed, arcuate from the base, and then straight; the right one slightly enlarged at middle along the joints 13, 14, 15, 16, 17, seventeenth joint elongate, very finely pectinate on the apical half, apex slightly prominent, the following joints (following the geniculation) six in number. Right foot of posterior pair slender, acute, subulate, subuncinate at apex, lateral appendage having the form of a short spine.

Plate 78, fig. 6 *a*, animal, enlarged; *a'*, extremity of anterior antenna; *b*, maxilliped; *c*, right leg of posterior pair (not quite complete); *d*, left, ditto.

Pacific, about three hundred miles southwest from Valparaiso, latitude 50° 20′ south, longitude 81° 30′ west, April 10, 1839.

Length, one-twelfth of an inch. Nearly colourless, except the extremities of the natatory legs which are black, and also, the extremities of the antennæ, and of the acute posterior angles of the cephalothorax.

This species is near the preceding, but is peculiar in its posterior thoracic feet, and some other points. The right posterior angle of the cephalothorax is longer than the left and bent inward. The abdo-

men is five-jointed, the first segment with an acute spinous process on the right, and the last very short. The last four joints of the anterior antennæ increase in length to the last. The smaller branch of the posterior antennæ terminates in five setæ. The pencil of hairs of the maxillæ, directed backward, is much shorter than in the *ornata*.

The maxillipeds have two short stout setæ on the inner margin of the first joint, two on the inner margin and one at the apex of the second joint, and two to the last joint.

CANDACE AUCTA.

Feminæ :—*Cephalothorax* 5–6-*articulatus, posticè subacutus aut obtusus. Antennæ anticæ fere corporis longitudine* 17–18-*articulatæ, e basi arcuatæ, apice prorsum parcè flexo, articulo secundo longo et crasso. Abdomen* 2–3-*articulatum.*

Female:—Cephalothorax five- to six-jointed, head not separate, posterior angles obtuse or subacute. Anterior antennæ nearly as long as the body, seventeen- or eighteen-jointed, slightly arcuate from the base, tips bent a little forward, second joint long, stout. Abdomen two- or three-jointed.

Plate 78, fig. 7 *a*, animal, enlarged; *b*, extremity of anterior antennæ.

Pacific, latitude 9° south, longitude 174° west, near Duke of York's Island, January 26, 1841; also, near Hall's Island, Kingsmill Group. April 14, 1841; also, in the Sooloo Sea, January 28, 1842.

Length, one-twenty-fourth of an inch. Body, slightly brownish black; natatories, black or brownish black; antennæ, dark colour, except basal portion. The two antennæ, after the curve at base, are nearly in the same straight line, very slightly advanced beyond it; the apical joint is bent a little forward out of the line of the antenna; most of the setæ are three or four diameters of the joints in length; apical joint longest; penult three-fourths the apical in length; antepenult one-third the apical, and a little shorter than the next preceding. Length of second joint of the antenna three or four times its diameter.

Candace truncata.

Feminæ:—*Cephalothorax posticè truncatus. Antennæ anticæ corporis longitudine, e basi oblique projectæ, deinde prope articulum sextum flexæ, postea rectè transversæ et tenuissimæ; articulo secundo crasso, non longiore quam articulus tertius quartusve.*

Female:—Cephalothorax having the posterior angles truncate. Anterior antennæ very nearly as long as the body, twenty- to twenty-two-jointed, straight at base and oblique, then bent outward at an angle, quite straight and very slender; second joint stout, not longer than third or fourth.

Plate 78, fig. 8 *a*, animal, enlarged; *a'*, extremity of anterior antennæ; *b*, maxilliped; *c*, posterior thoracic leg; *d*, profile of abdomen.

In the Pacific, off Upolu, Samoan Group, February, 1841; near St. Augustine Island, March 25, 1841; just south of Kingsmill Islands, latitude 6° south, longitude 176° east, April 1, 1841; also, in the Sooloo Archipelago, February 2, 1842.

Length, one-twelfth of an inch. Nearly colourless; a slight ochreous tint, scarcely perceptible.

The first third part of the two antennæ diverge from one another at an angle of about 100°; after this, both are flexed outward, and the two lie in the same straight line. The joints of the basal part are uneven, rather stout, and the second, third, and fourth of nearly equal length. Joints at the extremity of the antennæ nearly as in the preceding species. The maxillipeds have two very short setæ on the first joint. The posterior thoracic legs are quite small, with a few short setæ at apex. The abdomen is four-jointed, the second segment much the longest, and stout gibbous below.

Genus ACARTIA, *Dana*.

Quoad rostrum, oculos, cephalothoracem, maxillipedes, pedes anticos, antennas posticas, Pontellis *affines. Antennæ anticæ irregulariter seti-*

gerœ, valde flexiles, setis sœpe longiusculis, quaquaversum insistentibus, antennâ dextrâ maris non (?) *geniculatâ. Pedes postici obsolescentes, uni-articulati, duabus setis valde inœquis et divaricatis instructi. Setœ caudales mediocres.*

Like the *Pontellœ* in the beak, eyes, cephalothorax, maxillipeds, anterior feet, and posterior antennæ. Anterior antennæ irregularly setigerous and very flexible; setæ often rather long, and turned different ways; the right of the male antennæ of first pair not (?) geniculate. Posterior feet obsolescent, one-jointed, furnished with two very unequal setæ, which are much divaricate. Caudal setæ moderately long.

The longish setæ of the antennæ and especially their pointing in different ways, instead of being arranged along the anterior margin, give these species quite a different aspect from the Pontellæ. Moreover, the longer seta of the rudimentary posterior legs is seen in a vertical view projecting from the extremity of the thorax, either side of the abdomen. The male right antenna is probably without a geniculation, this character being compensated for by these organs being quite flexible throughout. Yet, I am not altogether confident that any of the specimens examined were males. The inferior and superior eyes are the same as in the Pontellæ. The cephalic segment is often distinct. The species observed were found with the Pontellæ and Calani in the open seas of the torrid and temperate zones.

The name Acartia is from the Greek ακαρτος, *unshorn*, and alludes to the irregular arrangement of the setæ of the anterior antennæ.

Acartia, DANA, Amer. Jour. Sci., [2], i., 227, and Proc. Amer. Acad. Sci., ii. 25, where the following new species are briefly described by the author.

ACARTIA LIMPIDA.

Gracilis. Frons triangulatus. Cephalothorax posticè obtusus, 5-articulatus, capite discreto. Antennœ anticœ latè divaricatœ, rectiusculœ, vix corporis longitudine, 7–8-articulatœ, articulis ultimis tribus brevibus, precedentibus longis; setis prœlongis, penultimâ posticâ dimidio breviore quam apicales. Styli caudales oblongi, tenues, setis divaricatis.

Slender. Front triangular. Cephalothorax obtuse behind, five-jointed, head separate, unarmed. Anterior antennæ widely divaricate, nearly straight, scarcely as long as the body, seven- or eight-jointed, last three joints short, three preceding much elongate and subequal; setæ long, anterior penult short, posterior penult twice longer, and half shorter than apical. Caudal stylets oblong, slender, setæ spreading.

Plate 79, fig. 2 *a*, animal, enlarged; *b*, one of the posterior thoracic legs.

Collected several individuals off Patagonia, January 14 and 15, 1839, latitude 31½°–32° south, longitude 48½°–49½° west.

Colourless and limpid, a little purplish along the venter. The three posterior segments of the cephalothorax are about one-third the length of the whole; the last longest. The posterior feet or appendages to this last segment are very short, and bear two setæ; one quite long and a little curved, the other less than a fourth as long. The inferior eyes have a light red pigment. The superior are either connate or approximate; it was difficult to see them, on account of the pigment of the inferior eyes directly below, on which they were projected in an upper view. The anterior antennæ have seven distinct joints, with an appearance of another near the base. The setæ are mostly a third the length of the organ. The last three joints are together hardly longer than the one next preceding, and they may be viewed as forming a single joint: there are two long setæ at apex, directed forward and outward, and two others directed straight backward; and one long seta proceeds from the posterior apex of the fourth joint from the apex. The long joints of the antennæ are indistinctly subdivided. The caudal stylets are longer than twice their diameter: the setæ are about as long as the abdomen. The abdomen is three-jointed; but the first segment is sometimes very short, or is quite concealed. Of the four pairs of natatories, the first and last are a little shorter than the others. There were two oval glands in the thorax, within the penult joint, and partly in the preceding, corresponding to the blue glands in the Pontellæ; they are probably ovarian.

ACARTIA NEGLIGENS.

Gracillima. Frons triangulatus. Cephalothorax angustus, posticè minutè apiculatus, capite fere discreto. Antennæ anticæ fere corporis longitudine, tenuissimæ, latissimè divaricatæ, apicibus fronte paulo anterioribus, 7–9-articulatæ, articulis tribus ultimis brevibus: setis prælongis, posticâ penultimâ apicales æquante. Styli caudales tenuissimi, oblongi, setis latè divaricatis.

More slender than the *limpida*. Front obtusely triangular. Cephalothorax narrow, obtuse behind but having a very minute point, the head faintly separated. Anterior antennæ nearly as long as the body, very slender, very widely divaricate, tips a little anterior to the beak, seven- to nine-jointed, last three joints short, setæ very long, the apical long, the penult anterior quite short, posterior penult as long as the apical, antepenult very short. Caudal stylets very slender oblong, setæ much spreading.

Plate 79, fig. 3 *a*, animal, enlarged; *b*, posterior part of body, in profile, the caudal setæ removed, enlarged; *c*, second pair of antennæ, more enlarged.

Pacific, near Hopper Island, Kingsmill Group, latitude 0° 30′ north, longitude 174° east, April 15, 1841; also, May 17, 1841, in latitude 27½° north, longitude 171° east.

Length, one-tenth of an inch. Colourless.

This species resembles the preceding, but is more slender. The antennæ are thrown less forward, the two being nearly in the same straight line; the third joint from the extremity is the shortest; the preceding are long and slender. In one or two of the long joints there are appearances of an articulation, but so faint as to be quite uncertain. The setæ of the antennæ are in general above one-third the length of these organs; the seta at the posterior apex of the penult joint is of the same length; those of the antepenult joint are not longer than the joint. The short spine at either posterior angle of the cephalothorax is seen only under a high magnifying power.

ACARTIA TONSA.

Frons rotundatus. Cephalothorax posticè obtusus, 6-articulatus, capite discreto. Antennæ anticæ multiarticulatæ, rectæ, apicibus fronte non anterioribus, setis plerumque brevibus, paucis longiusculis (3–4 *articulos simul sumtos longitudine æquantibus*). *Antennæ posticæ pertenues, ramo uno triplo longiore. Styli caudales perbreves.*

Front rounded. Cephalothorax obtuse behind, six-jointed, head separate, posterior segments three, and subequal. Anterior antennæ many-jointed, straight, as long as the cephalothorax, the tips not in advance of the front, near the base bent at an angle, and from thence straight, apical joint minute; setæ mostly short, apical and two or three others nearly as long as one-fourth the antenna; posterior antennæ slender, one branch three times the longer. Caudal stylets very short, but a little oblong.

Plate 79, fig. 4 *a*, enlarged; *a'*, extremity of anterior antenna, more enlarged; *b*, posterior antennæ, ditto; *c*, palpus of mandible; *d*, maxill.; *e*, maxilliped; *f*, first pair of feet; *g*, eyes.

Collected in Port Jackson, New South Wales, March, 1840.

Length, one-eighteenth of an inch. Colourless. The front of the head is scarcely at all prominent between the anterior antennæ. These antennæ at the fourth joint bend directly out, and each falls slightly back of a common straight line. At the bend there is a longish seta, another on the fifth joint from the apex, one a little shorter on the anterior side of the second, and a much shorter one on the posterior side of the same joint. The setæ of the last and the penult joint are nearly equal, that of the posterior antepenult is of the same length or a little longer, but the anterior antepenult, and both on the joint next preceding, are quite short. The third joint from the apex is longer than the fourth or second. The caudal setæ are not quite as long as the abdomen. The length of the abdomen little exceeds one-third the cephalothorax. The eyes are situated on a single quadrate spot of pigment, which is rather large.

ACARTIA LAXA.

Gracilis. Frons rotundatus. Cephalothorax 4-articulatus, capite non discreto, posticè longè acutus. Antennæ anticæ rectiusculæ usque ad basin, corpore paulo longiores, nusquam fronte anteriores, multiarticulatæ, articulo primo longiore, setis longiusculis, valde inæquis. Abdomen breve. Styli caudales paulum oblongi, setis latissimè divaricatis, abdomine non longioribus.

Slender. Front rounded. Cephalothorax four-jointed, head not separate, long acute behind. Anterior antennæ a little longer than the body, nearly straight even from the base, tips not anterior to the front, many-jointed, first joint longest; setæ of moderate length, the longest about one-fourth as long as the antenna, others quite short, the apical rather long. Abdomen short, three-jointed. Stylets small, a little oblong, setæ very widely spreading, not longer than the abdomen.

Plate 79, fig. 5 *a*, animal, enlarged; *b*, outline of head, showing the superior eyes, and the two lenses with the pigment of the inferior eyes directly below; *c*, posterior thoracic appendages.

Several specimens were collected in the Sooloo Archipelago, February 2, 1842; also, in the Straits of Banca, March 2, 1842.

Length, one-fifteenth of an inch. Colour, bluish.

The anterior antennæ have a lax appearance, owing to a slight irregularity of direction, and the position and inequality of the setæ. They are in the same straight line nearly, even from the base. The first joint of the antennæ (or the first observed) is as long as the next four joints; the longer apical setæ about equal in length the last six joints. The thorax behind has a slender spiniform prolongation on either side. The caudal setæ are so widely spread, that the flabellum they constitute is much broader than long. The second pair of antennæ has the branches very unequal, the shorter and its setæ together but little exceeding in length the longer without its setæ. The eyes are situated quite close to the front, and the mass of pig-

ment is large; the two are nearly separate. The appendages to the posterior part of thorax (fig. *b*) are as in the preceding species.

Genus PONTELLA.

Rostrum infra rigide et acute furcatum. Oculi inferiores et superiores, pigmentis horum sive connatis sive disjunctis. Antenna antica maris *dextra articulo geniculans. Antennæ posticæ birameæ, ramo minore setis quinque apicalibus sæpius confectum. Cephalothorax 4–7-articulatus. Maxillipedes crassi et recti, pedibus anticis majores, setis longis spinulosis antice armati. Pes posticus* maris *dexter crassus, prehensilis. Setæ caudales mediocres.*

Beak short and acutely furcate below. Eyes both inferior and superior, the pigments of the latter either connate or disjoined. Anterior right antenna of male having a geniculating joint. Posterior antennæ two-branched, smaller branch ending, with rare exceptions, in five setæ. Cephalothorax four- to seven-jointed. Maxillipeds stout and straight, larger than anterior feet, armed anteriorly with long spinulous setæ. Posterior right foot of male prehensile. Caudal setæ of moderate length.

The Pontellæ are remarkable for the geniculating joint of the right antenna; the stout prehensile form of the right posterior foot; the straight and stout maxillipeds, with long setæ; the inferior as well as superior eyes, and the frequent disjunction and remoteness of the two superior; the frequent obliquely forward projection of the anterior antennæ.

Cephalothorax.—A cephalic segment—the part of the cephalothorax pertaining to the eyes and two pairs of antennæ—is usually separated by a suture. Closely similar species, however, may differ in this particular; and it is even probable that the sexes may be in this respect unlike. On this point, compare *P. hebes* with those related to it. The subdivisions of the cephalothorax posterior to the cephalic segment are illustrated on page 1024. The posterior angles may be obtuse or acute, and often the right point is longer than the other.

The beak is strongly furcate. A suture may be observed at its

base, as shown in figure 6 *a*, Plate 82, representing *P. valida*, and the beak admits usually of slight motion at this suture. In some species, the beak is very much inflexed, and in others it is directed downward simply; in the latter, the front in an upper view is more or less pointed or triangular.

Eyes.—The superior eyes have each a distinct spherical lens; the pigment is either blue-black or carmine-black. The pigment of the inferior eyes forms a circular or elliptical or reniform spot, behind or between the superior eyes, as seen in an upper view through the head. Sometimes it is so beneath the superior eyes as hardly to be distinguished in this view. The existence of this pigment seems to show that these are true eyes; yet, we cannot but recall the dark "eye-spot" in the front of a Daphnia, which has been shown by Schödler to contain otolites, and therefore to be the ear of the animal.*

In the Calanoid species, resembling Calanus in the transverse position of the anterior antennæ and the *three* terminal setæ of the smaller branch of the posterior antennæ, the inferior eyes are very small.

Anterior antennæ.—The *anterior antennæ* vary in the number of joints from nine to twenty-four, which last is probably the normal number. The setæ are arranged along the front margin, as in the Calani.

The *first* joint has usually a very short seta or two at apex. On the second there are a few quite short setæ on the front margin, and generally one or more longer at apex, varying from a length of *one* diameter of the joint to *three* diameters, seldom *four*. Beyond the second, for some distance, the setæ are often crowded (the joints being short), and they are a little longer than those along the middle of the antenna. There is sometimes a minute fringe on the posterior side of the antenna, extending from the second joint through half the length of the organ.

The *right male antenna* has a geniculating joint at the fifth or sixth articulation from the apex, as described in our general remarks on the Calanidæ, and illustrated on Plate 70, figs. 26 to 36.

In a few species resembling the Calani, the right antenna scarcely differs from the left, except in the geniculating articulation itself, and a very slight enlargement along the middle portion.

* Archiv für Naturgeschichte, 1846, p. 301.

The anterior antennæ in the more typical species are generally very nearly straight, excepting the outward curve at base, and sometimes a forward curve at tip; and they usually extend obliquely outward, with the extremities much in advance of the line of the beak. Sometimes the two make an angle between them less than 60°. The angle of divergence is an important characteristic of species.

In the few Calanoid Pontellæ the antennæ have the double curvature of the Calani, and the tips are behind the line of the beak.

The length of the antennæ varies from *three-fourths* of the length of the *cephalothorax*, to *one and a half times* the length of the *whole body*. In some species, with the antennæ shorter than the cephalothorax, the joints are few and rather long (9 to 13); but in others they are 18 to 24, and the joints are consequently short.

Posterior antennæ.—The posterior antennæ consist of a *basal* joint, stout and rather short, and two branches. The longer branch has the first joint oblong, and the second quite short, and often appearing double, or, at least, bilobate, each lobe bearing a tuft of long setæ; or, if the lobes are not distinct, all appearing as a single tuft. There are sometimes one or two setæ on the back of the first and second joints. The shorter branch is also two-jointed, but, unlike the Calani, the joints are commonly very unequal, and sometimes the apical is extremely short. The Pontellæ are further unlike the Calani in having about five long setæ at the apex of this branch, and none on the margin of the first joint.

In some Calanoid species, the joints of the accessory branch are nearly equal, the apical setæ are three in number, and the side setæ exist precisely as in the Calani. In those least Calanoid, the branches are very unequal. This inequality increases almost regularly with the more forward position of the anterior antennæ; and where these antennæ diverge at 60° or less, the accessory branch is but a fourth the other, or even less than this, becoming almost rudimentary.

These antennæ are used as in the Calani.

Mandibles.—The mandibles are stout and corneous, with a dentate edge. There appear to be *six* acute teeth on the cutting edge, besides a *seventh*, situated a little out of the plane of the others, and in the natural position of the parts, more interiorly. The remaining part of the organ, called the palpus, consists of a large oblong basal joint and

two short branches. The branches are one- or two-jointed, and long setigerous (figs. 60, 61, Plate 71).

Maxillæ.—The maxillæ are more or less lamellar. There is an irregular basal joint, bearing stout setulose setæ on the interior side, and also longer setæ on the opposite side. This basal portion bears a lamellar palpus, consisting of an oblong joint, broad at base, but abruptly narrowed near middle, where there is a one-jointed lateral branch, besides often having a single articulation near the extremity. The palpus has long setæ at apex.

Maxillipeds.—The maxillipeds consist of three very stout joints, forming a line at right angles with the body, slightly flexed, and admitting of motion only in the direction of the body. They are crowdedly furnished on the anterior side with a number of stout and long spinulous setæ, those of the third joint being the longest. They extend forward to the mouth or a little beyond it, and constitute a kind of scoop-net for collecting the food of the animal (fig. 77, Plate 71, and Plates 79, 80, 81).

First pair of legs.—These organs, so largely developed in the Calani, are here smaller than the maxillipeds. They have commonly two rather stout joints, bearing a few unequal spinulous setæ, resembling the setæ of the maxillipeds. Besides these, there is a second branch, which is slender, and consists of three to five naked joints. This branch is large in the Calani, and constitutes the organ, the other being obsolete. It appears to be the outer branch, while the other is the inner.

In the Calanoid Pontellæ, the maxillipeds are but little larger than the first pair of legs.

Natatory legs.—These are two-branched, from a stout base; the longer branch is two- or three-jointed, usually three in adults; and the shorter is one- to three-jointed (Plate 82, fig. 6 *d*, *e*). They are furnished with setæ at the extremity and on the inner side, while at the apex of each joint there are one or two short spines, besides one or two others on the outer side of the last joint.

The four pairs of natatories are similar in characters. The first is usually the shortest, and the second and third the longest.

Posterior feet.—The posterior pair of thoracic feet in the female is usually quite small or nearly obsolete and naked, though occasionally approaching the size of the first pair of natatories. The two are often a little unequal, with slight differences at times in the terminal spine or seta, but without anything very marked in form.

In the males, the left is small, something like those of the female. The right terminates in a large cheliform hand. The carpus is a stout oblong joint. The hand is large, and of a very different shape in different species. It is articulated with the inner apex of the carpus, and when at rest, it folds back against the inner margin, so as to lie between the carpus and the left leg. The basal extremity is prolonged outward into a spine, or bears a spinous process, which answers to a thumb or immoveable finger; it is short, or very long, according to the species. At the opposite extremity there is an oblong finger, sometimes very stout, sometimes like a long claw, and sometimes having a spoon-shaped or spatulate extremity. It closes against the thumb, and between the two when closed together there is usually a space of considerable size. The inner margin of the finger, and also of the hand, is at times furnished with one or two setæ or spines, or with short villi (Plate 82, fig. 6 *f*).

Abdomen.—The abdomen has from two to five segments. The number is not constant in the same species. It is probable, that it increases with the later metamorphoses, as we have observed only two segments in smaller individuals of a species, in which those of full size had four. The relative sizes also vary. In some species the female has but *two* or *three* joints, when the male has *four* or *five;* and the form of the abdomen in the female may be gibbous or ovoid, when it is regularly terete or decreasing in the male. Five is a common number for adult males, and is not frequent in females.

It is often the case also that the abdomen is distorted. Sometimes one of the joints is widened on one side by a process, and yet this character is confined to a few individuals of a species. This takes place usually on the right side, though not always so; and it is observed in both sexes. When there are five joints, it is commonly the *third* joint that is modified. Sometimes the abdomen is gibbous above, and occasionally so below.

On account of these strange variations, it is difficult to draw satisfactory specific distinctions from the abdomen. Yet, when we are

confident of having the adult form, the characters probably admit of being employed.

Caudal stylets.—The stylets are never as long as the abdomen, and are sometimes shorter than their breadth. In some species, they appear to be constantly diverged, while in others they are parallel. There is usually a slight pubescence on the inner margin. They bear at apex five plumose caudal setæ: the second is the longest, as in the Calani, being usually about as long as the abdomen, though sometimes excceding it; occasionally it is nearly twice as long as the other setæ. In a few species, the outer seta proceeds from the outer side of the stylet, near its middle. There is also a minute inner seta, which is commonly bent, making the whole number six, as elsewhere stated.

Eggs.—Out of the thousands of Pontellæ, collected through the Atlantic, Pacific, and Indian Oceans, during three and a half years of investigation, I did not succeed in capturing one with a bag of eggs attached; and it is therefore probable, that the eggs are extruded directly from the body, without forming an external ovarian sac. Some of the females, however, contained internal ovaries which were very distinct. They extend up the cephalothorax on either side, from the abdomen to the mouth or beyond it, and the two lines, which are irregularly flexed or convoluted, are united just posterior to the mouth, after which they are disunited and continued on separate. Glands evidently seminal, having the same position, were observed in some males.

In many species, oblong blue-black glands occur either side of the medial line in the posterior part of the cephalothorax; and often there is a second pair, a little in advance; and in other species, the line is farther continued, with or without interruptions. These are evidently portions of the ovarian organs in females, or of the spermatic in males; although, differing in their depth of colour from glands distinguished in other cases as of this character. On the death of the animal, the blue colour after a while spreads, and gives an indigo tint to the adjoining parts of the animal.

Colour.—Sea-blue and purplish blue are the prevailing tints of the Pontellæ: yet, there are some colourless species. Moreover, some

individuals of a species may occur colourless, while others are deeply coloured. Some deep green and yellowish species were observed; also, a few reddish, or pale umber. Several have a silvery, or pearly white back, which presents a bright appearance in the water. One yellowish individual was crossed by an elegant crimson band of great breadth, presenting a beautiful effect. The blue species commonly have the alimentary canal green or greenish, which shows through along the middle of the cephalothorax; in a few species it has a brownish colour.

In some instances, the tips or bases of the anterior antennæ, the bases of the caudal setæ, and some other organs are coloured.

Size.—The adult Pontellæ usually vary in size, from one line to half a line. There are many species as long as an eighth of an inch, and a single one was found which measured one quarter of an inch in length. The length, as here given, includes the distance from the beak to the extremity of the abdomen, *exclusive* of the caudal stylets; and this is always our use of the term in the descriptions following. The common proportions between the length and breadth of the cephalothorax, is as 3 to 1. There are slender species with the ratio 4 to 1, and stout species with the ratio 2 to 1 and 1¾ to 1. The abdomen is commonly one-third to one-fourth the length of the cephalothorax, and never exceeds or hardly equals one-half its length.

Habitat.—The species of Pontellæ are widely distributed through the oceans. The hand-net was seldom used without bringing up some individuals, especially when the time just before daylight was devoted to this kind of fishing. In these respects, and also, in their greater abundance near the surface in calm weather, they are like the Calani. They are, however, much less common than the Calani in the higher latitudes, being mostly confined to the seas between the parallels of 30° either side of the equator.

The specimens often have the setæ of the antennæ and caudal stylets mutilated, especially the latter. In some instances, not more than one specimen in thirty had the caudal setæ entire. Sometimes all the setæ of the antennæ are broken off, and give a false character to these organs, calculated to lead to error in description.

Affinities.—The relations of the Pontellæ to the Calani have been

mentioned in the course of the preceding remarks. When the anterior antennæ have the double curvature of the Calani, falling back behind the line of the beak, the inferior eyes are quite small, the right male antennæ, though geniculant, is but little different from the others in form and number of joints, and in the posterior antennæ the accessory branch is but little the shorter, nearly equi-articulate, and terminates in but three setæ, with others along the side of the first joint. From this condition, there is a gradual change to those in which the antennæ are oblique forward in position, and all the Pontella characters are strongly brought out.

This genus was instituted by Milne Edwards, in 1828, under the name *Pontia*, by whom three species have been described. As this name was given by Fabricius long before to a genus of Lepidoptera, another branch of the Articulata, it becomes necessary to change it, and the word *Pontella* is therefore substituted. It was first proposed by the author in 1846 (Amer. J. Sci. [2], i. 228).

The genus *Irenæus* of H. Goodsir (Jameson's J., xxxv. 337) is identical with Pontia. This author has given detailed figures, and he represents the inferior eyes, observing that the organ is an organ of vision, but not distinguishing, in his description, the superior from the inferior, although the former are figured in the back view given in Plate 6, figure 15. The species *Irenæus splendidus* is near *P. detonsa* and *P. margaritacea*, though evidently different. *Anomalocera* of Baird (Brit. Entomost., 229) is another name given to the *Irenæus splendidus*.

This genus may be conveniently subdivided into three subfamilies:

1. CALANOPIA. — Including the Calanoid Pontellæ, in which the anterior antennæ are situated as in Calanus, with the tips not anterior to the line of the front; the anterior branch of the posterior antennæ have but three setæ at apex; the inferior eyes are quite small. This subgenus may include some species referred to Hemicalanus.

2. PONTELLINA.—Antennæ of second pair having five setæ at the apex of anterior or smaller branch; head either side unarmed.

3. PONTELLA.—Antennæ as in the last; head either side armed with a reversed spine. The *Pontia atlantica* of Edwards is of this kind. In this division, the second of the caudal setæ is considerably longer

(one-fourth at least) than the others (in most, if not all cases), which is not true of the preceding subgenus Pontellina.*

I. Subgenus CALANOPIA.

Calanopia elliptica.

Feminæ : — *Frons rotundatus. Cephalothorax crassus, 4-articulatus, capite inermis, angulis posticis acutis, remotis. Oculi superiores remotiusculi, inferiores minuti. Antennæ anticæ duplo curvatæ, corpore breviores, apicibus fronte valde posterioribus, setis brevibus, subapicalibus perbrevibus, apicalibus vix articuli longitudine. Styli caudales oblongi, setis valde inæquis.*

Female:—Front rounded. Cephalothorax stout, four-jointed, angles behind acute and distant. Superior eyes small, a little separate; inferior minute. Anterior antennæ strongly doubly curved, shorter than the body, slender, tips much behind line of beak; setæ short, subapical very short, the apical scarcely as long as the last joint. Caudal stylets oblong, setæ unequal, somewhat spreading.

Plate 79, fig. 6 *a*, animal, enlarged; *b*, extremity of antenna.

Collected in the Straits of Banca, east of Sumatra, on the 2d of March, 1842.

Length, one-sixteenth of an inch. Colour, yellowish umber, with red each side of the alimentary canal.

The antennæ are quite Calanoid in position, and the cephalothorax has also but four segments. The eyes are however separate, and the inferior eyes were distinct, appearing in an upper view just behind the superior. Of the caudal setæ, the second is considerably the longest, and curves a little outward. The anterior antennæ have at tip an anterior setæ very nearly as long as the last joint, a posterior a little shorter, and one or two outer, which are quite short and uncinate. The apical joint of the antennæ is about as long as the penult. Abdomen two-jointed, segments oblong.

* The new species beyond are briefly described in the Proceedings of the Amer. Acad. Sci., ii. 26.

CALANOPIA BRACHIATA.

Maris :—*Frons subtriangulatus. Cephalothorax* 6–7-*articulatus, anticè angustior, angulis posticis acutis, remotis. Oculi superiores remotiusculi aut coaliti. Antennæ anticæ corporis longitudine, duplo curvatæ, setis brevibus, posticâ penultimâ articulum longitudine fere duplo superante, anticâ apicali breviore, aliis apicalibus et subapicalibus brevioribus; antenna dextra medio paulum incrassata, fere* 23-*articulata, duobus articulis medianis anticè unidentatis, articulo antepenultimum præcedente elongato, duplice. Pes posticus dexter maximus, digito elongato, rectè inflexo. Styli caudales oblongi, non divaricati, setis abdomine non longioribus, vix divaricatis.*

Male:—Front triangular. Cephalothorax six- to seven-jointed, cephalic segment separate, four posterior segments subequal, head narrower, posterior angles of cephalothorax remote and prolonged acute. Anterior antennæ as long as the body, doubly curved; setæ short, the posterior penult the longest, nearly twice longer than its joint, the anterior apical a little shorter, the other apical and subapical short; right antennæ incrassate at middle, subterete, about twenty-three-jointed, two joints bearing a tooth on the middle of the front margin, joint preceding antepenult long, double. Right leg of last pair very large, finger long, inflexed. Caudal stylets long, not divaricate; setæ not longer than the abdomen, scarcely spreading.

Plate 79, fig. 7 *a*, animal, enlarged; *b*, posterior feet, more enlarged.

Collected, April 8, 1842, on the Lagulhas Bank, near Cape of Good Hope.

Length, one-twelfth of an inch. The left antenna consists of twenty-four joints, of which the second is much larger than the first, or the following. The anterior apical setæ are a little longer than the posterior, but hardly exceed the length of the joint. The posterior penult is one and a half to two times the length of the same joint. The posterior antennæ have the three apical setæ of one

branch, and the posterior setæ of the first joint of the same branch, characterizing the Calani. The right male antenna has four joints following the geniculating articulation, of which the first corresponds to two in the left antenna. Preceding this geniculating articulation there is a long joint, which appears to be subdivided at middle, and evidently corresponds also to two joints. The next two joints towards the base bear the dentations described; they are nearly cylindrical and the thickest of the antenna. The next preceding is a little smaller, and beyond this there are several joints much shorter; the second is oblong, and has a small prominence on the anterior margin. The inferior eyes are quite small, the pigment deep carmine, nearly black. The posterior feet are very dissimilar. One branch of the right terminates in a large hand, and the basal joint of this branch is small and has a prolonged spiniform apex. The next joint is stout and short, but is laterally prolonged at right angles to the line of the leg, and then this long process is again bent at right angles; there is a spine on the inner side of this process. The next joint is articulated with the basal portion of the preceding, and is elongated into a spine, which is nearly straight or but slightly curved. It has a small spine at base on the inner side. The other branch of this leg is simply three-jointed and furnished with setæ. The other leg of the pair resembles the natatories; the branches are three-jointed, and the inner bears a few setæ. Abdomen four-jointed.

Plate 19, fig. 8 *a*, represents a female probably of the above species; it was taken at the same place and time. The head, however, is more rounded in front; the posterior angles are divaricate and have an angle within in addition to the acute extremity; the abdomen is three-jointed, the first two quite large, the last very short, the first bearing a curved spinous process on the right side; the oblong stylets are divaricate, and the setæ spreading. The antennæ have the same position, but are more slender; the setæ are similar in relative length, except that the posterior apical are shorter, and the anterior apical a little longer. The last five joints are subequal; the setæ towards base are one to two diameters of the joints in length.

Plate 79, figs. 9 *a*, *b*, *c*, *d*, *e*, *f*, *g*, represent parts of a specimen supposed to be the same species with the *brachiata*, and to which our description above given applies. The right male antenna is similar,

except that the joint following the geniculating articulation is more slender and arcuate. Figure 9 *a*, represents the head of a male; *b*, the posterior part; *c*, part of the right antenna; *d*, the extremity of the left antenna; *e*, the right posterior foot; *f*, one of the female feet corresponding; *g*, a female abdomen, distorted (yet resembling the female above described in the divaricate posterior angles of the thorax and the divaricate stylets). The right male posterior foot is somewhat different, but it may be owing partly at least to the position of the organ when figured. Abdomen including stylets more than half the cephalothorax. Caudal setæ shorter than abdomen. It was found in the Pacific, April 3, 1839, in latitude 42° south, longitude 78° 45′ west; also, April 10, at 5 A. M., latitude 36° south, longitude 74° west. At the latter date they were in immense numbers, and great quantities were collected. A solid cubic inch of them, in the net at one time, must have included forty thousand or fifty thousand individuals. The abdomen of the females were occasionally distorted, as in fig. *g*, in which the segments are irregularly enlarged, and on the left side, there is a broad elongate lamellar appendage.

SUBGENUS II. PONTELLINA.

a. Cephalothorax postice obtusus, aut brevissimè acutus.

PONTELLINA PLUMATA.

Feminæ:—*Frons rotundatus. Cephalothorax curtus, obesus, 6-articulatus, capite discreto, segmento postico perbrevi, et posticè vix acuto. Oculi superiores parce disjuncti. Antennæ anticæ corpore paulo longiores, latè divaricatæ, fere rectæ, setis raris suboblongis, apicalibus articulo plus duplo longioribus, subapicalibus brevioribus. Antennæ posticæ ramis valde inæquis, setis ramorum et palporum sequentium fere corporis longitudine instar plumarum. Styli caudales parce oblongi.*

Female:—Front rounded. Cephalothorax very short and thick, six-jointed, the head separate, rounded in front, behind hardly acute, posterior segment very short. Superior eyes a little separate. Anterior antennæ somewhat longer than the body, obliquely divari-

cate, nearly straight, a few longish setæ at intervals, the apical more than twice as long as the last joint, the subapical shorter. Posterior antennæ with the branches very unequal; the setæ of these and the following organs nearly as long as the body, elegantly plumiform. Caudal stylets sparingly oblong; setæ a little longer than the abdomen, spreading.

Plate 79, fig. 10 *a*, animal, enlarged; *b*, maxillipeds; *c*, one of the natatories; *d*, fifth pair.

Collected, October 20 and 23, 1838, in the Atlantic, latitude 5°–7° north, longitude 21°–22° west.

Length, one-twelfth of an inch. Colour, yellowish, with grayish or brownish yellow along the centre. The species is remarkable for its thick short form and the long plumes of the posterior antennæ and following organs. The length of the cephalothorax is about twice the width. Beak below long and straight. Second joint of abdomen longest; the whole abdomen not more than one-third the cephalothorax. Caudal stylets very little longer than the last abdominal segment; a plumose seta on the second joint of the anterior antennæ, which is longer than the joint; and another still longer on the fourth joint; another seta of nearly the same length from near the middle of the antenna; the anterior apical setæ a little shorter. Abdomen three-jointed.

PONTELLINA TURGIDA.

Frons rotundatus. Cephalothorax crassus, obesus, 5–6-*articulatus, capite discretus, posticè obtusus. Oculi superiores approximati. Antennæ anticæ corporis longitudine, fermè* 21-*articulatæ,* 60°–90° *divaricatæ et prope medium obsoletè reflexæ; setis brevibus, penultimâ posticâ longiore quam apicales aut ceteræ subapicales. Antenna antica* maris *dextra* 10–12-*articulata, articulo submediano latè subovato et apice acuto, articulis tribus sequentibus valde elongatis, ultimo triplice. Antennæ posticæ ramis valde inæqui, setis longis. Abdomen* 4–5-*articulatum. Styli caudales oblongi; setis mediocribus.*

Front rounded. Cephalothorax short and stout, obtuse behind, five-

or six-jointed, posterior segments three in number, head separate. Superior eyes sparingly separated. Anterior antennæ as long as the body, divergent 60°–90°, and near middle slightly bent outward, setæ rather short, a longer one towards the middle, posterior penult longer than apical or the other subapical setæ. Right anterior antenna of male not terete, containing near middle a large flattened ovate joint, bearing within a longish seta and others shorter, the three following joints slender linear, the last of the three, triple. Posterior antennæ with very unequal branches and long setæ. Abdomen four- or five-jointed. Caudal stylets a little more than twice as long as broad; setæ of moderate length, spreading.

Plate 79, figs. 11 *a*, *b*, and 12 *a*, *b*, different varieties, enlarged.

Collected abundantly in the Atlantic, October 15, 22, 23, 26, latitude 8½° north to 0°, longitude 23°–18° west, and November 5, 6, 7, latitude 1°–4½° south, and longitude 17½°–21½° west; also, April 8, 1842, on the Lagulhas Bank, off Cape of Good Hope; also, in the Atlantic, May 13, 1842, latitude 4° 30′ south, longitude 25° west, and May 17, 1842, latitude 0° 15′ north, longitude 31° west; also, common in the Pacific, April 13 and 28, 1841, near Hall's and Pitt's Islands, Kingsmill Group, latitude 1°–3° north, longitude 173° east.

Length, one-twenty-fourth of an inch. The specimen collected on the Lagulhas Bank is represented in figures 12 *a*, *b*; while the Pacific specimens are represented in figures 11 *a*, *b*. The latter is the form found in the equatorial Atlantic. They appear to be essentially the same. Yet in *one*, the abdomen has four segments, and the large joint of the right male antenna has an angle towards the base on the posterior side; and in the *other*, there are five abdominal joints, and the large antennary joint referred to is rounded on the posterior side.

In both, the length of the cephalothorax is about twice the width in a vertical view. The superior eyes are slightly separated. The antennæ are of the same length and position, and the setæ similar; the anterior apical setæ being longer than the apical joint, and directed obliquely forward; the posterior penult of same length or a little longer, the anterior penult short, the posterior seta of antepenult shorter than joint, the anterior antepenult much shorter. The last three joints of

the right male antenna are coalescent into a single slender joint. These antennæ diverge from the head at an angle of nearly 60°, and afterwards bend outward to 90°. The shorter branch of the posterior antennæ is not over half the length of the longer. The setæ of these and the following organs are long. Caudal stylets nearly half the length of the abdomen, in the Pacific and Atlantic species divaricate; and the same, or perhaps a little longer proportionally, in the specimen from the Lagulhas Bank. The caudal setæ are about as long as the abdomen. In the specimens from the former regions, the first, third, and fourth setæ are equal, the second one-third longer, the fifth shorter than the fourth.

PONTELLINA CURTA.

Frons rotundatus. Cephalothorax curtus, crassiusculus, 5-articulatus, capite discreto, angulis posticis brevissimè acutis. Antennæ anticæ corpore breviores, rectæ, 105° *divaricatæ, setis brevibus, apicali anticâ longiore. Antennæ posticæ ramis valde inæqui, minore plus dimidio breviore. Styli caudales oblongi, non divaricati. Setis mediocribus.*

Front rounded. Cephalothorax short and rather stout, rounded in front, very short acute behind, five-jointed, the head separate and unarmed, posterior segments three. Anterior antennæ straight, divergent 105°, much shorter than the body; setæ short, anterior apical longest, the subapical either half shorter or less. Caudal stylets a little oblong, not divaricate; setæ about as long as abdomen, somewhat spreading.

Plate 80, fig. 1 *a*, animal, enlarged; *b*, extremity of antenna.

Collected, January 24, 1842, off the south end of Mindoro, East Indies; March 4, 1842, at the eastern entrance of the Straits of Sunda; also, on the Lagulhas Bank, April 8, 1842.

Length, one-twentieth of an inch. Head blue, but body yellowish, with a green medial portion, proceeding from the alimentary cavity. This is another short and stout species, yet not as thick as the last.

It differs from that also in the acute points behind, and in the antennæ.

The anterior apical seta of the antennæ is as long as the last two joints of the organ, while the other apical are shorter than the joint. The penult setæ, anterior and posterior, are nearly equal, and about as long as the penult joint. The posterior antepenult has the same length; but the anterior is half shorter. The anterior of the next joint preceding is as long as the joint. The last joint of the antennæ is longer than the preceding. There is a longish seta to the eighth or ninth joint from the extremity.

The caudal stylets are nearly twice as long as broad; and the setæ are about as long as the abdomen. Abdomen short, four-jointed. The inferior eyes are quite small; the superior being directly over the former, in a vertical view they were not distinctly observed.

PONTELLINA CONTRACTA.

Frons rotundatus. Cephalothorax 6–7-*articulatus, capite discreto, angulis posticis brevissimè acutis, segmento postico fere obsoleto. Oculi inferiores majusculi. Antennæ anticæ cephalothorace non longiores,* 100°–110° *divaricatæ, rectæ, fermè* 17-*articulatæ, setis brevibus, apicali anticâ longiore. Rami antennarum posticarum valde inæqui. Styli caudales elongati. Abdomen* 2-*articulatum.*

Front rounded. Cephalothorax posteriorly very short acute, six or seven-jointed, head separate, posterior segments four, but the fourth nearly obsolete. Inferior eyes rather large. Anterior antennæ not longer than the cephalothorax, divergent 100° to 110°, about seventeen-jointed; setæ short, the anterior apical longest, about as long as joint, other apical a little shorter, the subapical short or very short. Branches of posterior antennæ very uneqal. Abdomen two-jointed, the second joint oblong. Caudal stylets elongate, parallel; setæ about as long as abdomen.

Plate 80, fig. 2 *a*, animal, enlarged; *b*, side view of beak; *c*, extremity of antenna; also, fig. 3, view, enlarged.

Collected (fig. 2 *a*), August 7, 1839, 5 A. M., latitude 18° 13′

south, longitude 124° 30′ west; also (fig. 3), November 6, 1838, latitude 2° south, longitude 20° west.

Length, one-eighteenth of an inch. Colour (fig. 2 *a*), deep blue, with pearly white reflections along the back; also (fig. 3), blue with red, and a yellowish band occupying the larger medial part of the cephalothorax.

The cephalothorax of fig. 2 *a* is rather broadest posterior to the middle. Furcation of beak long and flexed inward. Last thoracic segment very short and much narrower than the preceding. Abdomen, excluding stylets, not one-fourth the cephalothorax in length. Caudal stylets more than half as long as abdomen. Caudal setæ four, subequal, with a minute spine exterior to the four, and another within. The basal joint of the anterior antennæ is directed more directly forward than the following part of the organs. Near the middle, or about seven joints from the apex, the antenna is abruptly smaller than the part below. The posterior subapical setæ are shorter than the anterior penult, and the latter is less than the length of penult joint. The four pairs of natatories are nearly equal, the posterior a little the smallest; the fifth pair is very minute.

The specimen figured in fig. 3, differs from the preceding in not having the back pearly white. Moreover the antennæ are shorter, being about three-fourths as long as the cephalothorax, and containing only about fourteen joints. It agrees with the preceding in form, in the position of the antennæ, the terminal setæ, the short two-jointed abdomen (less than one-fourth the cephalothorax), minute points to the posterior extremity of the thorax, and in having the setæ of the longer branch of the posterior antennæ so long as to extend to the penult segment of the thorax (counting only three, instead of four posterior segments). The pigment of the inferior eyes is also large. The shorter branch of the posterior antennæ is about half as long as the other. Length, one-twelfth of an inch. It may be distinct.

Plate 80, fig. 4 *a*, *b*, represents another species, unless it may be young of the last. It was collected on the same day, November 6, 1838. I have it named in my manuscript *Pontia curticornis*. The body is slender; head separate and rounded in front. There are three posterior thoracic segments, of which the last is quite short, narrow and obtuse behind, and appearing as if it belonged to the abdomen. The abdomen is two-jointed, the second segment longest; whole length not

one-fourth the cephalothorax. Caudal stylets oblong, about as long as last abdominal segment; caudal setæ not longer than abdomen, somewhat divergent. Anterior antennæ two-thirds the length of the cephalothorax, nine or ten joints; the first very short, the second, third, and fourth rather long and nearly equal. Setæ short, the longest at apex directed forward, but not longer than the joint; posterior subapical very short; anterior antepenult, obsolete. Two pairs of natatories, the last two thoracic segments having none; both branches one-jointed. Length, one-sixteenth of an inch. Colour blue, having a long central area of a dirty yellowish colour, with red either side.

PONTELLINA MEDIA.

Frons rotundatus. Cephalothorax 5-articulatus, segmento postico brevissimo et valde angusto, non acuto, capite vix discreto. Oculi superiores remotiusculi, inferiores parvuli. Antennæ anticæ corporis longitudine, parum duplo curvatæ, fere transversæ, apicibus fronte anterioribus, setis brevibus, rectis, apicalibus articuli longitudine, posticâ penultimâ parce longiore, aliis subapicalibus brevioribus. Styli caudales oblongi. [*Abdomen 2-articulatum.*]

Front rounded. Cephalothorax a little slender, segments five, the last short and quite narrow, subobtuse behind. Superior eyes somewhat remote, the inferior quite small. Anterior antennæ as long as the body, somewhat doubly curved, nearly transverse, the tips a little anterior to line of beak, setæ short, the apical not longer than the apical joint, posterior penult a very little longer, the other subapical shorter. Caudal stylets half as long as abdomen, not divaricate. [Abdomen two-jointed, the second segment longest.]

Plate 80, fig. 5 *a*, animal, enlarged; *b*, extremity of antenna.

Sooloo Sea, fifteen miles west of Panay, January 27, 1842.

Length, one-twentieth of an inch. A little smoky brown near the middle of the thorax; and also one branch of posterior antennæ presenting the same tint. The posterior thoracic segments diminish in breadth successively, and the last is but little broader than the abdo-

men; there were small points behind. The caudal setæ were mutilated. The setæ of the antennæ towards the base were about as long as three diameters of the joints; of the apical and subapical, the anterior antepenult is the shortest, being half as long as the joint.

PONTELLINA CRISPATA.

Feminæ:—*Frons subtriangulatus, obtusus. Cephalothorax 7-articulatus, segmento postico brevissimo, obtuso aut subacuto. Oculi superiores remotiusculi, inferiores mediocres. Antennæ anticæ vix corporis longitudine, latè divaricatæ, apicibus fronte valde anterioribus et prorsum curvatis; setis brevibus, prope basin confertis et paucis uncinatis, apicalibus et posticâ antepenultimâ articulo parce longioribus, posticâ penultimâ paulo longiore. Styli caudales parce oblongi, setis 5, subæquis.* [*Abdomen 4-articulatum.*]

Female:—Front subtriangular, obtuse. Cephalothorax rather slender, seven-jointed, last segment very short, obtuse behind or short subacute. Superior eyes a little separate; inferior of moderate size. Anterior antennæ a little shorter than the body, widely divaricate, extremities anterior to line of front, and tips curving forward; setæ short, towards base crowded and several uncinate, apical hardly longer than the joint, the posterior penult a little longer, the posterior antepenult shorter than penult, the anterior penult scarcely as long as joint, anterior antepenult much shorter. Caudal stylets slightly longer than broad, five subequal setæ. [Abdomen four-jointed, segments a little unequal, the first largest.]

Plate 80, fig. 6 *a*, animal, enlarged; *b*, extremity of antenna.

Collected, near the Kingsmill Islands, in the Pacific, March 22 and 26, 1841, latitude 5°–7° north, longitude 174½°–177½° east; also, in the Atlantic, October 15, 1838, latitude 8½° north, longitude 23° 45′ west.

Length, one-twelfth to one-sixteenth of an inch. Colourless or bluish. The anterior antennæ about as long as the cephalothorax and half the abdomen; the second joint is oblong, and several following

are very short; the last joint of these antennæ is slightly longer than the preceding, and the penult is a little shorter than the antepenult. The anterior of the apical setæ is a little the longest. The last segment of the thorax is less than one-third the length of the preceding, and is also considerably narrower. The caudal stylets are slightly divergent. Colour of pigment of inferior eyes carmine-black; seen in a vertical view usually just behind the superior eyes. In the posterior part of the cephalothorax there are four oblong glands of a deep blue colour.

The description above given is drawn from the Pacific specimens. The Atlantic specimens present essentially the same characters. The posterior extremity of the cephalothorax has very short acute points. The curved hairs towards the base of the antennæ are the same as above mentioned, and so also, the apical setæ and the position of the organs. The longer caudal setæ may be only four in number; of this I am not certain. The spot of pigment corresponding to the inferior eyes, is smaller in my figure than for the Pacific specimens. The apical joint of longer branch of posterior antennæ is hardly one-fourth as long as the preceding joint; the setæ of the same are as long as the branch. Natatories four pair, the posterior longest. The blue glands in the posterior part of the cephalothorax are only two, but are much elongated, as if proceeding from the coalescence of the two on each side in figure 6 *a*. After death, these spots diffuse a blue colour through the surrounding parts.

PONTELLINA DETRUNCATA.

Frons obtusus. Cephalothorax 5–6-*articulatus, capite discreto, angulis posticis rectè truncatis et extus brevissimè acutis. Oculi superiores sæpius disjuncti, inferiores mediocres. Antennæ anticæ* 22–24-*articulatæ, vix corporis longitudine, late divaricatæ, apicibus fronte valde anterioribus et prorsum curvatis; setis brevibus, rectis, posticâ penultimâ longiore quam apicales vel aliæ subapicales. Antenna dextra* maris *medio incrassata, subteres,* 12–13-*articulata, articulo tertio elongato, obsoletè articulato, septimo* (*octavo?*) *brevi et subtriangulato, duobus sequentibus tenuibus, longis. Pes posticus dexter* maris *crassissimè cheliformis, manu subovatâ, digito immobili laterali, obtuso, dimidio breviore, digito mobili elongato, tenui et curvato. Styli caudales breves, setis* 5 *subæquis.*

Front obtuse. Cephalothorax five- or six-jointed, the head separate, only three posterior segments, the fourth obsolete, posterior angles transversely truncate and exteriorly very short acute. Superior eyes usually separate, the inferior of moderate size. Anterior antennæ twenty-two- to twenty-four-jointed, a little shorter than the body, very widely divaricate, the tips curving a little forward; setæ short, straight, posterior penult longer than apical or other subapical, the apical not longer than the joint, the anterior subapical very short. Right antenna of *male* incrassate at middle, subterete, twelve- to thirteen-jointed, third joint elongate, obsoletely jointed, seventh (eighth?) short and subtriangular, next two slender and long. Right leg of posterior pair of male very stout cheliform, hand subovate, immoveable finger lateral, obtuse, moveable finger elongate, twice longer, slender and curved. Caudal stylets short, five subequal setæ.

Plate 80, fig. 7 *a*, male, enlarged; *a'*, part of right male antenna; *b*, profile of head; *c*, maxillipeds (magnified twice as much as fig. 7 *a*); *d*, anterior feet; *e*, posterior thoracic feet, in male; *f*, same, in female; *g*, under view, showing the organs of the head and mouth; *h*, *i*, different views of a distorted female abdomen.

Collected several specimens in the Pacific, two hundred and fifty miles southwest of Tongatabu, latitude 26° 8′ south, longitude 178° west, April 18, 1840; also, March 25, 1841, south of the Kingsmill Islands, latitude 5° 20′ south, longitude 175° 30′ east; and afterwards, north of the equator in this group, near Hall's Island.

Length, one-twelfth to one-sixteenth of an inch. Colour, bluish. The truncate posterior extremity of the cephalothorax, with the outer angles still acute, afford a striking character. In the antennæ and the eyes, this species is much like the preceding. The anterior antennæ curve forward and outward from the head, and the two afterwards are very nearly in the same straight line. The maxillipeds are much larger than the following pair of organs. The last five joints of the anterior antennæ are subequal and short. The setæ towards the base of the antenna are rather crowded, and longer than the diameter of the organ.

The right antenna of the male has the third joint rather longer

than the second, and with one or two obsolete articulations towards its apex. The next joint is rather short and enlarges outward; the next three make a single joint, the largest one in the antenna, and from the first of the three there is a seta; the following two are the pectinated joints. The geniculating articulation is between the fourth and fifth joints from the apex, or normally the fifth and sixth joints. Both the fourth and fifth just referred to, correspond to two normal joints. The posterior thoracic feet of the male are large: the right consists of three joints; the first oblong and stout; the second much larger, subovate, with a long thumb-like process from one side near base; the third a curving hook, longer than the preceding. In the female these organs are small, simple, and naked, the right a little larger than the left.

The beak is flexed much inward.

In some females the abdomen was distorted, as represented in figures 7 *h*, *i*. Only a few of those seen were of this character.

PONTELLINA SIMPLEX.

Frons obtusiusculus. Cephalothorax subgracilis, capite obsoletè discreto, segmento postico brevi et perangusto. Oculi superiores subremoti, inferiores mediocres. Antennæ anticæ cephalothorace breviores, 9-articulatæ, 100° divaricatæ; setis totis brevibus. Styli caudales elongati. [*Abdomen 2-articulatum. An specimen adultum?*]

Front rather obtuse. Cephalothorax somewhat slender, head imperfectly separate, posterior segments four, the last very narrow and short. Superior eyes remote, inferior of moderate size. Anterior antennæ nine-jointed, much shorter than the cephalothorax, divergent about 100°, straight, all the setæ very short. Caudal stylets elongate and slender. [Abdomen two-jointed. Adult?]

Plate 80, fig. 8 *a*, animal, enlarged; *b*, posterior antenna.

Collected, April 9, 1840, in the Pacific, latitude 32° 24′ south, longitude 178° east, northeast of New Zealand.

Length, one-twentieth of an inch. Colour, blue. This may be a

young individual. The caudal stylets are more than half the length of the abdomen; the setæ were mostly broken off; the inner one was entire, and was about as long as the abdomen. The first three joints of the anterior antennæ are longest and nearly equal, and the fourth and fifth together about equal the third; the next four are subequal and each is a little longer than the fifth. The setæ hardly exceed the diameter of the joints, except one at the apex, which is shorter than the joint. The superior eyes are distant. The pigment of the inferior pair is seen in a vertical view just behind the superior eyes, and is reniform in shape. The posterior antennæ have the smaller branch one-fourth shorter than the longer; the longer has the second joint one-fourth shorter than the first; the setæ are scarcely longer than the branches. Posterior feet very short.

PONTELLINA EXIGUA.

Gracilis. Frons obtusus. Cephalothorax 6-articulatus, capite discreto, segmento postico brevi, obtuso. Oculi inferiores maximi, valde elongati, subclavati. Antennæ anticæ corpore valde breviores, 120° (?) *divaricatæ, setis perbrevibus, apicali anticâ longiore, subapicalibus brevibus. Antennæ posticæ tenues, ramo majore plus duplo longiore. Styli caudales oblongi.* [*An adultum? Abdomen 2-articulatum.*]

Slender. Front obtuse. Cephalothorax six-jointed, head separate, posterior segments four, the last short, obtuse behind. Inferior eyes large, much elongate, the pigment subclavate. Anterior antennæ three-fourths as long as the body, 120° (?) divaricate, setæ very short, the anterior apical setæ longest, the subapical not longer than the joint. Branches of the posterior antennæ slender and very unequal, the smaller half the larger in length; the setæ of the longer branch exceeding the branch in length. Caudal stylets oblong, setæ subequal. [Abdomen short, two-jointed, second segment the longer. Adult?]

Plate 80, fig. 9 *a*, animal, enlarged, the antennæ removed; *b*, profile, showing outline of head.

Abundant in the Atlantic, October 16, 1838, latitude 7½° north,

longitude 23° 45′ west; also, October 24, latitude 4½° north, longitude 19½° west.

Length, one-thirtieth of an inch. Colour, greenish along the medial line (intestinal), reddish either side, and sides and head mostly bluish. The length of the cephalothorax is about four times the breadth. The pigment of the inferior eyes, as seen in a vertical view, forms an oblong spot extending forward to the front. The abdomen is very short; the caudal stylets about as long as the second joint. The longer apical setæ of the anterior antennæ is as long as two or three terminal joints. Natatories four pair, the two medial largest; the longer branch two-jointed; the shorter having but one joint, and not half the length of the longer.

b. Cephalothorax posticè productus et acutus.

* Seta antennarum anticarum apicalis subapicalibus brevior.

PONTELLINA AGILIS.

Feminæ: P. crispatæ *quoad antennas similis. Anguli postici cephalothoracis acuti. Frons rotundatus. Setæ antennarum anticarum fere rectæ, prope basin confertæ.*—[*Forsan* P. crispatæ *cephalothorax interdum posticè acutus et species non differt.*]

Female:—Like the *crispata* in the antennæ and most characters. Cephalothorax rounded in front, acute behind, posterior segments three, besides the fourth which is very short. Setæ of anterior antennæ nearly straight, crowded towards the base of the antenna.

Plate 80, fig. 10 *a*, animal, enlarged; *b*, side view of head; *c*, posterior antennæ; *d*, one of the third pair of natatories; *e*, one of the posterior thoracic feet.

Very abundant, November 17, 1838, 4 A. M., latitude 19½° south, longitude 38° 45′ west.

Length, one-eighth of an inch. Colour blue, especially anteriorly,

yellowish posteriorly. The cephalic segment is very distinct. The posterior acute angles of the cephalothorax are rather short. The position and general characters of the anterior antennæ are nearly as in the *P. crispata*, and if it is possible that the *crispata* has in its most advanced state, acute angles behind, the two species may perhaps be identical. The hairs towards the base of the antennæ are crowded as in that species, but none I believe are uncinate; the apical setæ are also shorter.

The pigment of the inferior eyes, as seen in a vertical view, is a nearly round blue-black spot behind the superior eyes. The abdomen has four segments, the first of which is a little the largest, and the fourth the smallest; but they vary in relative proportions. The caudal setæ are about as long as the abdomen; the stylets are a little longer than broad. There are about eighteen joints to the anterior antennæ; the five terminal are short and subequal; the anterior subapical setæ are hardly longer than the diameter of the joints. The second joint of longer branch of posterior antennæ is one-third to one-fourth the preceding in length. There are four pairs of natatories, the anterior smallest. The longer branch, in all four pairs, three-jointed, the shorter two-jointed. There is also a fifth pair, much smaller and naked, with two minute spines at apex of longer branch.

In the posterior part of the cephalothorax, either side of the intestine, there is an oblong deep blue gland.

Specimens were collected in the Atlantic which are probably identical with the above. The abdomen is only two-jointed, the second very short: but this organ varies much in the same species. There are only three posterior segments to the cephalothorax; a posterior fourth was not distinctly observed; yet the posterior angles were acute, as above. Pigment of superior eyes carmine-black, separate. Anterior antennæ about as long as body; setæ as above described. Posterior antennæ have the second joint of longer branch not one-fourth the length of the first joint; the setæ are nearly as long as the branch.

The maxillipeds were observed to be employed in giving the body a leaping motion, while the animal was under the microscope without sufficient water to swim. First pair of legs two-branched, one branch consisting of five slender joints; the other of two stout joints, and bearing three or four long spinulous setæ. Natatories four pairs;

longer branch three-jointed, shorter two-jointed, and half the length of the longer. Colour, bluish; spots in posterior part of cephalothorax of a deep blue colour. Length, one-tenth of an inch.

Collected, October 12, 1838, latitude 9° 20′ north, longitude 24° 18′ west.

PONTELLINA ACUTIFRONS.

Maris:—P. crispatæ *et* agili *similis. Anguli postici cephalothoracis acuti. Frons acutus et prominens; rostro longissimè furcato et valde inflexo. Oculi superiores approximati; inferiores parvi. Setæ antennarum anticarum rectæ, prope basin fere articuli secundi longitudine, posticâ penultimâ plus duplo longiore quam apicales. Antenna dextra medio incrassulata, subteres,* 12–13-*articulata; articulis secundo et quinto æquis, septimo brevissimo, octavo valde elongato, subattenuato, recto, fere duplo longiore quam nonus; nono ad apicem anticum instar spinæ valde producto; articulis sequentibus (ultimis) tribus normalibus. Pes posticus dexter latissimè cheliformis, manu subquadratâ, digito immobili breviter spiniformi, digito mobili recto, apice minutè inflexo, valde breviore quam manus.*

Male:—near the *crispata* and *agilis.* Cephalothorax acute posteriorly. Front acute and prominent, beak very long furcate, and much inflexed. Superior eyes approximate, inferior small. Anterior antennæ nearly as long as the body, very widely divaricate, tips curved a little forward; setæ short, crowded towards base and a little long, apical not longer than the joint, posterior penult as long as last four joints, antepenult not longer than joints, anterior subapical quite short; right antenna of male subterete, a little incrassate at middle, twelve- to thirteen-jointed. Second and fifth joints equal, seventh very short, eighth much elongate, subattenuate, straight, nearly twice as long as ninth, ninth at apex produced into a spine, following three joints (the last), as in the left. Posterior right foot in male large cheliform, hand subquadrate, immoveable finger short, spiniform, moveable finger straight, apex minutely inflexed, much shorter than hand.

Plate 80, fig. 11 *a*, animal, enlarged; *a'*, extremity of antenna; *b*, male right antenna; *c*, side view of head; *d*, mandible and palpus; *e*, maxilla; *f*, first pair of legs; *g*, posterior thoracic feet; *h*, natatory leg, one of three posterior pairs.

Collected near El Gran Cocal, latitude 5½° south, longitude 175° 45′ east, March 25, 1841; and in the Kingsmill Group, 1° 13′ south, longitude 174° 50′ east, April 1, 1841.

Length, one-seventh of an inch. Colour, blue. The beak is long, and very much incurved. The front is a little prolonged at middle and acute. The superior eyes have large spots of pigment, which are in contact. The length of the caudal stylets a little exceeds the breadth. The longer hairs towards the base of the anterior antennæ are two or three times as long as the diameters of the joints, and one of them curves forward and inward. In the right antenna of male, after four or five oblong joints at base, there is a tri-articulate stout joint, as long as the part of the antennæ following it; the two articulations intersecting it are towards its base; and near its middle there is a minute spine and a seta, beyond which the margin is very finely pectinate; beyond this long joint there is the geniculating articulation. Then follows a long joint, whose apex is lineally prolonged nearly to the apex of the following joint, and the margin is very finely pectinated. The posterior margin of this and the preceding joint is very nearly straight. The last three joints are nearly like the same in the female.

The mandible has six teeth, and a two-branched palpus, as in the figure. The right posterior foot has the second joint very large and broad, the form approaching subquadrate, with the outer angle broadly and deeply removed; it has articulated with it a finger, hardly exceeding half its length and uncinate at apex, which finger is opposed to a short spine from the basal portion. The large second joint folds back against the side of the preceding. The other leg is simple and naked.

PONTELLINA ACUTA.

Frons elongatè acutus, rostro brevi, vix inflexo. Cephalothorax 5-articulatus, capite discreto, angulis posticis elongatis, acutis. Oculi supe-

riores remoti, inferiores parvi. Antennæ anticæ subtransversæ, fere corporis longitudine, fermè 21–22-*articulatæ, apicibus fronte paulo anterioribus et prorsum leviter curvatis, setis prope basin confertis, longiusculis, posticâ penultimâ duplo longiore quam articulus, apicalibus et aliis subapicalibus brevioribus. Antenna dextra* maris *subteres, fermè* 13-*articulata, articulo secundo longo,* 6 *sequentibus brevibus, proximis duobus elongatis et tenuibus, parce arcuatis, subæquis,* 3 *proximis (ultimis) normalibus. Pes posticus dexter* maris *latus, manu apice late orbiculatâ, digito immobili nullo, digito mobili vix manus longitudine, paulum inflexo. Styli caudales oblongi.* [*Abdomen* 4-*articulatum.*]

Front long acute, beak short, hardly inflexed. Cephalothorax long acute behind, five-jointed, head separate, three posterior segments besides a fourth behind very short. Superior eyes subremote, inferior quite small. Anterior antennæ very nearly as long as the body, very widely divaricate, the tips curving forward a little, but not much in advance of the line of the beak; setæ towards the base longish and crowded, posterior penult as long as last two joints together, the subapical and apical not longer than a joint, the anterior antepenult very short. Right antenna of male subterete, thirteen-jointed, incrassate at middle, second joint long, six following short, next two long and slender, sparingly arcuate, subequal, last (next) three joints as in the left antenna. Right posterior foot of male broad, hand at extremity broad orbiculate, no immoveable finger, moveable finger hardly as long as hand, a little inflexed. Caudal stylets oblong, setæ five, spreading. [Abdomen four-jointed.]

Plate 80, fig. 12 *a*, male, enlarged; *a'*, front of head, in profile; *b*, right male antenna; *c*, posterior feet.

Abundant in the East Indies, off the southeast end of Mindoro, January 24, 1842; also, in the China Sea, February 15, 1842, latitude 6° 40′ north, longitude 111° east.

Length, one-tenth of an inch. Colour, blue. Remarkable for its prolonged acute beak in a vertical view, but singularly short beak in a lateral view. The pigment of the inferior eyes is not larger than that of one of the superior eyes; and in a vertical view it is seen a

short distance posterior to them. The right of the two spinous processes at the posterior extremity of the cephalothorax was abruptly bent outward in the male. The caudal stylets are about twice as long as broad; and the setæ are as long as the abdomen. The anterior antennæ extend laterally (after the basal curve) nearly in the same straight line, the tips curving a little forward. The longish setæ at the apex of the second, third, and fourth joints are three or four times as long as the diameter of the joints. The last three joints of the antenna are very nearly equal. The posterior antennæ are a little stout; and the shorter branch hardly exceeds half the longer. The right posterior foot of the male is geniculate; it has the first joint oblong, the second narrow at base, and then abruptly enlarged, so as to be in the following part of a Pecten shape. The third joint or finger is stout, bent, and articulated with the lower angle of the Pecten-shaped joint.

† Seta antennarum anticarum apicalis subapicalibus longior.

PONTELLINA RUBESCENS.

Feminæ:—*Frons rotundatus. Cephalothorax* 6-*articulatus, capite discreto, segmento septimo obsoleto, angulis posticis acutis. Oculi superiores remoti; inferiores quoad pigmentum bilobati. Antennæ anticæ cephalothorace non longiores, fere* 120° *divaricatæ et rectæ; setis brevibus, apicali vix longiore quam articulus. Ramus major antennarum posticarum fere triplo longior. Styli caudales elongati, paralleli.* [*Abdomen* 3-*articulatum.*]

Front rounded. Cephalothorax acute behind, six-jointed, head separate, posterior segments three, besides a fourth which is very short. Superior eyes remote. Pigment of inferior eyes bilobate. Anterior antennæ scarcely as long as the cephalothorax, very nearly straight, divergent about 120°; setæ short, apical seta not longer than the apical joint, subapical shorter, the posterior penult shortest. Shorter branch of posterior antennæ hardly one-third the length of the other, the longer slender, with long setæ. Caudal stylets parallel, rather longer than half the abdomen. [Abdomen three-jointed.]

Plate 78, fig. 13 *a*, animal, enlarged; *b*, extremity of the antenna.

Collected in the Pacific, six miles north of Upolu, one of the Samoan Islands, February 24, 1841; also, near El Gran Cocal, March 25, 1841, latitude 5½° south, longitude 175° 45′ east.

Length, one-fifteenth of an inch. Colour, pale reddish with greenish along the intestine. The acute extremities at the posterior part of the cephalothorax appear to belong to a fourth posterior segment, of which only this part is seen. Counting this as one, there are seven segments to the cephalothorax. The above character, in addition to the rather long stylets, the bilobate pigment (deeply indented behind) of the inferior eyes, and the characters of the two pairs of antennæ (the anterior shorter than the cephalothorax), serves to distinguish the species. The beak has the usual character. The fourth and fifth joints of the anterior antennæ are much longer than those immediately preceding or following. A seta on the tenth or eleventh joint from the extremity is longer than the others near by. The setæ of the longer branch of the posterior antennæ, when thrown back, extend as far as the fifth segment (out of the seven) of the cephalothorax.

PONTELLINA EMERITA.

Feminæ:—*Crassa. Frons obtusus. Cephalothorax* 6–7-*articulatus, capite discreto, angulis posticis elongatè acutis, segmento postico brevi. Oculi superiores remoti, inferiores sat parvi. Antennæ anticæ cephalothorace vix longiores, fermè* 100° *divaricatæ, rectæ. Ramus major antennarum posticarum fere quadruplo longior. Styli caudales breves.* [*Abdomen* 2-*articulatum, segmentis subæquis.*]

Female:—Stout. Front obtuse. Cephalothorax long and remotely acute behind, six- to seven-jointed, head separate, posterior joints four, the last short. Superior eyes remote, inferior rather small. Anterior antennæ scarcely longer than the cephalothorax, divergent 100° to 110°, straight, setæ short. One branch of the posterior antennæ hardly one-fourth the other in length. Caudal stylets short, setæ of moderate size (rather short), much spreading. [Abdomen two-jointed, segments subequal.]

Plate 80, fig. 14 *a*, animal, enlarged (a joint of the anterior antennæ

probably wanting); *b*, posterior thoracic legs, enlarged to correspond.

Collected off the Cape of Good Hope, April 12, 1842, latitude 35° 20′ south, longitude 20° east.

Length, one-tenth of an inch. Colour, grass-green; head, deep blue in front. The specimen, although perfect in every other respect, appears to have the last joint of the anterior antennæ wanting. The posterior seta of the joint, which was the terminal (supposed to be the penult), is a little longer than the joint, the anterior quite short; the posterior of the next preceding is about as long as the joint, and the anterior very minute. The second joint of the antenna is oblong, and has a few curving setæ, the longest of which is hardly twice the diameter of the joint in length. The shorter branch of the posterior antennæ is very small, not exceeding a sixth the length of the other. The longer branch is long, and the setæ extend back as far as the sixth cephalothoracic segment. The posterior angles of the cephalothorax are long acute, distant, and somewhat divergent.

PONTELLINA REGALIS.

Feminæ:—*Crassissima. Frons rotundatus. Cephalothorax* 5–6-*articulatus, angulis posticis elongatè acutis, capite discreto, brevi. Oculi superiores remoti, inferiores parvi. Antennæ anticæ cephalothorace breviores,* 100°–110° *divaricatæ, duplo leviter curvatæ, setis brevibus, subapicalibus articulo non longioribus, apicali anticâ triplo longiore, aliis apicalibus perbrevibus. Ramus major antennarum posticarum quadruplo longior. Styli caudales brevissimi.* [*Abdomen* 2-*articulatum, segmento secundo brevi.*]

Female:—Very stout. Front rounded. Cephalothorax five- to six-jointed, posterior angles long acute and remote, head separate, short, posterior segments three. Superior eyes remote, inferior small. Anterior antennæ shorter than the cephalothorax, divergent 100° or 110°, slightly curved, setæ short, subapical not longer than the joint, anterior apical nearly three times longer, the other apical very short. Short branch of posterior antennæ minute, hardly

one-fourth the other in length. Caudal stylets very short, setæ nearly as long as abdomen, spreading. [Abdomen two-jointed, the first joint gibbous and elongate, the second short.]

Plate 81, fig. 1 *a*, animal, enlarged; *b*, extremity of antenna.

Collected in the Sooloo Sea, fifteen miles west of Panay, January 27, 1842.

Length, one-seventh of an inch. Colour, greenish yellow, with the head in front blue. This is a remarkably large and stout species. The anterior antennæ leave the head at right angles with one another, then bend outward a little, and then again forward, so that the tips are also in lines at right angles with one another. The setæ are generally one to three diameters of the organ in length. The penult setæ, anterior and posterior, are nearly as long as the corresponding joint, the antepenult are shorter, and the anterior antepenult is very short. The pigment of the inferior eyes in a vertical view forms a small short oval spot behind the superior eyes; and the latter are quite remote, appearing nearly marginal. The caudal stylets are very short, and the articulation with the abdominal oblique. The shorter branch of the posterior antennæ *with its setæ*, is but little longer than half the other branch.

The specimen is a female; and the eggs form two irregular series either side of the body, which appear to meet over the mouth or near it, and then separate into four branches extending towards the head. The colour of the ova was yellowish. The lines did not extend into the abdomen.

There is also laterally, a blue spot near each of the three posterior articulations of the thorax, on either side.

PONTELLINA PERSPICAX.

Frons rotundatus. Cephalothorax 6-*articulatus, capite discreto, segmento postico non breviore, angulis posticis elongatè acutis. Oculi inferiores grandes et prorsum valde elongati. Antennæ anticæ corpore valde breviores,* 100°–110° *divaricatæ, fermè* 21-*articulatæ, ante medium obsoletè flexæ. Antenna antica* maris *dextra* 9–10-*articulata, articulo*

quarto lato, subovato, apice spiniformi. Pes posticus maris *dexter vix crassus; manu angustâ, breviusculâ, digito mobili vix longiore, acuminato, digito immobili setiformi, longissimo, reflexo. Styli caudales elongati, setis mediocribus.* [*Abdomen 5-articulatum.*]

Front rounded. Cephalothorax six-jointed, posterior angles long acute and remote, head separate, posterior segments three. Inferior eyes large and very much elongate. Anterior antennæ much shorter than the body, divergent 100° to 110°, the left below middle very slightly bent, and beyond abruptly more slender, twenty-one- or twenty-two-jointed; setæ short. Right antenna of *male* nine- to ten-jointed, the fourth joint broad subovate, the apex a stout spine, the following joints slender. Right leg of posterior pair in male hardly stout, hand narrow, shortish, moveable finger acuminate, hardly longer than hand, immoveable finger setiform, very long, reflexed. Caudal stylets elongate, setæ of moderate length. [Abdomen five-articulate, joints short, subequal, the third having a process on the right side.]

Plate 81, fig. 2 *a*, animal, enlarged (the posterior antennæ omitted); 2 *b*, one of the six posterior natatories; 2 *c*, right foot of genital pair; 2 *d*, left foot, ditto.

Collected in the Atlantic, 4 A. M., November 3, 1838, latitude 0° 40′ south, longitude 18° west; perhaps the same, latitude 7° 25′ north, longitude 20° west, October 17, 1838.

Length, one-twelfth of an inch. Colour, blue, with a broad yellowish band across the cephalothorax; middle portion of the extremity of the antennæ, red. The inferior eyes are much prolonged, and in a vertical view, the pigment extends forward to the front. The posterior acute angles of the cephalothorax are much prolonged, and the right, in the male specimen examined, was nearly as long as the abdomen. The caudal stylets are rather longer than half the abdomen; and the margin from which the setæ proceed extends from the middle of the outer side to the inner apex. The inner seta is but slightly shorter than the second. The left anterior antenna has a seta to the eleventh joint from the extremity, a little longer than others near. The right has the first joint short; the second much

oblong, with a few setæ hardly as long as the diameter of the joint. The third joint is half shorter, and smaller at base; the fourth at base is about two-thirds its length, and has the posterior side nearly straight, and there is a stout spinous prolongation of the anterior apex. The fifth and sixth joints are quite slender, and each not longer than the fourth; the following part appears like a single joint, though consisting normally of three joints, and having the setæ of three, like the left antenna.

The second (or third ?) joint of the right posterior foot is stout and oblong subterete; and from the basal part proceeds a long spine, bent at first backward, and then around and forward, three times as long as the joint. At apex, this joint is articulated with an acute spiniform finger, but little longer than the preceding.

Natatories four pairs, the anterior half smaller than the others, which are nearly equal. The longer branch three-jointed, the shorter in all, two-jointed.

Pontellina pulchra.—Figs. 3 *a*, *b*, *c*, *d*, *e*, on Plate 81, represent a species which in many respects resembles the preceding. The position of the antennæ in the figure may not be accurate, as in a few earlier drawings made, the importance of strict accuracy in this point was not appreciated. It has the antennæ of a female; yet the posterior thoracic feet are large and the right is prehensile, as in fig. 3 *e*. The hand of the right foot is made of a large broad joint, nearly quadrate, articulated with the preceding near one angle, and bearing towards the other of the same side a long stout spine, which projects first backward and then bends around forward, and is incurved at apex. The moveable finger is arcuate, and is articulated with the large joint directly opposite the base of the spine described. The species has the inferior eyes large and very much elongate as in the *P. perspicax*. The longer branch of the posterior antennæ is more than twice the length of the shorter, and its setæ are longer than the branch. The anterior apical seta of the anterior antennæ is a little longer than the joint. The posterior angles of the cephalothorax are much prolonged and acute, being longer than half the abdomen. The abdomen is five-jointed. The caudal stylets are shorter than in the *perspicax*, being about as long as the last joint of the abdomen; and there are four subequal setæ, with an outer much shorter. Natatories four pairs,

the first smallest; shorter branch of each two-jointed. Length, one-tenth of an inch. Collected in the Atlantic, October 17, 1838, latitude 7° north, longitude 23° 45′ west.

PONTELLINA STRENUA.

Maris:—*Frons acutiusculus. Cephalothorax* 5–6-*articulatus, angulis posticis elongate acutis, capite discreto. Oculi superiores remoti, inferiores mediocres. Antennæ anticæ fere corporis longitudine,* 80°–90° *divaricatæ,* 17–18-*articulatæ, ad medium obsoletè flexæ, setis brevibus, anticis apicalibus articulo duplo longioribus. Antenna antica dextra* 12–14-*articulata, articulo mediano subovato, apice antico acuto. Ramus major antennarum posticarum fere triplo longior. Pes posticus dexter crassiusculus, manu ellipticâ, breviore quam carpus, digito immobili tenuissimo, acuto, parce longiore, digito mobili mediocri, subulato, rectiusculo. Styli caudales breves. Styli caudales paulo oblongi.* [*Abdomen* 5-*articulatum.*]

Male:—Front rather acute. Cephalothorax five- to six-jointed, posterior angles long acute and remote, head separate, posterior segments four, the last very short. Superior eyes distant, inferior of moderate size. Anterior antennæ about as long as the body, diverging 80° at base, and apical half about 90°, seventeen- to eighteen-jointed, near middle a slight flexure; setæ short, the anterior apical more than twice as long as the joint. Right antenna twelve- to fourteen-jointed, a median joint broad subovate, with an angle on the posterior side near base, and the anterior apex acute. Posterior antennæ having one branch nearly three times longer than the other. Right posterior leg rather stout, hand oval, shorter than the carpus, immoveable finger very slender, acute, sparingly the longer, moveable finger of moderate size, subulate, nearly straight. Caudal stylets a little oblong. [Abdomen five-jointed.]

Plate 81, fig. 4 *a*, animal, enlarged; *a′*, extremity of left antenna; *b*, part of male antenna; *c*, profile of head; *d*, posterior feet.

Collected at 4 h. A. M., April 2, 1841, in the Pacific, south of the Kingsmills, latitude 3° south, longitude 175° east.

Length, one-twelfth of an inch. Colour, blue, with the abdomen wine-yellow and yellowish carmine; base of caudal setæ, wine-yellow. The head is shorter than broad. The pigment of the inferior eyes in a vertical view appears just behind the superior eyes. The caudal stylets are short; the length not twice the breadth. The large joint in the right male antenna is scarcely twice as long as broad; it is prominently convex on the anterior side, and angled on the posterior side near base; the next joint is oblong terete, with the margin minutely pectinate; the following joint shorter and more slender.

The right posterior foot has the second joint oblong, subterete; the third stout suboval, with a stout spine as long as second joint, proceeding from one side near base; the fourth a finger nearly straight, as long as the third, and having one or two minute spines on the inner margin. The segments of the abdomen are transverse, and the third had a process on the right side.

This species resembles the preceding, but differs widely in the size of its inferior eyes, its shorter caudal stylets, the posterior feet, &c.

PONTELLINA PROTENSA.

Maris:—*Crassa. Frons rotundatus. Cephalothorax* 5–6-*articulatus, capite discreto, brevi, angulis posticis elongatè acutis. Oculi superiores remoti, inferiorès mediocres. Antennæ anticæ corpore breviores, basi vix* 60° *divaricatæ et medio fere* 70°, *setis brevibus, apicali anticâ articulo longiore, posticâ penultimâ paulo breviore, aliis subapicalibus perbrevibus. Antenna antica dextra fere ac in* P. strenuâ. *Ramus antennarum posticarum major plus quaruplo longior. Styli caudales oblongi.* [*Abdomen* 5-*articulatum.*]

Male:—Stout. Front rounded. Cephalothorax five- to six-jointed, posterior angles long acute and remote, head separate, posterior segments three. Superior eyes remote, inferior rather small. Anterior antennæ shorter than the body, diverging less than 60°, near middle very slightly bent and then diverging about 70°; setæ short, anterior apical longer than the joint, posterior penult a little shorter, other apical short, other subapical very short. Right antenna very nearly as in the *P. strenua.* Longer branch of posterior antennæ four times as long as the other branch. Caudal stylets elon-

gate, setæ five, of moderate length. [Abdomen five-jointed, third segment having a small process on the right.]

Plate 81, fig. 5 *a*, animal, enlarged; *a'*, extremity of antenna; *b*, posterior part of cephalothorax in one specimen.

Collected in the Straits of Banca, east of Sumatra, March 1, 1842; also, March 4, at the east entrance of the Straits of Sunda.

Length, one-tenth of an inch. Colour, yellowish, clouded with red either side of intestine. This is a short and thick species, having the thorax broad behind and long acute, and the antennæ thrown very much forward. The right male antenna is similar to that of the preceding species.

The pigment of the inferior eyes in a vertical view forms a blue spot, of reniform shape, just posterior to the superior eyes. The caudal setæ are subequal and nearly as long as the abdomen. The anterior antennæ have the apical joint a little longer than either of the two preceding. In the right antenna, the geniculating articulation is just anterior to the last four joints, or normally the last five, the first of the four being a double joint. The joint preceding the articulation is a little longer than the following one, and both are straight. The minute pectination is nearly as in the *P. strenua*. The right posterior angle of the cephalothorax is more prolonged than the left, and is incurved; and in one specimen there was a tooth on the inner side. The shorter branch of the posterior antennæ is very short, not one-fourth the longer.

III. Subgenus PONTELLA.

Pontella hebes.

Feminæ:—*Frons truncatus. Cephalothorax 4-articulatus, posticè rotundatus. Oculi superiores disjuncti, inferiores parvi. Antennæ anticæ fere corporis longitudine, transversæ, apicibus fronte paulo anterioribus, prorsum parce curvatis, prope basin setis confertis longiusculis, et unâ sublongâ mobili, setis apicalibus articuli longitudine, posticâ*

penultimâ paulo longiore, aliis subapicalibus brevibus. Styli caudales vix oblongi. [*Abdomen* 3-*articulatum.*]

Female:—Front truncate. Cephalothorax four-jointed, rounded behind. Superior eyes a little separate, inferior quite small. Anterior antennæ nearly as long as the body, the two after the curve at base in the same straight line, the tips curving forward, yet but little anterior to line of front, setæ rather short, a crowded tuft towards base, and one seta longer than the others proceeding from the second joint, apical setæ as long as joint, posterior penult a little longer, other subapical setæ short. Caudal stylets short, hardly longer than broad. [Abdomen three-jointed, first segment elongate.]

Plate 81, fig. 6 *a*, animal, enlarged; *a'*, view of front and base of antenna; *b*, superior eyes.

Collected, March 3, 1842, latitude 4° 20′ south, longitude 106° east, southeast of Sumatra.

Length, one-sixteenth of an inch. Colour, pale brownish. The cephalothorax is broadest posterior to middle, and the front is strikingly truncate between the antennæ. The anterior antennæ are in the same straight line, excepting the curves at base and apex. The longer seta near base is moveable in every direction; its length is about equal to the first three joints of the antenna. The shorter branch of the posterior antennæ is hardly a fourth shorter than the other. The pigment of the inferior eyes is quite small, and is seen in a vertical view, sometimes behind and sometimes beneath the superior eyes. There are metallic reflections from the pigment of the superior eyes. The caudal stylets are but little longer than broad.

This species is near *Pontella crispata*, but has the head laterally armed, the antennæ not thrown so much forward, and other differences.

Pontella frivola.—Plate 81, fig. 7. This may be only a variety of the last, as the general form is the same, the laterally armed head, the length, position, form, and terminal setæ of the anterior antennæ, the posterior antennæ, the position and size of the eyes. Yet, the posterior angles of the cephalothorax are rather long acute, while there are

no angles in the specimen of the *hebes* examined; the abdomen is four-jointed, instead of three, the longish seta near the base of the anterior antennæ was not observed, or not one nearly as long. It may be that this is the result after an additional moulting, and that both are thus related.

The following may possibly be *male of this species.*

Cephalothorax rather slender, posterior angles long acute; head separated by an imperfect suture, laterally armed; posterior segments three. Abdomen four-jointed. Caudal stylets short, setæ unequal, the second half longer than the others. Superior eyes separate, inferior quite small. Anterior antennæ a little shorter than the body, divergent about 170°, tips curving forward a little; the right few-jointed, subterete, joints 2, 3, 4, 5, 6, oblong, the third rather stout, 7, 8, 9 (the terminal) short; setæ rather short, apical and posterior antepenult not longer than the joint, the posterior penult one-half longer, the anterior antepenult very short. Posterior antennæ very slender, branches about equal, the setæ not longer than the branches.

Plate 81, fig. 8 *a*, animal, enlarged; *a'*, extremity of antenna.

Collected in the East Indies, west of the Island of Panay, January 28, 1842.

Length, one-twelfth of an inch. Nearly colourless; caudal setæ and anterior antennæ, brownish yellow; alimentary canal, light green. This resembles the preceding; but the posterior antennæ are remarkably slender, and the branches are about equal. Owing to this last character, I have doubted its being the *male* of the preceding. The caudal stylets are a little longer than broad. In the right antenna of the male, near the base of the third joint, there is a seta about as long as the second joint; on the fourth joint, which is the longest and largest of the antenna, there are two longish setæ distant from one another; this joint has two transverse sutures towards its base; at the apex of the next joint there is a seta as long as the last joint of the antenna. The pigment of the inferior eyes is quite small, and is seen in a vertical view behind the superior eyes.

PONTELLA DETONSA.

Caput discretum, subtriangulatum, fronte obtusiusculo. Cephalothorax 7-articulatus, segmento septimo brevissimo, posticè obtuso aut obtusiusculo. Oculi superiores remoti, inferiores majusculi, vix elongati. Antennæ anticæ cephalothorace breviores, rectæ, fere 100° *divaricatæ,* 20–22-*articulatæ, setis totis perbrevibus. Antenna dextra* maris *paululum incrassata, teretiuscula, fermè* 20-*articulata. Styli caudales elongati, vix divaricati.* [*Abdomen* 3-*articulatum.*]

Head separate, subtriangular, front rather obtuse. Cephalothorax seven-jointed, short and subobtuse behind, head separate, posterior segments four, last very short. Superior eyes distant; inferior of moderate size. Anterior antennæ shorter than cephalothorax, straight, divergent about 100°, twenty- to twenty-two-jointed, joints very short, setæ all very short, neither apical nor subapical as long as the joints. Right antenna of *male* a little incrassate, nearly terete, about twenty-jointed. Caudal stylets elongate, longer than half the abdomen, hardly divaricate. [Abdomen three-jointed, second segment the shortest.]

Plate 81, fig. 9 *a*, animal, enlarged; *b*, profile of head; *c*, extremity of left antenna of male, or of either in female; *d*, supposed to be right antenna of another specimen; *e*, front view of beak; *f*, mandible and palpus; *g*, maxilla; *h*, maxilliped; *i*, upper view of head, in another specimen. Also, fig. 10 *a*, view, enlarged; *a'*, extremity of antenna.

Collected a few individuals in the Pacific, latitude 18° 10′ south, longitude 125° 20′ west, August 8, 1839 (fig. 9 *a, b, c, e, f, g, h,* from the specimens of this date); also, specimens supposed to be the same species, just north of the Navigator (Samoan) Islands, latitude 12° 45′ south, longitude 171° west, February 5, 1841 (fig. *d* from this specimen); also, latitude 5½° south, longitude 175° 50′ east, near El Gran Cocal, March 25, 1841 (fig. 10 *a, a'*); also, probably the same, off the south end of Mindoro, in the East Indies, January 24, 1842 (fig. 9 *i*).

Length, one-tenth to one-fifteenth of an inch. Colour, deep blue. This is rather a stout species, with a triangular head laterally armed, and very short points (if any) at the posterior extremity of the cephalothorax, the fourth of the posterior segments being extremely short. The joints of the antennæ are all very short except the second; the setæ are all remarkably short, and those at apex are straight. The abdomen sometimes shows in addition to the three segments mentioned, a short basal segment; the length of the whole is scarcely one-fourth that of the cephalothorax. The stylets are longer than half the abdomen, and a little divergent.

The superior eyes have a deep carmine pigment. The pigment of the inferior eyes, as seen in a vertical view, forms a rather large spot, a little oblong transversely, and is seen just behind the superior eyes. The segments of the abdomen are variable.

The right antenna (fig. 9 *d*), in a specimen collected February 5, 1841, differed from the left; but as the posterior feet were quite small, there was no reason to consider the specimen a male. It had the same number of joints as the left, but was slightly enlarged along the middle.

Figure 3, Plate 82, represents a specimen obtained in the Pacific, north of the Samoan Islands, February 1, 1841, which is probably a variety of the *detonsa*. The anterior antennæ diverged about 115°; the setæ were all short, the apical and subapical very nearly equal, the anterior apical barely exceeding the joint in length.

The *Pontia Savignii* of Edwards (Ann. des Sci. Nat., xiii. 1828, 296, Pl. 14), has the short antennæ and some other characters of the female of *P. detonsa*. But the hairs of the anterior antennæ as represented differ, being much longer, those of the joints about the middle of the organ being twice as long as the joints, and these joints more than twice as long as broad; moreover, the apical and subapical setæ are very different; and the maxillæ are also of different form.

PONTELLA ARGENTEA.

Caput discretum, subtriangulatum, fronte obtusum. Cephalothorax 5 (–6)*-articulatus, posticè brevissimè acutus, segmentis tribus posticis subæquis. Oculi superiores remoti, inferiores majusculi non elongati.*

Antennæ anticæ cephalothorace breviores, fere 90° *divaricatæ et levissimè incurvatæ,* 18–20-*articulatæ, setis totis perbrevibus, duabus apicalibus subuncinatis, articulo brevioribus. Styli caudales parce oblongi.* [*Abdomen* 3-*articulatum.*]

Head separate, subtriangular, front obtuse. Cephalothorax short, short acute behind, five- or six-jointed, posterior segments three, abruptly smaller. Superior eyes very remote, inferior of moderate size. Anterior antennæ shorter than the cephalothorax, nearly 90° divaricate, slightly incurved, 18–20-articulate, setæ all very short, the apical two sparingly uncinate, shorter than the joint. Caudal stylets sparingly oblong. [Abdomen three-jointed, the third segment oblong.]

Plate 81, fig. 11 *a*, animal, enlarged; *a'*, extremity of antenna; *b*, base of the same; *c*, beak, nearly in profile; *d*, under view of inferior eyes.

Collected several specimens in the Atlantic, latitude 45° 35′ south, longitude 60° west, January 24, 1839, just before reaching Rio Negro, Patagonia.

Length, one-twelfth of an inch. Colour, bright copper-green, with silvery or pearly reflections from the back, sides dirty orange. Some large deep blue glands posteriorly in the cephalothorax. This is a stout species like the last, and has also short, many-jointed antennæ. It differs in the posterior extremity of the thorax and the slightly incurved antennæ, as well as the uncinate setæ at apex. The sides of the cephalothorax are nearly parallel. The caudal stylets are rather stout, and the outer margins of the two are divergent. The segments of the thorax are abruptly smaller, each than the preceding. There are four pairs of natatories, the anterior of which is much the smallest. The mass constituting the inferior eyes has a subreniform shape, and appears to show by its form and appearance that there are actually two eyes. The shorter branch of the posterior antennæ is about three-fourths the length of the longer.

PONTELLA SPECIOSA.

Caput discretum, subtriangulatum, fronte obtusum. Cephalothorax 5–7-*articulatus, posticè acutus aut obtusiusculus. Oculi superiores remoti, inferiores mediocres. Antennæ anticæ cephalothoracis longitudine, fere rectæ, prope* 110° *divaricatæ,* 21–22-*articulatæ; setis brevibus, apicali anticâ et penultimâ posticâ longioribus, articulum paulo superantibus, apicali posticâ et antepenultimâ posticâ brevioribus, anticâ penultimâ perbrevi. Antenna dextra* maris *pauciarticulata, articulo quinto latè ovato. Pes posticus dexter* maris *crassus, manu latâ, apice truncatâ et obtusè dentatâ, digito immobili e basi manus producto, elongato, spiniformi, digito mobili prælongo, incurvato. Styli caudales oblongi.*

Head separate, subtriangular, front obtuse. Cephalothorax five- to seven-jointed, posterior angles acute or subobtuse, posterior segments three (sometimes four and obtuse behind). Superior eyes remote, inferior of moderate size. Anterior antennæ about as long as the cephalothorax, nearly straight, about 110° divergent, twenty-one- to twenty-two-jointed; setæ short, anterior apical and posterior penult rather longer than the apical joint, the posterior apical and antepenult shorter, the anterior penult very short. Right antenna of *male* few-jointed, fifth joint large and broad ovate, the following five (or last) slender. Right posterior leg of male stout, hand broad, truncate at apex and obtusely dentate, immoveable finger produced from base of hand, elongate, spiniform, moveable finger very long, incurved. Caudal stylets oblong, second seta nearly half the longest. Abdomen four-jointed.

Plate 82, fig. 1 *a*, view, enlarged; *a'*, profile of head in some individuals; *b*, posterior feet, enlarged two diameters more than fig. *a*; *c*, extremity of thorax and abdomen in some small individuals.

Abundant, March 4, 1841, at the eastern entrance of the Straits of Sunda.

Length, one-twelfth of an inch. Colour, deep green, with a broad silvery band (as long as broad) across the middle of the cephalothorax.

The pigment of the inferior eyes is seen in a vertical view just behind the superior eyes, and is transverse, being slightly oval. The antennæ have the setæ towards the base numerous, and but little longer than two diameters of the joints. The male right antenna is bent outward a little at the large joint, and again forward at the third articulation from the extremity. The character and colour presented in figure 1 *a*, were constant for the larger specimens. But some smaller individuals had the cephalothorax obtuse behind, with a very short posterior segment (as in fig. 1 *c*), and the abdomen was only two-jointed. The length of the caudal stylets is more than twice their breadth.

The beak in many individuals was large ventricose at base, as shown in figure 1 *a'*.

The right posterior leg of male is very large. The second joint is stout oblong. The next is very broad, subtrapezoidal, with the upper side arcuate, and the two others nearly straight, the one opposite the articulation with the second joint dentate, the other bearing two remote setæ; the base of this joint is prolonged outward into a long, curving spine, into which the joint diminishes. The fourth joint is a long arcuate finger articulated with the more distant angle of the dentate side of the third joint. The left leg of the same pair is simple, and terminates in a short joint, bearing four bent unequal spines.

The males and females contain within a deep blue glandular mass, which extends along either side, somewhat irregularly, nearly to the base of the posterior antennæ, and two spots of similar colour appear through the silvery back, one behind the other.

Var. *formosa*. (Plate 82, fig. 2 *a*, *a'*.)—The individual here figured closely resembles the preceding, and was collected at the same time. The anterior and posterior antennæ, the eyes, and the caudal stylets, are similar to the above; so also the general form of the body, except that there were four posterior segments to the cephalothorax, the last very short, and the posterior angles were less prominent; also, the abdomen was three-jointed. The anterior antennæ were a little shorter than the cephalothorax; the second joint shorter than in the preceding, owing apparently to articulations across its apical portion, which thus make twenty-three or twenty-four joints to the antenna. The colour strikingly differs, the body being clear yellow, verging to

orange, with a broad crimson band across the middle. Only this one specimen was seen, while of the former, having a green colour and silvery back, there were great numbers uniformly alike in colour, both male and female. A pair of oblong blue glandular masses were observed in the posterior part of the cephalothorax, and also in the anterior part, either side of the mouth; also, two small spots of the same colour were situated near the middle of the cephalothorax, on the medial line.

PONTELLA PRINCEPS.

Feminæ: —*Caput discretum, subtriangulatum, fronte obtusiusculum. Cephalothorax* 6-*articulatus, posticè elongatè acutus, articulis tribus posticis subæquis. Oculi superiores remoti; inferiores mediocres, parce elongati. Antennæ anticæ cephalothoracæ parce breviores, rectiusculæ, fermè* 110° *divaricatæ, setis brevibus, apicali anticâ articulos duos æquante, ceteris apicalibus et subapicalibus brevioribus. Styli caudales perbreves.* [*Abdomen* 4-*articulatum, distortum.*]

Female:—Head separate, subtriangular, front rather obtuse. Cephalothorax stout, posterior angles long and divaricately acute, posterior segments three. Superior eyes remote, inferior a little elongate. Anterior antennæ slightly shorter than cephalothorax, nearly straight, divergent 110°; setæ short, anterior apical about as long as two joints, the other apical and the subapical not longer than a joint or shorter. Shorter branch of posterior antennæ about half the other in length. Caudal stylets very short; setæ spreading. [Abdomen four-jointed, gibbous.]

Plate 82, fig. 4 *a*, animal, enlarged; *a'*, extremity of an antenna; *b*, beak, in profile; *c*, posterior part of cephalothorax and abdomen, in profile.

Collected, March 29, 1840, in the Pacific, two hundred and fifty miles south by west from Tongatabu, on a calm day.

Length, one-fourth of an inch. Colour, deep blue, with a pearly white back. This is the largest Pontella seen by the writer. The

antennæ have a seta a little longer than others at the apex of the fourth joint from the apex; those setæ near the base were mostly about two diameters of their joints in length. The four terminal joints are short, and so also their setæ, except the anterior apical seta, which is as long as two joints.

The posterior of the cephalothorax has a tooth either side of the abdomen, some distance within the long acute points. The abdomen appears distorted, it having an angle on the left near the middle, and an acute process above (see fig. 4 *a* and *c*). The beak is short and directed downward, or is but a little inflexed.

PONTELLA FERA.

Caput vix discretum, subtriangulatum, fronte rotundatum. Cephalothorax 6–7-*articulatus, posticè obtusus aut obtusiusculus, segmento postico brevissimo. Oculi superiores remoti, inferiores grandes, non elongati. Antennæ anticæ vix cephalothoracis longitudine, fermè* 21-*articulatæ,* 130° *divaricatæ, setis prope basin sublongis, confertis, aliis brevibus, apicali anticâ et penultimâ posticâ articulo vix longioribus. Antenna antica dextra* maris *subteres,* 11–12-*articulata, articulo secundo longo, tertio brevissimo, quarto sub quinto producto, proximo spinam reversam ferente. Pes posticus dexter* maris *tenuis, manu subcylindricâ, ad apicem breviter acutâ, ad medium spinam longam uncinatam gerente, digito mobili tenuissimo, ad apicem spatulato et concavo. Styli caudales elongati, divaricati.*

Head hardly separate, subtriangular, rounded in front. Cephalothorax six- to seven-jointed, behind subacute or obtuse, posterior segments four, the last very short. Superior eyes remote, inferior of moderate size. Anterior antennæ nearly as long as the cephalothorax, about twenty-one-jointed, diverged 130°; setæ towards base crowded, anterior apical longer than the joint, posterior penult a little shorter, the other terminal short. Right antenna of male subterete, eleven- to twelve-jointed, second joint oblong, third very short, fourth extends along the posterior side of the fifth, sixth bearing a short reversed spine, the following one slender, anteriorly excavate, the remaining four slender. Right posterior foot of male slender, hand subcylindrical, short acute at apex, having a long

uncinate spine near middle, finger very slender, spatulate, and concave at apex. Caudal stylets long, divaricate.

Plate 82, fig. 5 *a*, animal, enlarged; *a'*, extremity of female antenna; *b*, part of male right antenna; *c*, profile of head; *d*, front view of beak; *e*, abdomen of a male; *f*, profile of female abdomen; *g*, another female abdomen, upper view; *h*, lips; *i*, view of mandible; *j*, mandible (in another position) and its palpus; *k*, maxilla; *l*, right posterior foot.

Collected several individuals, February 1 and 5, 1840, in the Pacific, north of the Samoan Islands, latitude 11°–12° 45′ south, longitude 170°–171° west.

Length, one-twelfth of an inch. Colour, deep blue, sometimes a little pearly white along the back. This species has the antennæ more divergent than the preceding, and the long caudal stylets are divaricate. The male is not quite as stout as the female. The setæ towards the base of the antennæ are two or three diameters of the joints in length, and are somewhat curved. The smaller branch of the posterior antennæ is about as long as the longer, exclusive of the last joint. The pigment of the inferior eyes forms a rounded spot, slightly transverse, posterior to the superior eyes. The abdomen is five-jointed in the males, diminishing gradually from the first. The female abdomen has but three segments, the second large ovate, occupying more than half its whole length; the apical is short. In one female there was a recurved process on the right side. The stylets are about half as long as the abdomen, or a little exceed half in females. The longest of the caudal setæ is about as long as the abdomen and stylets.

Mandibles and maxillæ as in the figures.

The male right antenna has no ciliation on the posterior side along the basal half, like the left antenna. The second joint is also much longer; the fourth and fifth together form properly a single joint, the fourth being short, except that it is prolonged below the fifth; the fifth has two or three long setæ at apex, directed outward in the line of the antennæ. The last three joints are like those of the left antenna, but are together somewhat arcuated.

The right posterior foot has the third joint oblong and articulated

with the preceding below its middle; one extremity is bent, and terminates in a stout but short spine, the other is articulated to a long very slender joint, which has a spatulate or spoon-shaped extremity that plies against the spine alluded to. On one side of the third joint there is nearly at right angles with it, another spine, longer and more slender, and bent; also, on the inner side there are one or two dentations.

PONTELLA VALIDA.

P. feræ *affinis*. *Caput discretum. Cephalothorax postice breviter acutus. Oculi superiores remoti. Antennæ anticæ cephalothorace non breviores, setis brevibus, apicali anticâ longiore;* maris *dextra subteres, medio* (*articulis* 5–8) *incrassata, parte crassâ postice leviter subtriangulatâ vel arcuatâ, transversim* 4-*articulatâ, articulo sequente longo, ad basin spinâ reversâ antice armato. Pes posticus dexter* maris *latus et crassus, manu oblongâ, ad apicem inferiorem spinam longam parce arcuatam gerente, digito crasso.*

Near *P. fera*. Head separate. Cephalothorax short acute behind. Superior eyes remote. Anterior antennæ as long as cephalothorax, setæ short, the anterior apical seta longest. Right antenna of *male* subterete, incrassate at middle, the incrassate part subtriangular or arcuate behind, transversely four-jointed, the next joint long, and having a reversed spine at base on anterior side. Right posterior foot in *male* stout and broad, hand oblong, at lower apex bearing a long somewhat curved spine or immoveable finger, finger stout.

Plate 82, fig. 6 *a*, front, showing beak in profile, and lens of one of the superior eyes; *b*, right antenna of male; *c*, part of same, more magnified; *d*, natatory of first pair; *e*, ibid. of fourth pair; *f*, posterior legs of male; *g*, abdomen of a male (abnormal form).

North of New Zealand, towards Tongatabu.

Length of body, one and a half lines. Although this species resembles the *fera* in its male antennæ, it still differs in the articulations of the incrassate part; and the posterior feet in the male are

very unlike those of that species; in this, the long spiniform immoveable finger extends transversely; the moveable finger is terminal, while in the *fera* it is medial; moreover, the moveable finger is quite stout and does not enlarge towards the extremity. The spiniform immoveable finger has on its inner side a rasp-like surface. Of the last three joints of the male right antenna, the antepenult is much the longest; the posterior penult seta is a little longer than the apical joint; the other subapical setæ are shorter.

Genus CATOPIA, *Dana*.

Quoad antennas posticas et habitum antennarum anticarum Calano *affinis; antennam maris anticam dextram* Pontellæ *affinis. Oculi superiores nulli. Oculus inferior unicus* (?).

Allied to the *Calani* in the posterior antennæ and the position of the anterior; and to the *Pontellæ* in the right antenna of the male. Superior eyes wanting. Inferior eye single (?).

The species of this genus observed, has the habit of a Calanoid Pontella (*P. elliptica*, &c.); the anterior antennæ having a double curvature with the tips not in advance of the line of the front, and the posterior having three setæ to apex of one branch, and several setæ on back side of first joint of same branch. Like the Pontellæ, it has the right male antenna geniculating. The setæ of these antennæ are short, and are arranged along the anterior margin. It differs from the species of all other Calanidæ observed, in having no superior eyes. The lens of only one inferior eye was observed, although the specimen was examined with much care. It presented a distinct spherical lens, of unusually large size, with deep red pigment behind. The pigment was deepest in colour at a distance from the lens, and anteriorly about the inner portion of the lens there was an orange-yellow colour.

Catopia, Dana, Proc. Amer. Acad. Sci., ii. 25, where the following new species is described by the author.

CATOPIA FURCATA.

Gracilis. Caput quadratum, non discretum. Cephalothorax 4-articulatus, posticè 4-spini-dentatus, dentibus externis longioribus. Antennæ anticæ corpore longiores, duplo curvatæ, multi-articulatæ, graciles, medio parce incrassatæ, apicibus fronte non anterioribus: setis totis brevibus, anticâ apicali et posticâ penultimâ articulo non longioribus, anticâ penultimâ et antepenultimis valde brevioribus. Antennæ posticæ parvulæ. Abdomen 5-articulatum. Styli caudales elongati, dimidio abdominis longiores, divaricati, setis inæquis.

Slender. Head quadrate, not separate. Cephalothorax four-jointed, posterior extremity with four spinous processes, the two inner smaller than the outer. Anterior antennæ longer than the body, doubly curved, tips in the line of the front, many-jointed, slender, at the middle sparingly incrassate; setæ all short, the anterior apical and posterior penult as long as the joint of each, the anterior penult and the antepenult much shorter. Posterior antennæ quite small. Abdomen five-jointed. Caudal stylets slender, more than half the length of the abdomen, divergent; setæ unequal.

Plate 79, fig. 1 *a*, animal, enlarged; *a'*, side view of head, more enlarged; *b*, extremity of left antenna; *c*, enlarged view of geniculating articulation in right antenna; *d*, base of antenna, showing short stout spines.

Straits of Banca, March 2, 1842.

Length, one-sixteenth of an inch. Colourless, or nearly so.

The view of the head in fig. 1 *a*, shows the spherical lens under an exterior hemispherical cornea, and connected within with a mass of pigment. A filament, supposed to be nervous, connects with a mass just behind; while another, apparently muscular, extends upward, although lax, and is attached to the shell. The lens was observed to be in constant vibration beneath the cornea. The beak is very short.

The geniculating joint of the right antenna is situated just anterior to the last five joints; the first and second of the five, however, are

coalesced in one. The six joints preceding the geniculating joint are a little enlarged to contain the flexor muscle. Near the base of the antennæ there are three short stout spinules.

Family II. CYCLOPIDÆ.

The Cyclopidæ are closely related to the Calanidæ. In some species, the mandibular and maxillary palpi are considerably developed, and show forms similar to those of the preceding family, although these parts are always much less prominent and the setæ less spreading. The subprehensile character of the first pair of legs, at times becoming perfectly prehensile with a well-formed monodactyle hand, is the more striking characteristic of the family; for in the Calanidæ these legs never have this character. In this peculiarity, they resemble the *Corycæidæ*. They also often have appendages to the first or second abdominal segment, which do not occur in any Calanidæ.

The eyes are situated on a single spot of pigment, which is sometimes subquadrate in form. The inferior eyes are not found in this family.

The cephalothorax is either four- or five-jointed. These segments, as shown in figures 1 B, 2, and 8 (Plate 70) never include the seventh, which is common in Pontella, neither is the first or cephalic segment separated from the following by the suture *a* in any observed species of the group; and it is rarely the case that a suture *b* is present, shown in figure 2, by which method alone the number of segments becomes *five*. In this case, according to a figure by Philippi, of a species of his genus Laophon, the anterior of the five segments bears the two pairs of antennæ, the mandibles, one pair of maxillæ, one pair of maxillipeds, and the anterior feet; the second segment and the following three bear each a pair of legs. There does not appear to be the same variations in the number of thoracic articulations among closely similar species in this family as in the Calanidæ: on the contrary, there is a remarkable constancy among the species of a given type; and, consequently, the number of segments may be used as a generic character.

The anterior antennæ never attain the length found in some Calanidæ, and are generally quite short, though occasionally as long as the body. Unlike those of the Calanidæ, they are frequently furnished with a lateral appendage (figs. 42 *a*, 43, Plate 70). In males, either both of these antennæ are furnished with a geniculating joint for grasping in coition, or else neither is so modified. (Figures 18 *a* and 18 *b*, are male and female, so also, 19 and 20, and 42 *a* and 42 *b*.) And when not thus modified, these organs have often an unusual degree of flexibility, as in *Setella* and *Clytemnestra*.

The posterior antennæ terminate in setæ which act like fingers, and generally they have a small accessory branch.

The mandibles may have a distinct two-branched palpus, as shown in figure 62, Plate 71 (of a species of Harpacticus); it is but sparingly furnished with spreading setæ, though sometimes ending in one or two long hairs.

The maxillæ are small and lamellar, with a minute one- or two-jointed palpus.

The maxillipeds (fig. 76, Plate 71) sometimes approach the form in Pontella, or more nearly that of Oithona; they are armed anteriorly with setulous setæ and terminate in a nearly straight claw. In other cases, they are hardly flexed three-jointed organs, and have but few setæ.

The first pair of feet, often called jaw-feet, have a prehensile character. They may have the form of a monodactyle hand (figure 86), as in Setella, Harpacticus, &c., and have no accessory branch; or the structure may be imperfectly didactyle, as in Cyclops (fig. 89) where a small joint, ending in one or two stout setæ, acts against a projecting part of the preceding joint. In this genus, the leg has an accessory branch, which is one- or two-jointed and setigerous.

The second pair of feet is usually two-branched and setigerous, like the natatories following. But they may be nearly naked, excepting some short setæ or spinules, and sometimes one branch is obsolescent; and they are thereby fitted imperfectly for prehension. They have when thus modified, some lateral play, and appear at times to be used for grasping in coition. The natatories have the usual character. The posterior thoracic pair, pertaining to the twelfth normal segment, is obsolete or nearly so.

The abdomen is five- or six-jointed, and may or may not be abruptly smaller than the cephalothorax. The first joint is sometimes

concealed by the last thoracic segment or is obsolete. The first or second segment, or both, may bear appendages below, and the latter segment gives exit to the eggs, supporting the external ovarian sac or sacs.

The Cyclopidæ, like the Corycæidæ, include both subcylindrical and depressed species.

The species of the genus Cyclops carry two bags of eggs beneath the abdomen, while those of Harpacticus and the allied have but one. Two subfamilies are thus indicated, the CYCLOPINÆ and HARPACTICINÆ. The former species swim freely in the water, but are incapable of making any progress out of it. The latter, as far as examined by the author, have a much more flexible body, and with a sort of wriggling motion they move themselves readily over a wet surface. They often thus crawl out of the field of view, when upon a piece of glass under the microscope, although the water may be barely sufficient to keep the body wet. A Cyclops in the same condition could not crawl off, but might throw itself to a distance by a spring or leap, by means of the abdomen.

There appears also to be another group, containing some species with depressed bodies, described by H. D. S. Goodsir.* But the descriptions are too meagre and unsatisfactory for us to determine from them the characteristics of the group. The form is somewhat like that of Sapphirina; but the eyes are minute, and they are in general situated within a short projecting beak or prominence of the front. The superior antennæ are short, and in one species, they are represented with *two* branches, while in the Corycæidæ, the superior antennæ are always simple or without an accessory branch. The caudal stylets as represented by Goodsir are short subcylindrical, and in one species three-jointed.

Several new genera have been added to the family Cyclopidæ, by Philippi.† In some cases, we are left by this author in uncertainty, as to whether the genus is characterized by having two bags of eggs or one, and it is therefore doubtful to which subfamily they should be referred. His genera Euryta, Idomene, and Psammathe, we are therefore unable to refer to their true place. From the anterior antennæ being appendiculate, Euryta may be related to Harpacticus; yet both this and Psammathe appear to have the habit of Cyclops.

* Ann. and Mag. N. H., xvi. 1845, 325.

† Archiv f. Naturgeschichte, vi. 186, 1840, and ix. 54, 1843.

Dr. W. Baird, the author of the learned work on British Entomostraca has also added to the family a genus, called *Alteutha*, which is a depressed form of Harpacticus. His work also recognises the genus *Canthocamptus* of Westwood, which was instituted, as he shows, in 1846, for a group with *Cyclops minutus* of Müller for its type. Milne Edwards, in the third volume of his Histoire Naturelle des Crustacés, published in 1840, referred the species *Cyclops minutus*, Müller, to his new genus Cyclopsina, which was instituted also for the *C. castor*, one of the Calanidæ. Moreover, this author introduced the genus *Harpacticus* for the *Cyclops chelifer*, a related species. The same year Philippi proposed the name *Nauplius* (Archiv f. Naturg., vi. 189) for a genus identical with Harpacticus; and in 1844, M. Koch, in his Deutschl. Crust., gave the name *Doris* to a group having the *Cyclops minutus* for its type. Baird, in his recent work, adopts the genus Canthocamptus of Westwood, with the type *C. minutus*, and also, Harpacticus, with the type *C. chelifer*, distinguishing the two mainly by the size of the first pair of legs, this pair being very small in the former, and moderately large in the second. In form, these legs are essentially the same, although Dr. Baird's description seems to imply a difference besides that of size; and the distinction he adduces seems not to be important. The groups may, however, be distinct, if, taking the same types, we disregard the size of these legs, and look for a better characteristic to the next pair of legs. In the *C. minutus* and several species allied, the branches of this pair of legs are three-jointed, while in the *C. chelifer* they are two-jointed. On this ground, the genera may both be retained. The body is commonly nearly linear, or narrows gradually backward in *Canthocamptus*, with little or no interruption at the abdomen; while it narrows abruptly, as far as we have observed, in Harpacticus. The *Harpacticus nobilis* of Baird has one branch reduced to a single joint, and the thorax is very much thicker than the abdomen. This may be the type of another genus, for which we suggest the name *Westwoodia*.

These explanations prepare the way for the following synopsis of the subfamilies and genera of Cyclopidæ.

SUBFAM. 1. CYCLOPINÆ.—Sacculi ovigeri duo.

G. 1. CYCLOPS.—Cephalothorax 4-articulatus. Pedes 1mi articulo penultimo ad apicem internum elongato instar digiti immobilis, et digito mobili parvulo setigero. Corpus subcylindricum. Appendix abdominis basalis parva. Antennæ anticæ *feminæ* non appendiculatæ; *maris* articulatione geniculante confectæ.

An hujus sedis? PSAMMATHE, *Philippi.** — Cephalothorax 4-articulatus. Pedes 1mi lamellis duabus confecti. Corpus subcylindricum. Antennæ anticæ non appendiculatæ.

Quoque (?). IDOMENE, *Philippi.*†—Cephalothorax 5-articulatus. Pedes 1mi ac in *Cyclope*. Corpus subcylindricum. Appendix abdominis basalis sat magna, 2-articulata, setulosa.

Quoque (?). EURYTE, *Philippi.*‡—Cephalothorax 5-articulatus. Pedes 1mi unguibus duobus confecti. Corpus subcylindricum. Abdomen angustum. Appendix abdominis basalis nulla.

SUBFAM. 2. HARPACTICINÆ.—Sacculus ovigerus unicus.

1. *Cephalothorax 4-articulatus.*

G. 1. CANTHOCAMPTUS, *Westwood.*§—Corpus vix depressum, sæpius lineare vel sensim angustans. Pedes 1mi sæpissime parvuli; 2di biramei, ramis 3-articulatis. Antennæ 1mæ *feminæ* appendiculatæ, *maris* articulatione geniculantes. Appendix abdominis basalis sat parva.

G. 2. HARPACTICUS, *Edwards.*||—Corpus vix depressum, sæpius quoad abdominem subito angustius. Pedes 1mi monodactyli, sæpe majusculi; 2di biramei, ramis 2-articulatis. Antennæ 1mæ ac in *Canthocampto*.

G. 3. WESTWOODIA, *D.*¶—*Harpactico* affinis. Pedes 1mi monodactyli sat magni; 2di biramei, ramo uno perbrevi, 1-articulato.

G. 4. ALTEUTHA, *Baird.***—Corpus valde depressum. Pedes et antennæ ac in *Canthocampto* vel *Harpactico*. Appendix abdominis basalis valde elongata, falciformis.

G. 5. METIS, *Philippi.*††—Corpus subcylindricum. Frons appendicibus non instructus. Pedes 1mi ac in *Cyclope*. Antennæ 1mæ 2dis minores, appendiculatæ. Abdomen 5-articulatum.

* Philippi, Archiv für Naturgeschichte, vi. 1840, 189.

† Ibid., ix. 1843, 63.

‡ Ibid.

§ *Canthocamptus*, Westwood, Partington's Cyclop. Nat. Hist., Art. Cyclops, and The Entomologist's Text Book, 115; Baird, Trans. Berw. Nat. Club, i. 97, ii. 154, and Mag. Zool. and Bot., i. 326; *Cyclopsina* (in part), Edwards, Crust., iii. 427; *Nauplius* (in part), Philippi, Archiv f. Nat., vi. 1840, 189; *Doris*, Koch, Deutschl. Crust., 1841; *Harpacticus* (in part), Dana, Proc. Amer. Acad. Sci., i. 151, 1847.

|| *Arpacticus*, Edwards, Crust., iii. 430; *Nauplius* (in part), Philippi, Arch. f. Nat., vi. 1840, 189.

¶ *Arpacticus* (A. nobilis), Baird, Trans. Berw. Nat. Club, ii. 155, 1845, Ann. Mag. N. H., xvii. 416, and Brit. Entomost., 214.

** *Alteutha*, Trans. Berw. Nat. Club, ii. 155, 1845, and Ann. Mag. N. H., xvii. 416, and Brit. Entomost., 216.

†† *Metis*, Philippi, Archiv f. Naturg., ix. 59, 1843.

G. 6. CLYTEMNESTRA, *D.**—Corpus paulo depressum. Pedes 1mi portentosæ magnitudinis, monodactyli. Antennæ 1mæ *maris* articulatione non geniculantes, flexiles, longiores.

G. 7. SETELLA, *Dana.*†—Corpus perangustum, setis caudalibus prælongis, rectis. Frons appendices duas falciformes infra gerens. Antennæ 1mæ *maris* articulatione non geniculantes, appendiculatæ. Pedes 1mi monodactyli, mediocres. Appendices abdominis quatuor setigeræ.

2. *Cephalothorax* 5-*articulatus* (*Corpus subcylindricum*).

G. 8. LAOPHON, *Philippi.*‡—Pedes 1mi mediocres, monodactyli; 2di ramo uno sat longo, 2-articulato, altero rudimentario. Abdomen 5–6-articulatum, appendice basali majusculâ instructum.

G. 9. ONCÆA, *Philippi.*§—Pedes 1mi prægrandes, monodactyli. Abdomen 6-articulatum, appendice basali carens.

G. 10. ÆNIPPE, *Philippi.*‖—Pedes 1mi mediocres unguibus duobus confecti; 2di ramis duobus 3-articulatis. Abdomen 5–6-articulatum, appendice basali carens.

G. 11. IDYA, *Philippi.*¶—Pedes 1mi setis plurimis instar digitorum armati. Antennæ 2dæ ramo accessorio.

SUBFAM. 3. STEROPINÆ.—Habitu *Sapphirinis* paulo similes, sed oculis superioribus minutis conjunctis in processum rostriformem sæpe insitis, stylisque caudalibus vix lamellatis discrepant. Pedes 1mi monodactyli, ac in *Corycæo*. Antennæ breves.

G. 1. ZAUS, *Goodsir.***—Antennæ 1mæ birameæ. Styli caudales 3-articulati.

G. 2. STEROPE, *Goodsir.*††—Antennæ 1mæ simplices. Styli caudales uni-articulati.

Mr. Goodsir describes also another genus, which he calls *Carrillus;* but no satisfactory distinctive characters are mentioned. The antennæ are a little peculiar in having a clavate termination. These species, although like Sapphirina, are readily distinguished (if they are correctly figured by the author), by the caudal stylets, which have in that genus a character that cannot be mistaken.

Philippi has also described three genera of depressed or subfoliaceous species, which are of uncertain relations.

* *Clytemnestra*, Dana, Proc. Amer. Acad. Sci., i. 153, 1847.

† *Setella*, Dana, Amer. J. Sci. [2], i. 227, 1846.

‡ Philippi, Archiv f. Naturg. vi. 189, 1840.

§ Ibid., ix. 62, 1843. ‖ Ibid., ix. 61, 1843.

¶ Ibid., ix. 58, 1843.

** Ann. Mag. Nat. Hist., xvi. 1845, 326. In figure 6, Pl. xi., the antennæ of the first pair is represented as two-branched.

†† Ibid., 325.

His *Peltidium** closely resembles Sapphirina in habit and external form, and may be of that genus. The spectacle-eyes, or conspicilla, are not represented; but it was true also of the original description of Sapphirina, that they were overlooked.

Hersilia† is in all probability related to the Caligidæ, as Milne Edwards observes; and as the specimen was but one and a half lines long, it may have been young.

Thyone‡ is very peculiar in its appearance, differing much from the known genera of both the Cyclopoidea and Caligoidea. The outline on Plate 71, fig. 115, from Philippi, gives its general form. The body consists of but five segments, and the caudal stylets fill up a space in the extremity of the body, as in some Spheromidæ, instead of projecting beyond. The natatory legs have the usual Cyclops form, and are but six in number. The first pair of legs, or the pair anterior to the natatories, end in two small lamellæ, somewhat like those of Psammathe.§

Subfamily I. CYCLOPINÆ.

Genus CYCLOPS.

As in the preceding family, we number the caudal setæ 1, 2, 3, 4, 5, beginning with the inner one of each side. The first is shorter than the third, and the fourth is shorter than the first; the second is the longest; the fifth is quite short, and is situated on the outer side of the stylet.

The species of Cyclops swim freely, and with a saltating motion.

* Philippi, Archiv für Naturgeschichte, iv. 1839. † Ibid., p. 128.

‡ Philippi, Archiv für Naturgeschichte, iv. 1839. His description is as follows:—

"Corpus depressum, scutiforme, ovatum, segmentis 5 constans, segmento 1mo maximo. Cauda e lamellis duabus formata. Oculi duo confluentes. Antennæ 4; anteriores multiarticulatæ; inferiores 3-articulatæ, apice setis uncinatis, basi seta pectinata munitæ. Pes masticatorius [*nobis* pes 1mi] apice lamellis duabus laminatus. Pedes sex natatorii birami. Pedes spurii duo, lamellares, spatium inter segmentum penultimum caudamque opplentes."—Sp. *Th. viridis*, $\frac{1}{4}$''' long.

§ The new species of Cyclopidæ beyond, are briefly described in the Proceedings of the Amer. Acad. Sci., i. 1847.

In a view from above the jointed appendages are often concealed from sight excepting the two pairs of antennæ. The anterior antennæ extend laterally from either side of the head, usually with a double curvature, like either half of a bracket (⌒⌒). The posterior pair are either projected laterally, just behind the posterior, or else anteriorly, so as to appear in front of the head; and by means of the setæ, which may be spread or closed like the fingers of a hand, the animals may attach themselves to objects.

CYCLOPS BRASILIENSIS.

Cephalothorax posticè obtusus, abdominem longitudine superans. Antennæ anticæ in utroque sexu elongatæ (cephalothorace longiores), articulis primo secundoque majoribus et setis oblongis apice instructis, setis antennarum aliis brevibus; maris 7-*articulatæ, articulis tribus basalibus crassissimis, reliquis teretibus;* feminæ, 14-*articulatæ, teretes. Styli caudales oblongi, tres articulos abdominis ultimos simul sumtos fere æquantes; setâ secundâ fere abdominis longitudine, primâ dimidio breviore.*

Cephalothorax having the posterior angles obtuse, longer than the abdomen. Anterior antennæ of both sexes longer than cephalothorax, first and second joints largest and furnished with oblong setæ at apex, other setæ of the antennæ short. Antennæ of *male* seven-jointed, three basal joints very stout, the rest terete. Antennæ of *female* fourteen-jointed, terete. Caudal stylets oblong, as long as the last three abdominal joints; second seta nearly as long as abdomen, the first one-half shorter.

Plate 83, fig. 1 *a*, male, enlarged; *b*, lateral view, showing the beak and alimentary canal; *c*, second pair of antennæ; *d*, extremity of maxillipeds; *e*, one of the natatory legs; *f*, female antenna; *g*, abdomen, with external ovaries of female.

At Rio Janeiro, in stagnant pools, December, 1838.

The specimens of this species collected were colourless. Eyes placed on a large spot of pigment, of a reddish black colour. Abdo-

men six-jointed; the first or basal segment short, having two very short setæ on either side at apex of this segment and the following one. Anterior antennæ of the *male* have the first three joints quite stout, with a few short setæ on the front margin, and one or two at apex of first and second joints, which are as long as the first joint, or rather exceed it; other setæ of the antennæ much shorter.

The fourth joint of the anterior antennæ in the male corresponds to four joints in the female, as is apparent from indistinct articulations; the fifth corresponds to three, and the sixth to two joints in the female; so that the relation of the two may be expressed as follows:—

Female,	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Male,	1	2	3		4				5			6		7

In the female, the first two and the last three joints are the longest; the setæ of the three terminal joints are about as long as the joints, or a little shorter; the posterior seta of the antepenult joint is longer than the anterior of the same; the terminal joints are more slender than in the male. In the male, the extremity of these organs may be flexed upon the basal portion, and there is a geniculating joint, though it is not very distinct.

The maxillipeds terminate in a small moveable finger, having a claw and two or three short setæ at the extremity. The preceding joint is stout and has a projecting angle on the inner side, which is tipped with a minute spine, and the moveable finger folds against the surface below this spine. The stomach occupies nearly the whole cephalothorax, the intestine commencing in the segment before the last.

The ovarian sacs, in the females examined, were much elongate, a little divergent, projecting behind and some distance beyond the apex of the stylets. The number of eggs was quite large.

Cyclops curticaudus.

Feminæ:—*Nudus. Cephalothorax posticè obtusus, abdominem longitudine valde superans. Antennæ anticæ dimidio cephalothorace valde longiores,* 13–14-*articulatæ, articulis brevibus, quinque basalibus non oblongis;*

setis inæqualibus, posterioribus *articulorum penultimi et præantepenultimi longioribus* (*quatuor articulos ultimos simul sumtos longitudine æquantibus*), anterioribus *perbrevibus. Styli caudales prælongi, dimidio abdomine vix breviores, setis brevibus, secundâ tertiâque subæquis et stylo paulo longioribus.*

Female:—Naked. Cephalothorax having the posterior angles obtuse, much longer than the abdomen. Anterior antennæ two-thirds the length of the cephalothorax, thirteen- or fourteen-jointed, joints short, five basal not oblong; setæ of antennæ quite unequal, the *posterior* of the penult and præantepenult joints longest, equalling the last four joints together in length, *anterior* of same joints very short. Caudal stylets very long, nearly equalling half the abdomen, setæ short, the second and third nearly equal and slightly longer than the stylets.

Plate 83, fig. 2 *a*, female, enlarged; *b*, extremity of antennæ; *c*, extremity of posterior antennæ; *d*, extremity of maxillipeds.

Brackish water, Valparaiso, May, 1839.

Length, one-twentieth of an inch. Second pair of antennæ quite slender. Maxillipeds have a finger-like joint at apex, terminating in three or four setæ, and the preceding joint is largest near apex, with the inner margin setulose. Anterior pair of natatory legs a little the smallest. External ovarian sacs oblong, purple; nine or ten eggs in each, in the specimens examined.

CYCLOPS PUBESCENS.

Cephalothorax pubescens, abdominem longitudine vix superans, posticè subacutus. Antennæ anticæ feminæ *dimidii cephalothoracis longitudine*, 8–9-*articulatæ, setis totis brevibus;* maris *breviores, tribus articulis basalibus perbrevibus, quarto crassissimo subovato, dimidii antennæ longitudine, ultimo* (*forsan duplice*) *tenui brevique, digitiformi. Styli caudales abdomine quadruplo breviores; setâ secundâ abdomine longiore, primâ brevissimâ.*

Cephalothorax pubescent, but slightly longer than abdomen, subacute

at the posterior angles. Anterior antennæ of *female* half as long as cephalothorax, eight- or nine-jointed, setæ all short; of *male* shorter, three basal joints very short, fourth very stout, subovate, half as long as the antenna, last joint (perhaps a double one) a slender finger, half as long as the fourth. Caudal stylets scarcely a fourth the length of the abdomen, second seta longer than the abdomen, the first a short spine.

Plate 83, fig. 3 *a*, male, enlarged; *b*, female antenna; *c*, caudal setæ, magnified; *d*, bag of eggs, enlarged.

Fresh-water pools, Valparaiso, May, 1839.

Length, one-twenty-fourth of an inch. Colourless and nearly transparent. Caudal stylets scarcely three times their breadth in length. Third seta of the stylets about half the length of the second. In anterior antennæ of female the two terminal joints are longer than the two preceding, and the fifth from the apex is the longest. External ovarian sacs, dark purple, and each containing five or six large eggs; they extend as far back as base of stylets.

Cyclops Mac Leayi.

Feminæ: —*Cephalothorax abdomine valde longior. Antennæ anticæ longæ (cephalothoracem æquantes), ad basin paulo crassiores; articulo secundo oblongo,* 5–6 *sequentes brevissimos simul sumtos longitudine fere æquante,* 10 *reliquis paulum oblongis, septimo longiore; setis articuli secundi et septimi parum elongatis, duorum subultimorum totis brevibus, ultimi articulum longitudine vix superantibus. Styli caudales tenues, duos articulos abdominis longitudine æquantes, setâ secundâ abdomine breviore, primâ fere styli longitudine.*

Cephalothorax much longer than the abdomen. Anterior antennæ as long as cephalothorax, rather stout at base, many-jointed, second joint oblong, nearly as long as the five or six following together, which are each very short, remaining ten a little oblong, the seventh longest, setæ of second and seventh joints somewhat elongate, on the two subultimate joints all shorter than the joints, on

the terminal one a little longer than the joint. Caudal stylets slender, as long as last two abdominal segments, the second seta shorter than the abdomen, the first not longer than the stylets.

Plate 83, fig. 4 *a*, female, enlarged; *b*, extremity of antenna.

Fresh-water pools, near Sydney, New South Wales, December, 1839.

Length, one-twenty-fourth of an inch. Nearly colourless. Abdomen together with the caudal stylets nearly as long as the cephalothorax. Antennæ having the penult joint a little longer than the apical or antepenult; the longest seta at the apex of the anterior antennæ is but little longer than the apical joint; on antepenult joint, the posterior seta is longer than the anterior, but does not exceed the length of the joint. External ovarian sacs longer than abdomen, not divergent in position.

CYCLOPS VITIENSIS.

Feminæ:—*Cephalothorax posticè fere obtusus, abdominem longitudine vix superans, nudus. Antennæ anticæ longæ, cephalothoracis longitudine, multiarticulatæ; articulo primo crasso, oblongo, secundo dimidio minore, 6 sequentibus perbrevibus; setis antennarum inæqualibus, articulorum primi secundique paulo longioribus, ultimi et 3 subultimorum posterioribus subæqualibus, articulo penultimo paulo longioribus, setis anterioribus articulorum subultimorum perbrevibus. Styli oblongi, vix duorum articulorum abdominis longitudine; setâ secundâ abdomine paulo longiore.*

Female:—Cephalothorax rather obtuse at the posterior angles, but little longer than the abdomen, naked. Anterior antennæ as long as the cephalothorax, multiarticulate, first joint stout, oblong, the second one half smaller than the first, the six following very short; setæ of anterior antennæ unequal, of first and second joints elongate, of the last and the *posterior* of the three subultimate subequal, and rather longer than the joint to which attached; *anterior* setæ of same joints very short. Stylets oblong, scarcely as long as two abdominal segments together, second seta a little longer than the abdomen.

Plate 83, fig. 5 *a*, female, enlarged; *b*, extremity of antenna.

Fresh-water pools, Vanua Lebu, Viti Islands, July, 1840.

Length, one-twenty-fourth of an inch. Colour, faint yellowish. The anterior setæ of the two subultimate joints of the anterior antennæ scarcely exceed in length the diameter of the joints; while the posterior of these and also of the preceding joints are rather longer than the penult joint. The first or inner seta of the caudal stylets equals half the second, and the third is of intermediate length; the fourth is a little shorter than the stylets. The joints of the abdomen are variable. External ovarian sacs are as long as abdomen or nearly so, and divergent in position; the eggs were rather large and of a dull bluish colour.

Subfamily HARPACTICINÆ.

Genus CANTHOCAMPTUS, *Westwood.*

In the first species of this genus, here described, the legs of the first pair are not smaller than in some Harpactici, and have a similar form. The legs, however, of the second pair have three-jointed branches, the distinguishing characteristic of the Canthocampti as the genus is here adopted. The two following species are placed in this genus because of the form of the body, the abdomen being continuous in outline with the thorax and not abruptly smaller; our notes and drawings contain no information as to the character of the second pair of legs, and it is possible that farther investigation may require a different arrangement.

Canthocamptus virescens.

Cephalothorax ovatus, anticè rotundatus et breviter rostratus, segmentis posticè non acutis. Abdomen paululum subito angustius et posticè sensim deerescens, 5-articulatum. Antennæ anticæ breves, dimidii cephalothoracis longitudine, 9-articulatæ; articulis basalibus quatuor, crassiusculis, secundo maximo, setis perbrevibus. Pedes antici parvi, digito dimidii articuli secundi longitudine. Styli caudales brevissimi,

paulum divaricati; setâ secundâ caudali corporis longitudine, primâ tertiâque subœquis, abdomine valde brevioribus.

Cephalothorax regularly ovate, rounded in front, and having a short beak, segments not appearing acute at their posterior angles in an upper view. Abdomen somewhat abruptly smaller than last thoracic segment, and gradually decreasing in breadth, five-jointed. Anterior antennæ short, scarcely exceeding one-half the length of cephalothorax, nine-jointed, basal joints four in number, rather stout, second largest, setæ very short. First pair of feet small, moveable finger rather more than half the length of the preceding joint. Caudal stylets very short, a little divaricate, second seta as long as the body, first and third subequal, much shorter than abdomen.

Plate 83, fig. 6 *a*, female, enlarged; *a'*, eyes; *b*, anterior antenna of female; *c*, posterior antenna; *d*, mandible (without the palpus); *e*, part of maxilliped; *g*, first pair of feet; *h*, second pair of feet; *h'*, extremity of longer branch; *i*, figure of young animal, a day or two old; *y*, young.

Island of Madeira, in pools on the rocky shores, containing seaweed, below high water mark.

Length, one-twentieth of an inch. Colour, light greenish, or colourless. Length of cephalothorax, about twice its breadth. Abdomen as broad at base as one-third the breadth of anterior part of cephalothorax. Eyes with the spot of pigment large, red. Anterior antennæ not as long as the first segment of the body; last five joints minute, setigerous appendage one- or two-jointed, and bearing setæ, which included make it as long as the main branch. Posterior antennæ five-jointed, last three joints oblong, the last a little clavate. Mandible having an obliquely truncate summit, which is furnished with four or five teeth on the edge above, and two sharp processes at the commencement of the truncation. Only the last three joints (all?) of the maxillipeds were observed; these organs terminate in a slightly curved claw of rather large size, and have a setulose jointed appendage to each side of third joint, one of which extends as far as apex of claw; when projecting over the claw, the claw appears to be ciliated, and it was so viewed at first. Branches of second pair of

feet quite unequal, and just beneath a prominently projecting apex there appeared to be two short claws.

Ovarian appendages to first joint of abdomen. Ovarian sac is nearly oval, and projects some distance beyond the extremity of the abdomen. Eggs few, of a grayish or light brownish red colour.

The animals live ten days without changing the water, and produce numerous young in that time, which were one-seventy-second of an inch in length, and colourless.

Harpacticus virescens, DANA, Proc. Amer. Acad. Sci., i. 151, 1847.

CANTHOCAMPTUS LINEARIS.

Corpus fere lineare, abdomine non subito angustiore, posticè parum attenuatum. Antennæ anticæ brevissimæ, 7-articulatæ; articulis basalibus duobus crassissimis, primo majore, secundo perbrevi, setis totis brevibus. Styli caudæ styliformes, articulo abdominis ultimo longiores, parum divaricati, setâ secundâ longitudine fere dimidii corporis.

Body nearly linear, the abdomen not abruptly narrower than thorax, posteriorly a little narrower. Anterior antennæ very short, seven-jointed, basal joints two, very short, the first larger, the second very short, the setæ throughout short. Caudal stylets styliform, longer than last segment of abdomen, a little divaricate, second seta nearly half as long as body.

Plate 83, fig. 9 *a*, female, enlarged; *b*, antenna.

From the sea, among the Feejee Islands, July, 1840.

Length, one-twentieth of an inch. Anterior antennæ scarcely longer than breadth of cephalothorax. Anterior legs short and small. Moves rapidly over a wet surface, with a wriggling motion, like other species of this genus.

Harpacticus linearis, DANA, Proc. Amer. Acad. Sci., i. 152.

CANTHOCAMPTUS ROSEUS.

Corpus fere lineare, abdomine non angustiore. Antennæ anticæ perbreves et tenuissimæ, basi non crassiores, setis totis brevibus. Styli caudales breves, non divaricati; setâ secundâ corpore longiore, spinulosâ.

Body nearly linear, abdomen not narrower than the thorax. Anterior antennæ very short and very slender, not stouter at base, setæ throughout short. Caudal stylets short, not divaricate, second seta longer than the body, spinulose.

Plate 83, fig. 10, female, enlarged.

From the Sooloo Sea, southwest of the island of Panay, January 29, 1842.

Length, one-thirty-sixth of an inch. Colour of body, a tinge of purplish red. Appendages to base of abdomen rather long, and terminating in long setæ, extending nearly as far as the extremity of the abdomen. Ovarian sacs large. Antennæ about one-fourth the length of the body; the exact number of joints not ascertained.

Harpacticus roseus, DANA, Proc. Amer. Acad. Sci., i. 152.

GENUS HARPACTICUS, *Edwards.*

HARPACTICUS CONCINNUS.

Feminæ:—*Cephalothorax elongatè ovatus, segmentis posticè acutis. Abdomen subito paulo angustius, latum, lateribus bene rectum, 6-articulatum, parcè decrescens, segmento primo brevissimo. Antennæ anticæ breves, 9-articulatæ; articulis basalibus quatuor attenuatis, setis brevibus, ad apicem paulum longis (flagellum longitudine æquantibus). Pedes antici parvi, articulo secundo infra obtuso-angulato et digitum longi-*

tudine duplo superante. Styli caudales brevissimi, parum divaricati; setâ secundâ corpore paulum breviore, tertiâ fere dimidio minore, reliquis brevissimis.

Female:—Cephalothorax oblong ovate, segments (in an upper view) acute at the posterior angles. Abdomen abruptly narrower than last segment of thorax, broad, six-jointed, sides regularly a straight line and breadth a little diminishing posteriorly, first segment very short. Anterior antennæ short, nine-jointed, basal joints four in number, attenuate; setæ short, a little longer at apex, and equalling in length the last five joints together (the flagellum). First pair of feet small, second joint having an obtuse angle within and the finger hardly half its length. Caudal stylets very short, somewhat divaricate, second seta about three-fourths the length of the body, third nearly one-half shorter, the others minute.

Plate 83, fig. 7 *a*, female, enlarged; *b*, extremity of posterior antenna; *c*, extremity of a maxilliped (?); *d*, first pair of feet; *e*, second pair of feet; *f*, bag of eggs.

Found at sea, thirty miles off Valparaiso, on floating sea-weed, May, 1839.

Length, one-twentieth of an inch. Beak small, semicircular. Eyes on a large spot of deep red pigment. First segment of body longer than broad. Abdomen rather broad, and slightly but very irregularly tapering, with straight sides. Stylets scarcely longer than broad. Anterior antennæ curve a little forward and then directly outward, so that the two are nearly in the same straight line; they admit of flexion and even curl up at times; the third and fourth joints are rather longer than the preceding. First pair of legs have the stout claw-shaped finger applied against the lower part of inner surface of second (or preceding) joint. There is a pair of short appendages to the first abdominal joint. Ovarian sac broad and large, as long as abdomen and light flesh-coloured.

This species was abundant on the Fucus, over which, while it is wet, it creeps with rapidity, showing great flexibility of body. It swims with a nearly steady motion. It often attached itself to the

sides of the vessel in which it was placed, and worked its way up above the surface of the water.

Harpacticus concinnus, DANA, Proc. Amer. Acad. Sci., i. 152.

HARPACTICUS SACER.

Cephalothorax ovatus, anticè subdeltoideus, dimidio longitudinis latior, segmentis posticè obtusis. Abdomen subito multo angustius et brevius quam cephalothorax, 6-articulatum, segmento primo brevi. Antennæ anticæ breves; feminæ 9-*articulatæ, articulis basalibus quatuor, setis totis brevibus;* maris *articulo quinto* (*sexto?*) *crassissimo, subovato, margine anteriore rectiusculo, digito* 2-*articulato duabus setis minutis ad apicem instructo. Pedes antici parvi, digito tenui, largè dimidii articuli secundi longitudine. Styli caudales brevissimi, parum divaricati; setâ secundâ corporis longitudine, tertiâ dimidio breviore, primâ perbrevi.*

Cephalothorax ovate, with the front subdeltoid, length hardly twice the breadth; segments (in upper view) obtuse behind. Abdomen abruptly much narrower than cephalothorax and also much shorter, six-jointed, first segment short. Anterior antennæ very short, in *female* nine-jointed, basal joints four, the setæ throughout quite short, in *male* the fifth joint (sixth?) very stout, subovate, with the anterior margin nearly straight, articulating with this joint a two-jointed finger, stout, and having two small setæ at apex. Anterior feet rather small, finger slender and longer than half the second joint. Caudal stylets very short, a little divaricate, second seta as long as the body, the third half shorter, the first minute.

Plate 83, fig. 8 *a*, *male*, enlarged; *b*, eyes; *c*, hand of male anterior antenna; *c'*, female anterior antenna; *d*, extremity of posterior antennæ; *e*, first pair of legs; *f*, second pair.

Abundant in salt-water pools, on rocks, along the shores of the harbour of Valparaiso, May, 1839.

Length, one-sixteenth of an inch. Colour, a little reddish. Anterior antennæ of male not longer than breadth of cephalothorax, hand

very large and stout, with the finger not over half the length of the hand; setæ of finger as long as the finger. Anterior antennæ of female have the last five joints minute, and the setæ at apex shorter than these five joints together; second joint from base longer than third. Abdominal segments, excepting the sixth, equal. The second pair of legs has the apical joint of the longer branch longest at apex, the shorter branch is little longer than the basal joint of the longer branch, and has the apical joint short; both branches terminate in two minute claws. The caudal stylets are scarcely longer than broad, and the setæ are nearly as in *H. concinnus*. In coition, the female is grasped around the cephalothorax by the cheliform antennæ of the male. Many were observed thus in connexion.

Harpacticus sacer, DANA, Proc. Amer. Acad. Sci., i. 152, 1847.

HARPACTICUS ? ACUTIFRONS.

Maris :— *Cephalothorax angustè ellipticus, anticè acutus, posticè obtusus. Abdomen subito angustius, 6-articulatum, posticè valde attenuatum, segmento ultimo angustissimo. Antennæ anticæ breves, 5-articulatæ; 3 articulis basalibus non oblongis, tertio minimo, quarto crassissimo et cylindrico, fere dimidii antennæ longitudine, quinto (forsan duplice), digitiformi, parvulo; antennis juxta basin et ad apicem breviter setigeris. Styli caudales minuti, non divaricati; setis strictè appressis, setâ majore dimidio corporis parum longiore, nudâ.*

Male:—Cephalothorax narrow elliptic, acute in front, obtuse at the posterior angles. Abdomen abruptly narrower than cephalothorax, six-jointed, much attenuate posteriorly, last segment very narrow. Anterior antennæ short, five-jointed, three basal joints not oblong, the third smallest, the fourth very stout cylindrical, as long as the three preceding together, the fifth (perhaps a double one) digitiform, small; the antennæ near base and at apex bearing short setæ. Caudal stylets minute, not divaricate, setæ closely appressed together, the longest a little longer than half the body, naked.

Plate 83, fig. 11 *a*, male, enlarged; *b*, extremity of a maxilliped or perhaps of the mandibular palpus.

Abundant at sea, off Rio Negro, east coast of South America, January 25, 1839, 5 h., A. M.

Length, one-twenty-fourth of an inch. Colourless. Length of cephalothorax, much more than twice its breadth or nearly three times; last three segments nearly half the anterior. Antennæ have usually a double curvature and extend laterally with the tips hardly in advance of the beak; setæ on anterior margin near base short, and stout, and crowded; large joint naked (?). An extremity of a maxilliped, or perhaps the mandibular palpus, was observed, as shown in fig. *e;* it terminates in one or two straight setæ. Abdomen much shorter than cephalothorax. The abdominal segments decrease in width from the basal, the last being hardly one-fourth as broad as the first. The appendage to base of abdomen below is short, and has one or two short setæ at extremity.

Harpacticus acutifrons, DANA, Proc. Amer. Acad. Sci., i. 153.

GENUS CLYTEMNESTRA.

Frons subrostratus, appendicibus nullis. Antennæ anticæ flexiles; maris *non subcheliformes nec articulatione geniculantes. Pedes antici permagni, subcheliformes.*

Front subrostrate, appendages none. Anterior antennæ flexible; in *male* not subcheliform, not having a geniculating joint. Anterior feet very large, subcheliform.

This genus embraces such of the Harpacticinæ as have the male antennæ not distinctly geniculating, and the first pair of legs very large subcheliform.

The genus Harpacticus may contain species with large subcheliform anterior feet, like Clytemnestra. But the anterior antennæ of males are always geniculating. These organs are very similar in form to those of *Setella;* the setæ are rather long in the species observed, and the fifth joint is slightly arcuated.

Clytemnestra, DANA, Proc. Amer. Acad. Sci., i. 153, 1849.

CLYTEMNESTRA SCUTELLATA.

Cephalothorax subacutè rostratus, segmento antico lato, posticè utrinque dilatato, tribus segmentis sequentibus subito angustioribus, margine posteriore valde arcuatis et lateribus posticè productis et subacutis. Abdomen 6-*articulatum, segmentis subœquis, decrescentibus. Antennæ anticæ elongatæ,* 8- (9-*?*)*articulatæ; articulo quinto* (*sexto?*) *arcuato, sequente oblongo et apice cum appendice instructo* (?), *reliquis tribus oblongis; setis longis divaricatis, duabus apicalibus fere antennæ longitudine. Pedes antici pergrandes; articulo secundo subclavato, digito tenui arcuato fere articuli secundi vel precedentis longitudine.*

Cephalothorax subacutely rostrate, anterior segment broad, and the posterior angles projecting laterally; the following three segments abruptly diminish in breadth, have the posterior margin much arcuate, and the sides produced backward and subacute. Abdomen six-jointed, segments subequal, decreasing successively. Anterior antennæ elongate, eight- (or nine)-jointed, the fifth (sixth?) arcuate, the following oblong, and bearing a short appendage at apex, the remaining three oblong; setæ of anterior antennæ long divaricate, two apical almost as long as the antenna. First pair of feet very large, second joint subclavate, with a slender arcuate finger nearly as long as preceding joint.

Plate 83, fig. 12 *a*, animal, enlarged; *b*, eyes; *c*, posterior antennæ; *d*, extremity of a maxilliped; *e*, cheliform legs; *f*, leg of the three natatory pairs.

Pacific, longitude 124° west, latitude 18° south, August 6, 1839, at 5 h. A. M. The description and figure are from the specimens of this locality. Afterwards, near Pitt's Island, Kingsmill Group, April 30, 1841, and in the China Sea, February 17, 1842, three hundred miles northeast of Singapore.

Length, one-twenty-fourth of an inch. Colourless. Anterior segment of body scarcely longer than broad. Eyes on a large subquadrate mass of deep red pigment. Abdomen more than half as long as cephalothorax; the segments with convex sides. Antennæ longer than

half the body, the arcuate joint concave behind, hardly as long as the following one; setæ divaricate, the long apical setæ articulated at base so as to admit of motion by muscles. Before the penult joint, the apical part of antenna may be flexed upon the preceding portion. Posterior antennæ long and slender; observed but three joints; the last terminates in four or five unequal moveable setæ. Extremity of maxillipeds bearing a few short setæ. Cheliform feet of very large size. The first joint as long as the second, more slender, and a little arcuate; the second six times as long as its greatest breadth, naked; finger made up of a very short joint and a long slender spine. Natatories with the branches unequal, three-jointed; often thrown back as in the figure. Appendages to basal joint of abdomen four-jointed, and having setæ at apex extending nearly to extremity of abdomen. Caudal stylets but little longer than last segment of abdomen, not divaricate; two setæ, the second and third, are as long as the abdomen, and exterior to these are two very short ones.

Genus SETELLA.

Corpus angustissimum, fere lineare, anticè attenuatum et subacutum et sub fronte appendices duas parvulas falciformes gerens. Antennæ anticæ flexiles, appendice brevi instructæ, setis brevibus; maris *non subcheliformes. Pedes antici mediocres aut parvi; proximi sequentes lateraliter porrecti, apice breviter setigeri. Pedes abdominis quatuor elongati et elongatè setigeri, ad segmenta* 1*mum* 2*dumque affixi. Setæ caudales duæ longissimæ, reliquæ brevissimæ.*

Body very narrow and nearly linear, anteriorly attenuate and subacute, and the beak bearing below two small falciform appendages. Anterior antennæ flexible, having a short appendage; setæ short; in *male* not subcheliform. Anterior feet of moderate size or small; next pair following extending laterally, short setigerous at apex. Four abdominal feet elongate, and bearing long setæ attached to the first and second segments of the abdomen. Two caudal setæ very long, the rest quite short spines.

The Setellæ are remarkable for their very slender bodies, and the extremely long caudal setæ—exceeding much the length of the body

in the species examined. They are barely discerned in the water without a glass. They differ from the preceding species also in the falciform appendages to the beak; and the male anterior antennæ have not a geniculating joint. The large alimentary cavity is usually filled with a bright red fluid, which makes the whole body appear red. The caudal setæ, as far as examined, are spinulous.

Females were often observed with the bag of eggs attached. In some specimens, the appendages or feet pertaining to the base of the abdomen differ very much from the same organs in others (see the two following species), and this difference is probably sexual, as all females, known to be such by their bags of eggs, were of a similar character in this respect.

These species are confined to the open ocean.

SETELLA TENUICORNIS.

Antennæ anticæ fere corporis longitudine; articulis duobus basalibus valde crassioribus, secundo oblongo, reliquis teretibus gracillimis, tertio longissimo, quarto cum appendice instructo. Rami pedis antici biremis subæqui, major 3-articulatus, articulis fere æquis. Pedes abdominis cum 5–6 setis elongatis subæquis instructi. Setæ caudales corpore fere duplo longiores.

Anterior antennæ nearly as long as body; two basal joints quite stout, the second oblong, others terete and very slender, the third longest, the fourth with an appendage. Branches of first pair of natatories subequal, the longer three-jointed, the joints nearly equal. Abdominal feet with five to six elongate subequal setæ. Caudal setæ nearly twice as long as body.

Plate 84, fig. 1 *a*, animal, enlarged; *a'*, beak, with appendages; *b*, base of anterior antennæ; *c*, posterior antennæ; *g*, first pair of feet, claw not shown; *i*, *k*, natatory feet of first and third pairs.

Atlantic, latitude 7°–9½° north, longitude 21°–24° west, October 13 to 20, 1838.

Length, one-fifteenth of an inch, exclusive of caudal setæ. Colour, pale bluish; in most specimens, the whole alimentary cavity is deep

red. Last three joints of cephalothorax two-fifths of the whole in length. Abdomen six-jointed; articulation between the second and third segments less distinct than the others; last joint rather the longest and rounded. Anterior antennæ seven- or eight-jointed; third joint with a few short setæ near the centre of front margin as well as at apex. The setæ of the appendages to base of abdomen extend all nearly to the last joint of abdomen. The caudal stylets are longer than half the body.

This species is rather stouter than the following, and is peculiar in having stout basal joints to the antennæ, which organs are otherwise very slender.

Figures 1 *l*, 1 *m*, represent the young of Setellæ. The first was caught on the same day with the Setella above described, and it is probably the same species. The second was met with a few days after (the 26th of October, in latitude 4° 15′ north, longitude 19° 30′ west), and may possibly be a still younger state of this animal, or else the young of another species. The former was one-thirtieth of an inch long (including caudal setæ) and had a faint orange tinge; the latter was one-twenty-fourth of an inch in length, and was nearly colourless.

SETELLA LONGICAUDA.

Maris (?):—*Antennæ anticæ ad basin non crassiores, 7 aut 8-articulatæ; articulo quarto paululum arcuato (posticè convexo) et cum appendice instructo, tertio fere duplo longiore quam quartus aut secundus. Ramus major pedis biremis antici 3-articulatus, articulo primo valde brevissimo. Pedum abdominis ramus exterior brevissimè setiger, interior duabus setis spinulosis instructus, apicem abdominis fere attingens. Setæ caudales corpore largè duplo longiores.*

Male (?):—Anterior antennæ not stouter at base, seven- or eight-jointed, fourth joint a little arcuate (convex behind) and bearing an appendage, the third nearly twice as long as fourth or second; longer branch of second pair of feet three-jointed, the first joint very short; outer branch of abdominal feet bearing very short setæ, the inner with two long spinulous setæ, which extend nearly to apex of abdomen. Caudal setæ full twice as long as body.

Plate 84, fig. 2 *a*, animal, enlarged; *a'*, appendage to beak.

Atlantic Ocean, latitude 5° north, longitude 22° west, October 22, 1838.

Length, one-twenty-fourth of an inch. Nearly colourless, except the deep red of the stomach and intestine. The caudal stylets are about as long as last three abdominal joints, and the setæ are scabrous.

This species closely resembles the preceding, and was at first supposed to be the male of it. This view is perhaps favoured by the difference in the abdominal appendages. But we deem it more probable that they are distinct, judging from the antennæ, the two basal joints in the *longicauda* being no stouter than the following; moreover, the third joint is much less than twice the second in length, and the first half the second; while in the *S. tenuicornis*, the third is more than twice the length of the second. Moreover, the caudal setæ are much the longest in the *longicauda*.

SETELLA GRACILIS.

Feminæ:—*Antennæ anticæ gracillimæ usque ad basin, rectæ, inter sese prope* 130° *divaricatæ; articulo primo obsoleto, secundo quartum. æquante et dimidio tertio longiore, quarto non arcuato. Digitus pedis antici dimidio articulo secundo longiore. Setæ caudales corpore fere duplo longiores.*

Female: — Anterior antennæ very slender even at base, straight, angle of mutual divergence 130°, first joint obsolete, second as long as the fourth and longer than half the third, fourth not arcuate; finger of first pair of feet longer than half the second joint; caudal setæ nearly twice as long as the body.

Plate 84, fig. 3 *a*, side view, enlarged; *b*, back view, showing the appearance swimming; *c*, appendage to beak; *d*, extremity of a maxilla; *e*, first pair of legs; *f*, abdominal appendages; *g*, spinous character of caudal setæ.

Pacific, near the Kermadec Islands, and north towards Tongatabu; abundant; April 14 to 20, 1840.

Length, one-twenty-fourth of an inch. Colour bluish, with the whole alimentary cavity deep red. Head very narrow, pointed in front, in upper view. Anterior antennæ two-thirds the length of the body, and extremely slender, much more so than in the following species; the third joint (or second, the first being obsolete) is the longest, and has two curved setæ on the outer margin near its middle; the appendage to the fourth joint, with the setæ which terminate it, lies nearly parallel with the terminal portion of the antenna, and is two-thirds as long as this portion; this terminal part is four-jointed, the second joint longest, and the last, which is longer than the preceding, has two curved hairs on the posterior margin near middle, and also one or two straight hairs at apex. The second pair of antennæ terminate in three moveable setæ, but little longer than the last joint. In the first pair of feet, the second joint has its basal portion on the inner margin furnished with a few short setæ.

The outer pair of appendages to abdomen consist each of an oblong joint, having a long curved seta at apex, spinulose externally, besides two or three short setæ or spines; the inner pair appeared to be three-jointed, and had one or two long straight setæ at apex, and two unequal and much shorter on the inner margin. The longer setæ extend to the last articulation of the abdomen. The external ovarian sac, which has a brownish colour, lies between these two pairs of organs.

These animals have a very flexible body, and move through the water with a steady, rapid motion.

SETELLA CRASSICORNIS.

Maris (?):—*Antennæ anticæ crassiores, rectæ, inter sese* 130° *divaricatæ; articulo primo obsoleto, secundo tertioque brevibus, quarto appendiculato, hoc etiam sexto ultimoque tertium longitudine duplo superantibus. Digitus pedis antici dimidii articuli secundi longitudine setæ caudales prope sesqui corporis longitudine.*

Male(?):—Anterior antennæ stouter than in the other species; quite straight, angle of mutual divergence 130°, first joint obsolete, second

or third short, fourth, sixth, and last twice the third in length, finger of the first pair of feet about as long as half the second joint; caudal setæ about once and a half the length of the body.

Plate 84, fig. 4 *a*, animal, enlarged; *a'*, profile of head; *b*, anterior antennæ; *c*, extremity of second pair of antennæ; *d*, first pair of feet; *e*, abdomen, showing abdominal feet in profile.

China Sea, northeast of Singapore, latitude 4° 20′ north, longitude 106° 30′ east; February 17, 1842.

This species is peculiar in its comparatively stout antennæ; the first joint (*normally* first), if existing, is not seen in a back view, and hence the second joint appears to be the first. The appendage to the fourth joint (the third in appearance) and its setæ together are shorter than half the terminal portion of the antennæ; the fourth joint in this species is longer than the preceding, while generally in other species it is shorter. The width of the head across the eyes is about equal to the width of basal joint of antennæ. From the form of the abdominal feet we infer that the specimen was probably a male; the outer pair had only very short setæ, as in the *S. longicauda;* and the inner has but one long seta, and this extends back nearly to apex of abdomen, and is spinulose on its outer side. The articulation between the fifth and sixth abdominal segments is not very distinct.

SETELLA ACICULUS.

Feminæ:—*Antennæ crassiusculæ, fere rectè divaricatæ, ad basin paulum curvatæ; articulo primo perbrevi, secundo quartum longitudine æquante et longiore quam tertii dimidium. Pedis antici digitus dimidii articuli secundi longitudine. Setæ caudales sesqui corporis longitudine.*

Female:—Anterior antennæ rather stout, the two nearly in a straight line (angle of divergence 165°), having a slight curve at base: first joint very short, second as long as fourth and longer than half the third. Finger of anterior feet as long as half the second joint. Caudal setæ one and a half times the length of the body.

Plate 84, fig. 5 *a*, female, enlarged; *a'*, profile of head; *b*, anterior antennæ; *c*, posterior antennæ; *d*, first pair of feet; *e*, second pair of feet; *f*, bag of eggs; *g*, *g'*, profile of abdomen, showing appendages.

Eastern entrance of Straits of Sunda, March 5, 1842.

Body nearly colourless. The anterior antennæ not quite as stout as in the preceding species; the fifth and seventh joints nearly equal, and the eighth or last but little longer than the seventh. The first pair of legs a little larger than second pair of antennæ. The abdominal feet or appendages have in each pair an oblong base; to the apex of the outer branch there is a single long curved seta and two or three others quite short; the inner has two long setæ at apex (and one or two shorter on inner margin?). The caudal stylets are twice as long as the last segment of abdomen. The external ovarian sac had a dull green colour, and contained about twelve eggs.

FAMILY III. CORYCÆIDÆ.

THE Corycæidæ are characterized by having two large oblate lenticular cornea (which we call *conspicilla*), on the front of the animal, to concentrate the light that passes to the large prolate lens of the eye. These front lenses are well compared to a pair of spectacles, and in these minute animals nature anticipated man's invention. The organs of the mouth are quite small, and without jointed appendages, so that the only prominent organs of the cephalothorax are the two pairs of antennæ, a pair of prehensile legs, and four pairs of natatories.

The natatories are similar to those of the other Cyclopoidea. The fifth pair, corresponding to the genital feet of the Pontellæ, is often wanting.

The abdomen is either without appendages, excepting the terminal stylets, or the first segment bears a short pair, terminating in one or two setæ.

The external ovarian sacs are large, and either one or two in number, as in the Cyclopidæ.

The peculiar spectacle-eyes of this family were overlooked in the original examination of the genus Sapphirina by Thompson, and also in the descriptions of other species. The existence of lenticular corneæ is not peculiar to these species among Crustacea; but they have been observed only in compound eyes, in which case the lens and cornea are minute and not far distant. In the Corycæidæ they are often very remote, and of great size.

This family comprises two subfamilies; one of which, the MIRACINÆ, is related to the Harpacticinæ,—the structure of the body, frontal appendages, antennæ, single external ovarian sac, and other parts, being nearly as in *Setella;* the other, the Corycæinæ, having two bags of eggs, as in Cyclops, but diverging widely from that group, in the monodactyle posterior antennæ, the absence of mandibular and maxillary palpi, and approaching Harpacticus somewhat in the monodactyle anterior legs, and the simple superior antennæ. The following are the genera of these subfamilies and their characteristics:*

SUBFAM. 1. CORYCÆINÆ.—Antennæ anticæ non appendiculatæ. Antennæ posticæ plus minusve monodactylæ. Sacculi ovigeri duo.

G. 1. CORYCÆUS, *Dana.*†—Cephalothorax crassus, non depressus, antice rotundatus et conspicilla gerens, postice sæpius acutus. Abdomen multo angustius, pauci-articulatum, appendicibus basalibus carens. Antennæ posticæ monodactylæ pedibusque anticis majores. Pedes antici quoad sexus vix dissimiles, digito tenui confecti. Styli caudales styliformes.

G. 2. ANTARIA, *Dana.*‡—Cephalothorax fere ac in *Corycæo,* postice rotundatus. Abdomen ac in *Corycæo.* Antennæ posticæ parvæ, pedibus anticis non majores, digito apice breviter setigero, carpo posticè angulato. Pedes antici quoad sexus vix dissimiles, monodactyli, digito tenui subuncinato.

G. 3. COPILIA, *Dana.*§—Cephalothorax depressus, fronte latè quadrato et conspicilla ac angulos anticos gerente. Antennæ posticæ monodactylæ, digito elongato, subulato. Abdomen pauci-articulatum, appendicibus basalibus carens.

* The new species of Corycæidæ beyond are briefly described in the Proceedings of the Amer. Acad. Sci. Boston, ii. 1849.

† Proc. Acad. Nat. Sci. Philad., ii. 285, 1845; Amer. J. Sci. [2], i. 228, viii. 280, ix. 133; Proc. Amer. Acad. Sci., ii. 35, 1849.

‡ Amer. J. Sci. [2], i. 229; Proc. Amer. Acad. Sci. ii. 39. A species of this genus or of a Corycæus, is rudely figured by Dr. W. Baird, without a name, excepting a reference to the genus Cyclops, in Loudon's Magazine, iv. 501, 1831.

§ Proc. Amer. Acad. Sci., ii. 40.

G. 4. SAPPHIRINA, *Thompson.**—Cephalothorax depressus, interdum crassus, fronte arcuato; conspicilla sive frontalia sive inferiora. Sexus quoad antennas posticas stylosque caudales similes, abdominem pedesque anticos dissimiles. *Maris:*—Abdomen thorace subito non angustius, 4–5-articulatum, appendicibus basalibus carens; pedes antici digito elongato instructi. *Feminæ:*—Abdomen thorace subito angustius, 5–6-articulatum, appendices breves basales gerens; pedes antici digito brevi. [*Mares* sæpe lætè opalini aut fulgidè metallini; *feminæ* sæpius incoloratæ et plus minusve pellucidæ, interdum opacæ et indigoticæ.]

SUBFAM. 2. MIRACINÆ.—Antennæ posticæ apice setigeræ et non monodactylæ. Sacculus ovigerus unicus.

G. 1. MIRACIA, *Dana.*†—Corpus subcylindricum, elongatum. Frons appendices duas falciformes gerens ac in *Setellâ*. Abdomen feminæ (quoque an maris?) 6-articulatum. Antennæ anticæ appendiculatæ. Pedes antici monodactyli, digito tenui; duo sequentes biramei, lateraliter paulo porrecti. Antennæ anticæ ac in *Setellâ*. Appendices quatuor abdominis basales elongatè setigeræ.

SUBFAMILY CORYCÆINÆ.

The organs of the mouth in this subfamily have been particularly examined by the author in species of the genera Corycæus and Sapphirina, and are described in the remarks upon those genera.

GENUS CORYCÆUS, *Dana.*

Cephalothorax crassus, non depressus, antice rotundatus et conspicilla grandia fronte gerens, postice sæpius acutus. Abdomen multo angustius, pauci-articulatum, appendicibus basalibus carens. Antennæ posticæ monodactylæ, pedibusque anticis majores. Pedes antici quoad sexus vix dissimiles, monodactyli, digito tenui confecti. Styli caudales styliformes.

* Thompson, Zool. Researches, p. 46, pl. 8, f. 2; *Carcinium*, Erichson and Burmeister, in Meyen's Obs. Zool., in Itin. circum Terram, &c., in Nova acta Cæs. Leop. Car. Nat. Cur., xvi. p. 156. D. O. G. Costa has described a genus, which he calls *Edwardsia*, in his "Cenni Zoologici," etc. (1834), which appears to be near Sapphirina, if not identical with it. It has its brilliancy, a nine-jointed body, and several other characters of this genus.

† Proc. Amer. Acad. Sci., ii. 46, 1849.

Cephalothorax stout, not depressed, round before and bearing on the front large lenticular corneæ (conspicilla), behind usually acute. Abdomen much narrower than thorax, few-jointed, without basal appendages. Posterior antennæ monodactyle, larger than the anterior feet. Anterior feet, sexually hardly dissimilar, monodactyle, finger slender. Caudal stylets styliform.

The Corycæi have a stout and short cephalothorax, usually thicker than wide, and commonly acute at each angle behind. The abdomen is three- or four-jointed, and terminates in slender stylets. The posterior antennæ separate them from the Antariæ, the first pair of feet and not depressed body, &c., from the Sapphirinæ.

The *cephalothorax* is only four-jointed. The anterior segment is large and oblong; and below at the mouth there is a prominent angle. The front is rounded, and is occupied to a great extent by the large oblate lenticular corneæ or *conspicilla*. There is no appendage to the front, and no beak-like prolongation. The third segment, excepting on a single species of those observed, is prolonged and acute behind on either side. The last segment is smaller and much narrower, and has the angles either obtuse or acutely prolonged, according to the species.

Besides the division into segments here mentioned, there are indications of other segments sometimes to be observed within the large anterior segment. In fig. 5 *a*, Pl. 85, six subdivisions may be distinguished, dividing this large segment into seven, the last six very short and nearly equal. If these correspond normally to as many segments, they represent—beginning with the posterior—1, the first pair of natatories; 2, the anterior feet or maxillipeds; 3, 4, the maxillæ, two pairs; 5, the mandibles; 6, the posterior antennæ; 7, the anterior antennæ. It would seem, however, from the position of the posterior antennæ that they should both be considered as belonging to the seventh in this enumeration, and possibly the last transverse pseudo-articulation is incorrectly so considered.

The lenses of the eyes are situated nearly over the mouth, and more remote from one another than the conspicilla. The latter are sometimes in contact, and as frequently somewhat separate; their diameter is often one-third and occasionally one-half the breadth of the cephalothorax. The vermiform masses of pigment extend backward from the prolate lenses, gradually converging and becoming

nearly in contact at their posterior extremities. Along the venter there is sometimes a keel-like projection, which is quite prominent between the natatory legs of the two sides, and into which the pigment projects, reaching in certain species nearly to the posterior extremity of the cephalothorax.

There is a clear open space between the lenses and the conspicilla (or cornea-lenses).

The minute eyes between the prolate lenses were seen, but were not clearly made out. In one species a very minute fibre, supposed to be nervous, was traced to the conspicilla; they have no large nerve like the true ophthalmic nerve.

The *anterior antennæ* are short, and consist of three to seven joints; they are not geniculately flexed as in the Antariæ. They are irregularly furnished with setæ, which are sometimes as long as the antenna, or a little longer. It is common to find the antepenult joint larger than the preceding or following.

The *posterior antennæ* have a two-jointed base and a two-jointed finger. The second joint is long and stout, with the posterior margin naked and nearly straight; it has the front margin naked, but has often an acute tooth at the inner apex. The sides are furnished with one or more stout setæ, which are long, and are either naked or sparsely spinulous. The naked setæ appear to be situated more anteriorly than the spinulous; and when one kind exists alone, as is frequently the case, it probably arises from the obsolescence of the other kind, and not from the naked setæ of one species being spinulous in another. This however requires confirmation. Most of the Corycæi have one naked seta, arising from near the base of the second joint, on the outer side, and one within; both extending often beyond the apex of this joint, either curving or straight.

The third joint is short, and forms the basal part of the finger; it bears one or more short setæ, which are sometimes stout and longer than the joint, but usually quite short. The fourth joint is a kind of claw when short, or a slender corneous finger when long. In the latter case, it is at times longer than the second joint of the antenna. In two or three species there was an appearance that was taken at the time for another articulation, like the first one of the claw (see fig. 8 *a*, Pl. 86). This occurs only where the finger was short, and it is important that the point should be corroborated, before it is accepted as a fact.

The *organs of the mouth* were not completely made out. The mandible has an acutely lobed summit. In one of the pairs of maxillæ, the last joint has the inner apex prolonged inward claw-like and corneous. Beneath this acute apical prolongation there are two or more slender processes, one having one margin and the apex short setose, and the other with very minute setæ at apex, and somewhat brush-like. In the other pair of maxillæ, there is a large oblong lamellar joint, fringed at summit, having a small rounded process or lobe on the inner side. (Figs. 12 *a* to *d*, Pl. 85.)

The *maxillipeds* are, properly, as they have been called in treating of the Calanidæ, the *anterior feet*. There are three joints; the second oblong, with one or two short setæ towards the apex; the third a slender claw or finger, which folds against the preceding.

There are four pairs of natatories, and rarely a fifth of similar character. These natatories, wherever particularly examined, consisted of three joints to each branch, and the shorter branch was not more than half the length of the other; in the fourth pair, the length is not over one-third the longer branch, and in some species it is much shorter. In the longer branch there are two flattened spines on the outer margin of the third joint, besides an apical, and one apical to the other joints. The last joint terminates in an ensiform seta, ciliated only on the inner side. (Figs. 4 *g*, 4 *h*, Pl. 85.)

The *abdomen* is one- to three-jointed. It is oblong, and usually about half as long as the cephalothorax. The basal half is rather broad and suboval; and within, two vessels may be often seen corresponding to the extremities of the two ovaries. The remaining part is quite slender. There are no appendages below to the basal portion of the abdomen, or only minute obsolescent appendages, or setæ.

In some species there were two oblong oval or falciform appendages to the upper part of the abdomen, near its hinder extremity, which appeared to be the remains of the ovaries after the exclusion of the eggs (fig. 6 *a*, Pl. 86). Yet occasionally these appendages were in a cluster. They were half as long as the abdomen, or even longer.

The *caudal stylets* are slender styliform, and are either quite short, or longer than the abdomen. They have three or four setæ, and the inner of the three is usually largest; they are never very long.

Two ovaries were distinct in some species. But external ovaries were not met with in any of the many specimens examined. These

ovaries in some cases appeared to form a single oblong mass in the cephalothorax. They were not convoluted or reticulate, as in the Sapphirinæ. The two oblong cavities within the abdomen connect distinctly with the ovaries (see fig. 5 *b*, Pl. 85).

The distinction of the sexes was not ascertained. The test so apparent in the Sapphirinæ is not applicable here. I have looked for a difference in the posterior antennæ, but have made out none. There are females with long fingers to these antennæ, and others with very short claws; there are females with naked setæ, and others with the setæ of these organs setulose; and whether there be a distinction in these organs, is a point yet undetermined. As with the Calani, whose external sexual distinctions were not made out, numberless specimens have been seen by the author.

The stomach is a large sac, occupying in some species the greater part of the cephalothorax. The œsophagus, where distinctly seen (fig. 5 *a*, Pl. 85), was elongate, and extended from the mouth to the lower side of the stomach, instead of its anterior extremity.

Some information with regard to the arrangement of the muscles will be gathered from figure 5 *a*, Plate 85.

The *nervous system* was particularly studied in a species of Sapphirina, and will be described in our remarks on that genus.

Corycæus, DANA, Proc. Acad. Nat. Sci. Philad., ii. 285, 1845; Amer. J. Sci. [2], i. 218, viii. 280, ix. 133; Proc. Amer. Acad. Sci., ii. 35, 1849.

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1. ANTENNÆ POSTICÆ MACRODACTYLÆ, DIGITO NON BREVIORE QUAM CARPUS.

A. *Setæ caudales stylis valde breviores.* [*Cephalothorax posticè (ad segmentum tertium) acutus, segmento quarto minore.*]

CORYCÆUS GRACILIS.

Cephalothorax gracilis, ventre non carinato. Conspicilla fere contigua. Antennæ anticæ breviter setulosæ. Antennarum posticarum articulus 2dus digito brevior, setâ longâ, setulosâ. Abdomen uni-articulatum, apice subcylindrico fere triplo longius, basi angustum. Styli caudales abdomine breviores, setis brevissimis.

Cephalothorax slender, venter not carinate. Conspicilla large, very nearly in contact. Anterior antennæ short setulose. Finger of the posterior antennæ extremely slender and longer than the preceding joint, seta of the second joint long, setulose. Abdomen one-jointed, narrow at base, linear apex half shorter than the preceding elliptical part. Caudal stylets much shorter than the abdomen, setæ very short.

Plate 85, fig. 1 *a*, animal, enlarged, lateral view; *a'*, upper view, antennæ not finished; *b*, anterior antenna; *c*, posterior antenna; *d*, second or third pair of natatories.

Atlantic, latitude 1° 30′ north, longitude 18° 20′ west, October 31, 1838; also, latitude 2° 20′ south, longitude 20° west, November 6, 1838.

Length, one-thirtieth of an inch. Colourless, except along the venter, which is blue, and a little blue in the abdomen.

This is a very slender species compared with other Corycæi, and is remarkable for the slight prominence of the ventral angle. In an upper view, the cephalothorax is much the broadest at the head and quite narrow behind; the two conspicilla occupy the whole front. The posterior angles are slender acute. The anterior antennæ have the second and fifth joints longest. The setæ are not more than half the length of the antenna.

The posterior antennæ may possibly have a naked seta also to the second joint; but only the setulose one was observed; this one is about as long as the second joint. The finger has a very fine extremity. The first joint of the finger was not accurately made out.

The four pairs of natatories have each three-jointed branches.

The minute eyes between the prolate lenses were observed.

The abdomen in a lateral view has a very abrupt rectangular narrowing on the under side, near middle. The caudal stylets are about half as long as the abdomen, and the setæ less than half the stylets.

CORYCÆUS DECURTATUS.

Cephalothorax ventre carinatus. Conspicilla fere contigua. Antennæ

anticæ breviter setulosæ. Antennarum posticarum articulus 2dus digito brevior, setâ nudâ elongatâ, etiam setâ alterâ setulosâ breviore. Abdomen basi crassum, apice subcylindrico fere quadruplo longius. Styli caudales vix dimidii abdominis longitudine, setis brevissimis.

Cephalothorax with the venter carinate. Conspicilla large, very nearly in contact. Anterior antennæ short setulose. Finger of posterior antennæ longer than second joint, a long naked seta to second joint, another shorter setulose. Abdomen stout at base, linear apex one-third as long as the anterior subelliptical part. Caudal stylets half as long as the abdomen, setæ very short.

Plate 85, fig. 2 *a*, lateral view of animal, enlarged; *a'*, dorsal view, ibid.; *b*, anterior antennæ; *c*, posterior antennæ.

Pacific Ocean, off Duke of Clarence Island, latitude 9° south, longitude 171° 30′ west, north of Samoa, January 27, 1841.

Length, one-thirtieth of an inch. Colourless.

Body rather slender; in dorsal view broadest in front and narrowing behind. As in the preceding, the conspicilla occupy the whole front, and together have the breadth of the animal. The eye-pigment is very much elongated, extending into penult segment of cephalothorax. The abdomen is scarcely narrower at base. The caudal setæ do not exceed one-third the stylets in length.

The anterior antennæ are short, and the setæ do not exceed half the length of the organ. The second joint of the posterior antennæ has one or two short spines on the surface and at apex, besides the long setæ; the naked seta is as long as the joint, the setulose one two-thirds as long.

The penult or hand joint of the anterior feet is half as long as second joint of posterior antennæ.

Hairs of natatory legs nearly obsolete, being merely a very short pectination of the margin. The abdomen in a lateral view, has the lower side straight to within one-third its length from the apex, where there is a very short spine and a sudden diminishing of thickness.

Corycæus deplumatus.

Conspicilla remotiuscula. Antennæ anticæ brevissimè setulosæ, 7-articulatæ. Antennarum posticarum articulus 2dus digito brevior, setâ setulosâ longâ, et aliâ nudâ. Abdomen uni-articulatum, tenue. Styli caudales vix dimidii abdominis longitudine; setis plus dimidio brevioribus.

Conspicilla large, rather remote. Anterior antennæ very short setigerous, seven-jointed. Finger of posterior antennæ longer than second joint, one setulose seta and another naked, both long. Abdomen one-jointed, slender. Caudal stylets hardly half as long as abdomen, seta more than half shorter.

Plate 85, fig. 3 *a*, animal, natural size; *b*, one of the natatory legs.

Atlantic, latitude 9° 20′ north, longitude 24° 15′ west, October 13, 1838.

Length, one-thirtieth of an inch. Nearly colourless; bluish along the venter.

The conspicilla are more remote than in the two preceding species. The abdomen in a lateral view diminishes from near the middle by a gradual concave slope, and at the angle there is a pair of minute appendages.

Natatories five pairs, the last shortest and the penult longest. The branches are triarticulate, and they arise from a two-jointed base. Seta at apex of longer branch with distant pectination. On pressure a cylindrical mass of reddish matter was pressed out from the abdomen at the spot where its breadth diminishes and the minute appendages occur.

Plate 95, figs. 7 *a*, *b*, *c*, represent a young individual, which we suspect may pertain to this species, though it is very doubtful; it was found on the same day in the same bucket of water. It is rounded elliptical in form, prolonged behind, and having the posterior extremity margined with half a dozen minute spines a little remote. Eyes small, on a single red spot near the front margin. There are six pairs of

appendages, besides a fourth very short near the articulation of the thorax with the abdomen, 7 *a'*.

Anterior pair three-jointed and as long as half the cephalothorax; the second joint shortest, a few short spines at apex.

Next two pairs two-branched. Branches short, two-jointed, and having setæ at apex.

Colourless. Length, one-sixtieth of an inch. Movement very irregular and wriggling; not in regular leaps.

CORYCÆUS VARIUS.

Cephalothorax crassus. Conspicilla remotiuscula. Antennæ anticæ elongatè setulosæ. Antennarum posticarum articulus 2dus digito brevior, setâ longâ, nudâ. Abdomen 2-articulatum, segmento secundo cylindrico, breviore quam primum. Styli caudales abdomine vix breviores, setis dimidio brevioribus.

Cephalothorax stout. Conspicilla rather remote, large. Anterior antennæ with long setæ. Finger of the posterior antennæ longer than the second joint, seta of the second joint long, naked. Abdomen two-jointed, first joint elliptical, with a short cylindrical apex, second cylindrical, shorter than the first. Caudal stylets hardly shorter than the abdomen, setæ half shorter.

Plate 85, fig. 4 *a*, animal, enlarged; *b*, same, dorsal view; *c*, side view of abdomen; *d*, anterior antenna; *e*, posterior antenna; *f*, natatory leg of first pair; *g*, ibid. of fourth pair; *h*, eggs, pressed from the body.

Atlantic, latitude 7° 25′ north, longitude 22° west, October 17, 1838; latitude 1°–7° south, longitude 18°–21° west, November 5, 1838; latitude 7° south, longitude 20° west, May 11, 1842; latitude 1° south, longitude 30° west, May 16, 1842. Pacific, latitude 15° 30′ south, longitude 138° 30′ west, August 19, 1839; latitude 33° south, longitude 153° 30′ east, November 29, 1839; near the Ladrones, December 31, 1841.

Length, one-twentieth of an inch. Colour of one specimen, blue; another colourless, except a tinge of blue along the venter, and a clear red in the terminal joint of the abdomen.

The setæ of the anterior antenna at apex are about as long as the organ, or even longer. The posterior antennæ have a long slender finger. The first joint of it bears one or two longish spines. The anterior feet have a long finger much incurved at apex. Posterior pair of natatories smallest. The branches are three-jointed, the shorter not quite half the longer.

The elliptical part of the abdomen is about half the whole length. The stylets are longer than twice the second joint. The inner setæ are half as long as the stylets; the next are nearly half shorter; the outer are minute and are situated on the side, a little distance from the apex of the stylet. The pigment of the eyes was deep red.

Eggs were pressed from the body, proving the individual to be a female. They were grayish or yellowish, and elliptical in form, as seen in the figure (4 *h*). In specimens collected in the Pacific, August 19, 1839, the internal ovaries were distinct. Each was an oblong cylindrical mass, lying in the cephalothorax, and extending from the posterior extremity upward and forward to near the middle of the anterior cephalothoracic segment. Leaving the cephalothorax with a small diameter, it constituted another smaller oblong mass in the elliptical part of the abdomen.

CORYCÆUS LONGISTYLIS.

Cephalothorax crassus. Conspicilla remotiuscula. Antennæ anticæ elongatè setulosæ. Antennarum posticarum articulus 2dus digito vix brevior, ad apicem internum dentiformis, nudus et acutus, setâ basali longâ, nudâ; digito setam nudam ad basin ferente. Abdomen uniarticulatum, dimidio apicali cylindrico. Styli caudales tenues, abdomine valde longiores, setis perbrevibus.

Cephalothorax stout. Conspicilla large, somewhat distant. Anterior antennæ with the setæ rather long. Posterior antennæ having the second joint hardly shorter than the finger, dentiform and acute at the inner apex, its seta long and naked; finger also with a naked seta at base. Abdomen one-jointed, basal half elliptical, cylindrical apex but little shorter. Caudal stylets slender, much longer than the abdomen, setæ very short.

Plate 85, fig. 5 *a*, animal, enlarged, showing within the alimentary

cavity, the position of prominent muscles, and the ovaries, besides the eyes; *b*, same, dorsal view; *c*, posterior antennæ; *d*, one of the maxillæ and one anterior foot, drawing not completed.

China Sea, three hundred miles northeast of Singapore, latitude 5° north, longitude 107° east, February 17, 1842.

Length, one-tenth of an inch. Nearly colourless; brownish red about the mouth and along the venter.

The antepenult joint of the anterior antennæ is larger than the others, and the setæ are rather more than half the length of the antennæ. The setæ of the second joint of the posterior antennæ is as long as this joint. The next joint is less than one-third the following. The last segment of the cephalothorax has not the posterior angles at all prominent.

The abdomen in its elliptical part contained a pair of oblong sacs, as shown in the figure, which connected with a pair extending obliquely upward and forward in the cephalothorax, nearly to the middle of the back.

Within the cephalothorax along the back, there were appearances indicating traces of obsolete divisions, which if perfect would divide the large anterior segment into seven segments, corresponding (counting from the posterior part) to

1 pair of natatories.
1 pair of prehensile feet or maxillipeds.
2 pairs of maxillæ.
1 pair of mandibles.
1 pair of antennæ—the posterior.
1 pair of antennæ—the anterior.

The stomach is very large ovoid, and from the under side it connects with an oblong œsophagus, which diminishes a little to the mouth. The stomach occupies the greater part of the anterior segment, and becomes gradually smaller as it passes to the following segments.

The caudal setæ are about one-fourth as long as the stylets.

B. *Setæ caudales stylis non valde breviores, sæpe longiores.*

* Cephalothorax posticè obtusus.

CORYCÆUS OBTUSUS.

Conspicilla lata. Antennæ anticæ tenues, setis longiusculis. Antennarum posticarum articulus 2dus digito non brevior, setâ longâ nudâ. Abdomen 2-articulatum, sub basi apiculatum, segmento secundo dimidium primi longitudine paulo superante. Styli caudales dimidii abdominis longitudine, setis stylo parce longioribus.

Conspicilla large. Anterior antennæ slender, setæ rather long. Finger of posterior antennæ not longer than second joint, seta of second joint long, naked. Abdomen two-jointed, produced into a tooth below at base, second segment somewhat exceeding half the first in length. Caudal stylets half as long as the abdomen, setæ slightly longer than the stylets.

Plate 85, fig. 6, animal, enlarged, lateral view.

Pacific Ocean, near El Gran Cocal, latitude 5½° south, longitude 175½° east, March 25, 1841.

Length, one-thirtieth of an inch.

In a lateral view, the abdomen is very narrow at base, and then abruptly widens from below, and is prolonged into an acute curved tooth; it then narrows gradually. At the apex of the first segment below, there are two or more very short setæ. The stylets are quite slender. The longest of the setæ is about once and a half the stylets. The posterior antennæ are more than twice the size of the anterior legs.

† Cephalothorax posticè acutus.

CORYCÆUS CRASSIUSCULUS.

Cephalothorax crassiusculus, segmento quarto posticè subacuto. Conspicilla contigua. Antennarum posticarum articulus 2dus digito vix

brevior, setâ nudâ. Abdomen uni-articulatum, apice subcylindrico fere dimidio breviore quam pars basalis elliptica. Styli caudales dimidium abdominis longitudine superantes, setis paulo longioribus.

Cephalothorax rather stout, fourth segment posteriorly acute or subacute. Conspicilla in contact (or very nearly so). Finger of posterior antennæ longer than second joint, seta of second joint naked. Abdomen one-jointed, elliptical part a third longer than the cylindrical. Caudal stylets about two-thirds the length of the abdomen, setæ half longer than the stylets.

Plate 85, fig. 7 *a*, *b*, animal, enlarged, different views.

Sooloo Sea, west of the Island of Panay, January 27, 1842.

Length, one-twentieth of an inch. Nearly colourless, with deep red about the mouth and along the venter. Pigment of eyes red.

The cephalothorax in a dorsal view is about as broad behind as in front. The posterior angles are prolonged acute; and those of the small terminal segment lying between are acute and a little prolonged. This last character, the conspicilla in contact, and the characters of the abdomen, distinguish this species from the following.

In a lateral view the abdomen is gradually tapering, and the upper and under sides are nearly straight.

CORYCÆUS LATICEPS.

Cephalothorax crassus, segmento quarto breviter acuto. Conspicilla remotiuscula. Antennæ anticæ 7-articulatæ, setis dimidio brevioribus. Antennarum posticarum articulus 2dus digito paulo brevior, setâ longâ, nudâ. Abdomen 2-articulatum; segmento secundo cylindrico, dimidio breviore. Styli caudales dimidio abdominis breviores, setis parce longioribus.

Cephalothorax stout, fourth segment short acute behind. Conspicilla large, rather remote. Anterior antennæ seven-jointed, setæ half shorter than antenna. Finger of posterior antennæ longer than the second joint, seta of second joint long, naked. Abdomen two-

jointed, first segment broad elliptical, with a very short cylindrical apex, second segment cylindrical, about half shorter than the first. Caudal stylets less than half the abdomen in length, setæ slightly longer.

Plate 85, fig. 8 *a*, animal, enlarged; *b*, same in dorsal view; *c*, natatory leg.

Atlantic, latitude 4°–5° north, longitude 19°–22° west, October 22–26, 1828, abundant; latitude 1° south, longitude 18° 30′ west, November 5, 1838; latitude 0° 15′ south, longitude 31° west, May 17, 1842.

Length, one-twentieth of an inch. Colour, blue, with deeper blue along the venter; pigment of the eyes deep blue.

The basal joint of the anterior antennæ is the largest. The cylindrical part of the abdomen is very nearly as long as the elliptical portion, and the stylets are but little shorter. The fourth segment of the cephalothorax is acute behind, as in the preceding species, but the conspicilla are rather distant, the caudal stylets and setæ are shorter, and the elliptical part of the abdomen is shorter in proportion.

Corycæus vitreus.

Cephalothorax crassus, segmento quarto brevissimè acuto. Conspicilla remotiuscula. Antennæ anticæ elongatè setulosæ. Antennarum posticarum articulus 2dus digito vix brevior, setâ nudâ, longâ. Abdomen 2-articulatum, apice cylindrico brevi. Styli caudales dimidii abdominis longitudine, setis stylos paulum superantibus.

Cephalothorax rather stout, fourth segment very short acute. Conspicilla large, rather distant. Anterior antennæ six- or seven-jointed, setæ long. Finger of posterior antennæ about as long as second joint, seta of second joint long, naked. Abdomen two-jointed, subovate, quite a short cylindrical apex. Caudal stylets about half as long as abdomen, setæ rather longer than the stylets.

Plate 85, fig. 9 *a*, animal, enlarged; *b*, same, dorsal view; *c*, anterior antennæ; *d*, anterior legs.

Pacific, latitude 18° south, longitude 124° 30′ west, August 6, 1839, 5 A. M.

Length, one-fifteenth of an inch. Colourless, transparent.

The cephalothorax in the single specimen seen was a little broader in front than posteriorly. The cylindrical part of the abdomen is much less than half the preceding elliptical part, and is half as large in diameter. The long seta of the stylets a little exceeds the stylet in length. The slender finger of the anterior legs is about as long as the preceding joint. Some of the setæ of the anterior antennæ are as long as these organs. In a side view, the abdomen has both the upper and under sides alike and very slightly convex, the breadth diminishing rather abruptly where the cylindrical part begins.

CORYCÆUS AGILIS.

Cephalothorax crassiusculus, segmento quarto subrectangulato. Conspicilla remotiuscula. Antennæ anticæ breviter setulosæ. Antennarum posticarum articulus 2dus digito paulo brevior, setâ longâ, nudâ. Abdomen 2-articulatum, crassum, segmento secundo tenuiter subcylindrico, paulo breviore quam primum. Styli caudales tenuissimi, dimidio abdominis longiores, setâ paulo breviore.

Cephalothorax rather stout, fourth segment rectangular on either side. Conspicilla rather remote, large. Anterior antennæ quite small, setæ short. Finger of the posterior antennæ a little longer than the second joint, seta of second joint long, naked. Abdomen two-jointed, first segment oval, with a short cylindrical apex, second a little shorter than the first, and less than one-third the breadth, seta a little shorter.

Plate 85, fig. 10 *a*, *b*, animal, enlarged, different views.

Pacific, one to two hundred miles south of Tongatabu.

Length, one-thirtieth of an inch. Colour of venter, reddish; of abdominal legs, bluish; pigment, red.

The cylindrical part of the abdomen is quite as long as the pre-

ceding, and very slender. In a side view, the upper outline of the abdomen is nearly straight; the lower has a notch where the abdomen near middle diminishes in breadth; there are short setæ at this spot. The posterior antennæ have two naked setæ to second joint, according to my description; in the figure there is but one represented.

CORYCÆUS ORIENTALIS.

Cephalothorax crassus, segmento quarto rectangulato, subacuto. Conspicilla parva, remota. Antennæ anticæ breviter setulosæ. Antennarum posticarum articulus 2dus digito paulo longior, setâ longâ, nudâ, digito articulis duobus subæquis composito. Abdomen 2-articulatum, ad apicem vix productum, ad basin infra rectangulatum. Styli caudales breves, setis parce longioribus.

Cephalothorax stout, fourth segment rectangular, subacute. Conspicilla small, remote. Anterior antennæ with short setæ. Finger of the posterior antennæ scarcely shorter than the second joint, its two joints subequal; seta of second joint long, naked. Abdomen elliptical, apex scarcely prolonged, below at base rectangular in profile. Caudal stylets short, setæ but slightly longer.

Plate 85, fig. 11 *a*, animal, enlarged; *b*, dorsal view; *c*, posterior antenna.

Sooloo Sea, southwest of Panay, January 29, 1842; also, among the Sooloo Islands, February 2, 1842.

Length, one-twentieth of an inch. Nearly colourless, with red about the mouth and venter, and in the abdomen.

Cephalothorax in dorsal view elliptical. The conspicilla are remarkably small and distant. The abdomen is two-jointed, the second less than half the length of the first; the whole elliptical, apically a little prolonged, but not having a cylindrical apex. In profile the abdomen is broadest at base and tapers to apex, the lower side being however straight, and having a right angle at base. The stylets are less than half the length of the abdomen, and the setæ do not exceed half the abdomen.

2. ANTENNÆ POSTICÆ MICRODACTYLÆ; DIGITUS ARTICULO 2DO BREVIOR.

A. *Seta articuli antennarum posticarum 2di nuda.*

* Styli caudales abdomine non breviores.

a. Digitus antennarum posticarum articulo 2do paulo brevior.

CORYCÆUS LAUTUS.

Cephalothorax ad segmentum quartum obtusus. Conspicilla remotiuscula. Antennæ anticæ longissimè setulosæ. Antennarum posticarum articulus 2dus digito paulo longior, setâ longâ, nudâ, digito subæquè 2-articulato, et ad basin setam nudam longam ferente. Abdomen 2-articulatum, segmentis fere æquis, 1mo paulo latiore. Styli caudales tenuissimi, abdomine valde longiores, setis perbrevibus.

Cephalothorax with fourth segment obtuse behind. Conspicilla rather remote. Anterior antennæ slender, setæ long. Finger of posterior antennæ a little longer than half the second joint, joints of finger subequal, near the articulation a short spine, and at base another spine nearly as long as the finger. Abdomen two-jointed, segments nearly equal, the first a little the stouter. Caudal stylets very slender, much longer than the abdomen, setæ very short.

Plate 85, fig. 12 *a*, *a'*, animal, enlarged; *b*, posterior antenna; *c*, two pairs of maxillæ; *d*, the maxillæ and the anterior feet (or maxillipeds), in position (nearly), figure not quite completed; *e*, extremity of one of the natatory legs that extend laterally.

Pacific, near the Kingsmills, April, 1841.

Colourless, except a little orange-red near the mouth, and in the posterior pair of natatories, which are extended laterally in the natural position of the animal. This species differs from the following under this subdivision, in having the last cephalothoracic segment obtuse, and in other characters. Several of the setæ of the anterior antennæ are as long as the organ. The caudal setæ are less than

one-third the length of the stylets; the stylets are very long, and were not divergent in the specimen seen.

b. Digitus antennarum posticarum articulo 2do valde brevior, uncinatus.

CORYCÆUS SPECIOSUS.

Cephalothorax ad segmentum quartum elongatè acutus. Conspicilla non contigua. Antennæ anticæ setis longissimis. Abdomen 2-articulatum, articulo primo crasso, secundo cylindrico et dimidio breviore. Styli caudales abdomine longiores, divaricati, setis brevibus. [*Pedes biremes 4 posteriores utrinque protensi.*]

Cephalothorax with the fourth segment acute behind. Conspicilla not in contact. Anterior antennæ seven-jointed, setæ very long. Abdomen two-jointed, first segment stout, the second half shorter, cylindrical. Caudal stylets longer than abdomen, divaricate, setæ short. [Four posterior natatory feet extended laterally.]

Plate 86, fig. 1 *a*, animal, enlarged; *b*, abdomen, in lateral view; *c*, one of the natatories of the second pair; *d*, same, third pair.

Atlantic, latitude 5°–7° north, longitude 21°–22° west, October 20 and 22, 1838.

Length, one-sixteenth of an inch. Specimen of October 22, colourless, except a bright red spot near middle of cephalothorax; that of October 20, having the four posterior natatories of a deep orange, and the antennæ with the stout part of the abdomen of the same colour.

This species is remarkable for the lateral extension of the two posterior pairs of natatories, which when coloured give a beautiful appearance to the little animal. The setæ of the anterior antennæ are somewhat longer than the organ. The finger of the posterior antennæ is a short claw. The abdomen is enlarged posterior to the middle of the first segment, and above, upon this enlarged part, there is some appearance of an aperture. The branches of the natatories are both three-jointed.

CORYCÆUS REMIGER.

Cephalothorax ad segmentum quartum elongatè acutus. Conspicilla remota, parvula. Antennæ anticæ 7-articulatæ, setis longissimis. Abdomen 3-articulatum, segmento ultimo subito angustiore, cylindrico. Styli caudales fermè abdominis longitudine, divaricati, setis stylo paulo brevioribus. [C. specioso *quoad pedes biremes similis.*]

Cephalothorax with fourth segment prolonged behind and acute. Conspicilla remote, small. Anterior antennæ seven-jointed, setæ very long. Four posterior natatory feet extended laterally. Abdomen three-jointed, the third segment abruptly smaller, cylindrical. Caudal stylets about as long as the abdomen, divaricate, setæ slightly shorter than the stylets. [Natatory feet as in the *C. speciosus.*]

Plate 86, fig. 2 *a*, animal, enlarged; *b*, posterior antenna.

Atlantic, latitude 11° south, longitude 29° west, November 10, 1838.

Length, one-fifteenth of an inch.

This species resembles the preceding, but differs in its abdomen and stylets. The fourth segment of the cephalothorax has the acute prolongations behind one-third those of the preceding joint, and the latter are more than half the length of the abdomen. The anterior antennæ have the second, fourth, and sixth joints longer than the others.

The second joint of the abdomen is broadest at apex, and in the specimen there were above at the posterior part two oval laminæ, of large size.

† Styli caudales abdomine breviores. [Cephalothorax posticè ad segmentum tertium elongatè acutus.]

CORYCÆUS LATUS.

Cephalothorax crassus, segmento quarto posticè elongatè acuto. Conspicilla parva, remota. Antennæ anticæ mediocriter setigeræ. Abdomen

crassum, posticè attenuatum, segmento ultimo subcylindrico. Styli caudales dimidio abdominis breviores, divaricati, setis parce longioribus.

Cephalothorax stout, fourth segment much prolonged behind and acute. Conspicilla small, remote. Anterior antennæ seven-jointed, setæ shorter than the antenna. Abdomen stout, attenuate behind, three-jointed, third segment nearly cylindrical. Caudal stylets shorter than half the abdomen, divaricate, setæ a little longer.

Plate 86, fig. 3 *a*, animal, enlarged; *a'*, anterior antenna; *b*, posterior antenna; *c*, first pair of feet; *d*, one of the natatories of second pair; *e*, abdomen, lateral view.

Atlantic, latitude 3° 45′–4° 20′ north, longitude 19° 30′–18° 30′ west, October 26, 27, 1838; latitude 6° 20′ south, longitude 24° west, November 8, 1838.

Length, one-twenty-fourth of an inch. Colourless, or but slightly bluish.

The abdomen is fusiform in shape. The stylets are but little longer than the last segment. The second and fifth joints of the anterior antennæ are longer than the others. The finger of the posterior antennæ is about or nearly half the length of the second joint. The naked setæ are as long as this joint. The natatories of the four pairs have both branches three-jointed. The pigment of the large eyes extends backward into a prominent carinate ridge, on the under side of the cephalothorax, and this ridge has a nearly semicircular outline.

CORYCÆUS VENUSTUS.

Cephalothorax mediocris, segmento quarto breviter acuto. Conspicilla remotiuscula. Antennæ anticæ elongatè setigeræ. Antennarum posticarum articulus 2dus digito fere duplo longior, apice interno dentiformi, setâ longâ, nudâ, digito subœque 2-articulato. Abdomen 2-articulatum, segmento primo paulo latiore et longiore. Styli caudales abdomine paulo breviores, divaricati, setis abdominis longitudine.

Cephalothorax moderately stout, fourth segment very short acute.

Conspicilla a little separate, large. Anterior antennæ very slender, setæ long. Finger of the posterior antennæ rather short and nearly equally two-jointed, second joint of antenna having a tooth at the inner apex, seta of this joint long, naked. Abdomen two-jointed, first segment broad, narrow at base, second smaller and shorter. Caudal stylets divaricate, a little shorter than the abdomen, setæ as long as the abdomen.

Plate 86, fig. 4 *a*, animal, enlarged, lateral view; *a'*, same, dorsal view; *b*, posterior antenna; *c*, mandible or inner maxilla; *d*, first pair of feet.

Pacific, Kingsmill Islands, twenty miles north of Charlotte Island, 4 A. M., April 22, 1841.

Length, one-sixteenth of an inch. Nearly colourless.

The posterior cephalothoracic segment has the angles very slightly prolonged and acute. The caudal stylets are two-thirds as long as the abdomen. The ventral angle of the cephalothorax is not very prominent. The anterior antennæ have some of the setæ longer than the organ.

The posterior antennæ have a stout two-jointed finger; the joints are nearly equal, and the first of the two is furnished with two or three short spines. The naked seta from the base of the second joint of the antenna was straight in the specimen examined, and longer than the joint.

Corycæus inquietus.—Plate 86, fig. 5 *a*, *b*, represents imperfectly a specimen taken in the Sooloo Sea. It was lost before the drawing was finished, having leaped from the glass containing it, the glass at the time being nearly dry. It has the posterior angles of the cephalothorax acute; also, the posterior angles of the fourth cephalothoracic segment acute; the conspicilla large and *in contact;* the posterior antennæ with a short claw and naked setæ; the posterior natatories (the preceding pair also?) laterally extended. None of the species of Corycæus seen by the author, combine contiguous conspicilla with the other characters mentioned.

B. *Seta articuli 2di antennarum posticarum setulosa.* [*Cephalothorax posticè elongatè acutus.*]

CORYCÆUS PELLUCIDUS.

Cephalothorax gracilis, ventre maximè carinato. Conspicilla fere contigua. Antennæ anticæ 7-articulatæ, setis fere brevibus. Antennarum posticarum articulus 2dus apicem internum acutus, digito brevi. Abdomen 1-articulatum, apice obliquè truncato. Styli caudales dimidio abdominis longiores, setis vix majoribus.

Cephalothorax slender, venter prominently carinate. Conspicilla nearly contiguous, large. Anterior antennæ seven-jointed, setæ rather short. Finger of the posterior antennæ short, second joint acute at the inner apex, and its setæ long and setulose. Abdomen one-jointed, posterior apex obliquely truncate and much excavate. Caudal stylets longer than half the abdomen, setæ scarcely longer than the stylets.

Plate 86, fig. 6 *a*, animal, enlarged; *b*, dorsal view of abdomen; *c*, profile of cephalothorax, showing carinate process below; *d*, posterior antennæ.

Atlantic, latitude 4°–7° north, longitude 19° 30′–21° 30′ west, October 18, 20, 22, 24, 26; also, latitude 2° 20′ south, longitude 20° west, November 6, 1838.

Length, one-twenty-fifth of an inch. Colourless and pellucid, with a little light blue in the cephalothorax and along the venter.

The cephalothorax in the specimen examined was peculiarly slender in a dorsal view, but this may not be a constant character. It was broadest anteriorly.

The abdomen in a lateral view has the upper and under sides parallel, through the basal two-thirds; after this the upper apex is truncated, and at this spot there are two oblong oval laminæ attached. In an upper view, the outline of the abdomen is oblong elliptical. In one specimen there were several appendages to the abdomen above, instead of two, the usual number.

There are four pairs of natatories, and the fourth pair is very short. Both branches are three-jointed.

In latitude 17½° north, longitude 20½° west, October 2, 1838, a specimen was obtained having nearly the above characters. It was the first seen of the genus. The only points of difference which the drawings seem to indicate, are a much stouter cephalothorax in a dorsal view, and the anterior antennæ but five-jointed. Length, about one-thirtieth of an inch. Colourless, or slightly greenish. The abdomen has the same form as in the above, and two similar though smaller appendages.

CORYCÆUS CONCINNUS.

C. pellucido *similis. Cephalothorax paulo crassior; abdomen gracilius; styli breviores, dimidium abdominis longitudine non superantes. Antennæ anticæ* 3-*articulatæ.*

Similar to *C. pellucidus.* Cephalothorax a little stouter; abdomen more slender; caudal stylets shorter, not half as long as the abdomen. Anterior antennæ three-jointed.

Plate 86, fig. 7 *a*, lateral view, natural size; *a'*, dorsal view of cephalothorax, imperfect; *b*, posterior antenna.

Pacific Ocean, latitude 15° 35′ south, longitude 138° 30′ west, August 19, 1839; also, about two hundred and fifty miles south of Tongatabu.

Length, one-twenty-fourth of an inch. Colourless, with a blue tinge along the venter.

This species resembles the preceding; but has a more slender abdomen and shorter stylets in proportion. The upper and under sides of the abdomen in a profile view are parallel. There are appendages to the posterior part above as in the preceding. The anterior antennæ appeared to be quite short and to have only three joints. The apex of the second joint of the posterior antennæ is truncate and bears a minute spine, rendering it acute.

Corycæus productus.

Antennæ anticæ 5–7-articulatæ, brevissimè setulosæ. Antennarum posticarum articulus 2dus ad apicem acutus et digitus brevis forsan 3-articulatus. Abdomen elongatum, versus basin crassius ad apicem oblique non truncatum. Styli caudales fere dimidio breviores, setis stylo paulo longioribus.

Anterior antennæ five- to seven-jointed, setæ short. Second joint of posterior antennæ acute at apex, finger short, probably three-jointed. Abdomen long, half as long as cephalothorax, stoutest near base, not obliquely truncate at apex. Caudal stylets nearly one-half shorter, setæ a little longer than the stylets.

Plate 86, fig. 8 *a*, animal, enlarged; *b*, natatory of third or fourth pair.

Atlantic, latitude 8° 35′ north, longitude 23° 40′ west, October 15, 1838.

Length, one-thirtieth of an inch. Colourless, or a light tinge of blue, with brown along the venter.

In a lateral view, the abdomen abruptly enlarges below, very near the basal articulation; from this part the under side is straight, while the upper has a slight slope and curve, the abdomen gradually diminishing in height. The conspicilla are large, but it is not stated in my notes whether they are in contact or not.

The posterior natatories the smallest; the branches three-jointed.

The claw or finger of the posterior antennæ appeared to have two short basal joints; but it is possible that the existence of one or two short spines may have led to a mistake with regard to one of the articulations.

Corycæus longicaudis.

Cephalothorax mediocris, segmento quarto elongatè acuto. Conspicilla fere contigua. Antennæ anticæ 7-articulatæ, setis longiusculis, antennâ

brevioribus. Antennarum posticarum articulus 2dus ad apicem internum acutus, et digitus parvulus, 3-articulatus (?). *Abdomen mediocre, subellipticum. Styli caudales abdomine longiores, setis dimidio brevioribus.*

Cephalothorax moderately slender, fourth segment prolonged behind and acute. Conspicilla large, nearly in contact. Anterior antennæ seven-jointed, setæ rather long, but shorter than the antenna. Second joint of posterior antennæ acute at inner apex, finger small, three-jointed (?). Abdomen rather longer than one-third the cephalothorax, subelliptical. Caudal stylets longer than the abdomen, setæ about half as long as the stylets.

Plate 86, fig. 9 *a*, animal, enlarged; *a'*, dorsal view; *b*, anterior antenna; *c*, posterior antenna.

Atlantic, latitude 5° north, longitude 20° west, October 24; and also, latitude 0° and 2° 20′ south, longitude 17° and 20° west, November 1 and 6, 1838.

Length, one-eighteenth of an inch. Colourless.

The length of the stylets exceeds that of the abdomen, and this species is thus at once distinguished from the preceding. The anterior antennæ have the first and fifth joints longest, and the whole length is about one-third that of the cephalothorax. The finger of the posterior antennæ is about half the preceding joint in length. Claw of first pair of feet very short. Natatories four pairs.

The short exterior seta of the caudal stylets is situated some distance from the apex. The abdomen in an upper view is oblong elliptical; in a lateral view, the upper side is a little convex, the under side very slightly convex, or nearly straight.

Genus ANTARIA, *Dana*.

Cephalothorax fere ac in Corycæo, *postice rotundatus. Abdomen ac in* Corycæo. *Antennæ posticæ parvæ, apice breviter setigeræ, pedibus anticis non majores, articulo secundo posticè angulato. Pedes antici monodactyli, quoad sexus vix dissimiles, digito tenui.*

Cephalothorax nearly as in *Corycæus*, rounded behind. Abdomen as

in *Corycæus*. Posterior antennæ small, short setigerous at apex, not larger than the anterior feet, second joint having an angle on the posterior margin. Anterior feet monodactyle, not differing between the sexes, finger slender.

The Antariæ differ from the species of the preceding genus in having the anterior feet not smaller than the posterior antennæ, and sometimes very much larger. Moreover, the posterior antennæ terminate in a short slender joint, having a few setæ and perhaps a claw at apex; and the preceding joint has an obtuse angle on the posterior side, with a very minute seta at its apex. Besides, the cephalothorax as far as observed is obtuse behind, and the conspicilla are remote.

The anterior antennæ have two very short joints at base, and three longer subequal joints, the last of which is usually triarticulate. These organs are bent at an obtuse angle after the third and fourth joints. The setæ are nearly as in the Corycæi, sometimes nearly as long as the antenna.

The external ovarian sacs are subdorsal in position, being attached to the second abdominal joint on its upper and outer side.

The ventral line in the profile of the Antariæ is slightly convex, or forms a low angle at the mouth.

The first pair of feet have each a slender finger, which folds down upon the inner side of the preceding joint or hand, as in *Corycæus*.

Antaria, DANA, Amer. Jour. Sci. [2], i., 229; Proc. Amer. Acad. Sci., ii. 39.

ANTARIA CRASSIMANA.

Pedes antici pervalidi, antennis posticis valde majores, articulo secundo abdomen longitudine fere æquante. Abdomen 3-articulatum, segmentis primo tertioque perbrevibus. Styli caudales abdomine triplo et setæ duplo breviores.

Anterior feet very stout, much longer than the posterior antennæ, second joint about as long and stout as the abdomen, claw but little shorter. Abdomen three-jointed, second segment long elliptical, first and third very short. Caudal stylets about one-third the length of the abdomen, setæ a little longer, the two exterior nearly as long as the stylet.

Plate 86, fig. 10 *a*, lateral view of animal, enlarged; *a'*, back view, conspicilla omitted; *b*, posterior antennæ; *c*, anterior feet.

Atlantic, latitude 0° 30′–1° north, longitude 18° west, November 3, 1838, 4 A. M.

Length, one-thirtieth of an inch. Nearly colourless; extremity of abdomen and of the anterior antennæ, vermilion, passing backward into orange and yellow.

The cephalothorax in a vertical view is ovate or suboval, being slightly larger anteriorly and truncate behind. The abdomen has the apical joint and the basal each not one-fourth the second. The anterior antennæ have five joints, the two basal quite short, the three terminal subequal, and the last obsoletely triarticulate; setæ at apex about half the length of the antenna.

ANTARIA GRACILIS.

Pedes antici mediocres, antennis posticis paululo majores. Abdomen sensim attenuatum. Styli caudales abdomine quadruplo breviores, setis dimidio abdominis longioribus.

Anterior feet rather small, very slightly larger than the posterior antennæ, claw small. Abdomen gradually tapering. Caudal stylets one-fourth as long as the abdomen, setæ longer than half the abdomen.

Plate 86, fig. 11 *a*, lateral view of animal, enlarged; *b*, back view of the first, with the external ovarian sacs; *c*, anterior antennæ; *d*, posterior antennæ; fig. 12, another variety.

Atlantic, latitude 5°–7° north, longitude 21°–22° west, October 18, 20, 22, 23, 1838, and latitude 2° 20′ south, longitude 20° west, November 6, 1838.

Length, one-twentieth of an inch. Colourless; also, often bluish, and reddish.

Cephalothorax in a vertical view is oval. The second abdominal

segment is subcylindrical, a little the largest near the base. The caudal setæ are sometimes as long as the abdomen. This is the case in one of the figures, the bluish one, a female, while in the reddish one they are somewhat shorter. The anterior antennæ have five joints, with the last distinctly triarticulate. Some of the setæ are nearly as long as the abdomen. There are four pairs of natatories, which are nearly equal, the anterior shortest.

In some specimens there were two bags of eggs attached to the abdomen. They were oval, and lay a little over the abdomen, attached to its upper and outer side near the base of the second joint. Their colour was a pale shade of bluish purple, like that of the animal. The abdomen of the same individual was yellowish.

ANTARIA OBTUSA.

Pedes antici parvuli, antennis posticis paululo majores. Abdomen sensim attenuatum, apice obsoletè 3-articulatum. Styli caudales dimidio abdominis paulo breviores, setis longiores.

Anterior feet small, slightly larger than the posterior antennæ, claw about as long as preceding joint. Abdomen gradually smaller towards apex, long ovate, with three obsolete articulations near apex. Caudal stylets a little shorter than half the abdomen, setæ longer, external setæ very short.

Plate 86, fig. 13 *a*, animal, enlarged; *b*, lateral view of body; *c*, posterior antennæ; *d d'*, anterior feet, the claw in the former open.

Sooloo Sea, southwest of Panay, January 29, 1842.

Length, one-twentieth of an inch. Colour, red, in blotches; other parts nearly colourless.

The abdomen is five- or six-jointed, counting the imperfect articulations near apex. The whole except the first or basal joint, constitutes in appearance a single oblong segment. The longest caudal seta is half as long as the abdomen and stylets together, the one inside of this is a third shorter, and the one next outside of it is one-fourth less; the two external are very short, but little exceeding the diameter of the

stylet. The setæ of the anterior antennæ are rather shorter than these organs. The first joint of the abdomen is partly included between the rounded projections of the cephalothorax either side.

Another specimen, taken in the Balabac Passage, had the stylets somewhat shorter in proportion, and possibly was a different species. It had two bags of eggs attached. Figure 13 *e*, represents the abdomen and one of the ovarian sacs. The caudal stylets are mutilated.

Very similar specimens, of a red colour, probably of the same species, were found twelve miles north of New Zealand. Longest hairs of stylets twice as long as stylet.

Genus COPILIA, *Dana*.

Corpus depressum, fronte quadratum, conspicilla ad angulos anticos gerens. Antennæ posticæ monodactylæ, digito elongato, subulato. Abdomen pauci-articulatum, appendicibus basalibus carens.

Body depressed, quadrate in front and having the conspicilla very distant, being situated on the angles. Posterior antennæ monodactyle, the finger long subulate. Abdomen few-jointed, without appendages at base.

The species here included differ from the Corycæi in having the body depressed, with the front broad truncate, and the conspicilla occupying the distant angles. In other respects they resemble more the Corycæi than the Sapphirinæ. The anterior antennæ of the two species seen have five joints. The posterior are four-jointed, the first and second long, the second with a prominence and spines on the margin near the basal extremity, which may in grasping be opposed to the long moveable finger. The third joint is short. The finger appears to have free motion at the articulation with the third joint, instead of acting in concert with this joint, the common mode in the Corycæi.

Copilia, Dana, Proc. Amer. Acad. Sci., ii. 40, where the following new species are described.

Copilia mirabilis.

Cephalothorax fronte latus et parce excavatus, posticè paulo latior, segmentis posticis latere obtusis, ultimo ad apicem dorsalem spinigero. Antennæ posticæ ad articulum primum setulosæ, digito longo. Abdomen tenue, cephalothoracis dimidio brevius, obsoletè 5-articulatum. Styli abdomine longiores, tenuissimi.

Cephalothorax broad in front and sparingly excavate between the conspicilla, broader posteriorly; following segments laterally obtuse, the last with a minute spine at the dorsal apex. Abdomen slender, hardly half as long as cephalothorax, obsoletely five-jointed. Stylets longer than abdomen, very slender.

Plate 86, fig. 14 *a*, animal, enlarged; *b*, under view of same, enlarged, showing the antennæ, mouth, conspicilla, &c.

Pacific, near the Kingsmill Islands.

Colourless. Length, one-sixteenth of an inch.

This singular species, as shown in figure 14 *b*, has the lenticular corneæ or conspicilla (*a*) of the eyes very distant from the lens (*b*). The form of the conspicilla on the anterior side is nearly a segment of a sphere; but behind it is low subconical. The pigment is bent at an angle and is very long, the two slender masses nearly meeting along the centre. Fig. 14 *b*, also shows the nerve (*c*) passing to the anterior antennæ, and the muscles (*d*, *e*, *f*,) moving the organs of the mouth; also *g*, moving the anterior leg or maxillipeds, which organs are like those of the preceding genus. The outer maxillæ appear to be quite different in form; they have a broad terminal joint, two-lobed, and ciliate or hairy at apex. The stomach is broad ovate, and hardly extends beyond the anterior segment. The first segment of the cephalothorax slightly enlarges from the front backward, and more rapidly towards its posterior part.

The three posterior cephalothoracic segments gradually decrease in width, but not much in length; the last is hardly half shorter than

its width. The abdomen has two setæ, situated somewhat dorsally at the first articulation, and below there are a few minute teeth at the following articulations. These articulations are indistinct, the organ appearing to be one-jointed. The stylets were divergent; their setæ were mutilated.

COPILIA QUADRATA.

Cephalothorax anticè bene quadratus, fronte parce excavatus, segmentis latere obtusis, postico brevissimo. Abdomen 4-articulatum, tenue, segmentis secundo tertioque non longioribus quam primum, quarto dimidium abdominis longitudine superante et lateribus parce excavato. Styli caudales abdomine longiores, tenuissimi.

Cephalothorax anteriorly regularly quadrate, the front a little excavate, segments laterally obtuse, the last very short. Abdomen four-jointed, slender, the first segment as long as second and third, the fourth longer than half the abdomen and with concave sides. Stylets longer than abdomen, very slender.

Plate 86, fig. 15 *a*, animal, enlarged; *b*, posterior antenna; *c*, under view of mouth organs and first pair of legs; *d*, natatory leg.

Pacific, latitude 15° 20′ south, longitude 148° 20′ west, obtained a single individual, September 10, 1839; also, May, 1841, near longitude 165° east, between latitude 10° and 12° north.

This species has the sides of the anterior half of the first cephalothoracic segment quite parallel, and consequently the head looks more quadrate than in the preceding species. The third and fourth segments are very short compared with their width. The caudal stylets were divergent; their setæ were mutilated. The posterior antennæ have the first and second joints nearly equal in length, the fourth as long as second and third. The termination of the fourth is acute, or like a short spine at the extremity. The first joint appeared to be naked (no setæ are mentioned in my notes, or represented in the figure).

The eyes and pigment are as in the preceding species.

There were two large oval glandular masses in the anterior part of the cephalothorax, situated as indicated in the figure.

The figure of the posterior antennæ (fig. *b*) was drawn from the specimen obtained near longitude 165°, in 1841, while the other figures are from that of 1839.

Genus SAPPHIRINA, *Thompson.*

Corpus plus minusve depressum, fronte arcuato. Conspicilla in frontem vel superficiem capitis inferiorem insita. Sexus quoad antennas posticas stylosque caudales similes, abdominem pedesque anticos dissimiles. Maris:—*Abdomen thorace subito non angustius, 4–5-articulatum, appendicibus basalibus carens; pedes antici digito elongato instructi.* Feminæ:—*Abdomen thorace subito angustius, 5–6-articulatum, appendices breves basales gerens; pedes antici digito brevi.* [Mares *sæpe lætè opalini aut fulgidè metallini;* feminæ *sæpius incoloratæ et plus minusve pellucidæ, interdum opacæ et indigoticæ.*]

Body more or less depressed, front arcuate. Conspicilla either on the front margin or under surface of the head. Sexes alike in the posterior antennæ and caudal stylets, but differing in the abdomen and anterior feet. *Male:*—Abdomen not abruptly narrower than thorax, four or five-jointed, without basal appendages; anterior feet with a long finger. *Female:*—Abdomen abruptly narrower than thorax, five- or six-jointed, having basal appendages; anterior feet with a short finger. [Males often beautifully opaline or brilliant with metallic tints; females usually colourless and more or less pellucid, or else opaque and indigo-blue in colour.]

The *body* in the Sapphirinæ varies from a long narrow form, three or four times as long as broad, to an ovate shape. The cephalothorax is much longer than the abdomen, and consists of either four or five segments; *four* is the usual number, and when *five*, the first or added articulation is often faint. The anterior segment is quite large; the others are short and transverse. When there are five segments each of the last four bears a pair of natatories. These segments vary in different species in their relative dimensions, and in the lateral margins and angles.

The *abdomen* in males is continuous in outline with the cephalothorax, and the whole body has an unbroken ovate, or oblong elliptical form. The number of joints is five, and the last is often concealed beneath the preceding.

In females, the abdomen is about half as wide at base as the posterior part of the thorax. The number of segments is five or six. The first is smaller or shorter than the following, and bears on either side a small cylindrical appendage, which is one- or two-jointed, and has a couple of setæ at apex. The second segment is commonly narrower than the third, and the sides are not often acute. The following two or three segments are generally lunate in form. The terminal segment is narrower than the preceding, and nearly truncate behind. It is often included almost wholly within the concavity of the preceding segment, or the cusps of this lunate segment.

The *caudal stylets* are lamellar and never as long as the abdomen. They are generally nearly ovate, with a rounded apex, but are sometimes quite narrow and falciform, and occasionally are truncate at apex. They have normally five setæ; one quite short, or reduced to merely an acute point at the inner apex, or on the inner side; two longer at apex; one at the outer part of the extremity, and one on the outer side, often distant from the apex. The inner is sometimes altogether wanting, and is not even represented by an angle in the lamella; and in this case there are but four setæ. The setæ are never longer than the lamellæ. Along a longitudinal line within the caudal stylets, there is a duct, which opens outward at the apex; and often loose shreds were seen projecting from the apex of the stylets at the extremity of each duct. The nature of the duct was not ascertained.

The *eyes* are of two kinds. One pair has an extremely large prolate lens, and a lenticular cornea of still larger size, as already explained. The pigment is an oblong cylindrical mass, of a very deep red, or blue colour, but lighter at the anterior extremity. This extremity is usually oblique, and faces forward and outward.

The eyes of the other pair (if eyes they are) are placed between the inner lenses just described. The two constitute a minute oval spot, only distinguishable under a lens of considerable power. This spot has a deep colour at the forward and hinder extremity, and appears to be divided longitudinally. No very distinct idea of the nature of

these eyes was obtained with a magnifying power of two hundred diameters; yet sufficient to suggest that there were two lenses placed side by side. See figs. 2 *a*, and 3 *b*, Pl. 88.

The *anterior antennæ* are short, five- to seven-jointed, with scattered setæ seldom as long as the antenna. They project either side of the head.

The *posterior antennæ* are slender prehensile, with a claw-shape joint at apex, and not a tuft of setæ. They are four-jointed, exclusive of the claw, which is properly a fifth joint. The organ is flexed at the second articulation, and the third and fourth joints are mostly in a single line; these two joints therefore constitute a kind of finger, and are so designated for convenience in the following descriptions. The second and fourth joints are the longest. The finger sometimes is slightly longer than the second joint, and occasionally is less than half as long. The claw is short, seldom when longest exceeding half the finger in length. There is usually a very short seta on the inner side of the second joint, near middle; one or two at the apex of the third joint, and often others at the apex of the fourth joint.

The *mouth* (see figs. 4 *d–l*, Plate 88), consists of a pair of *mandibles*, without palpi; a *first pair* of short *maxillæ*, having a few spines at apex; a *second pair* of *maxillæ*, rather slender and corneous, somewhat furcate at apex, with one or two slender setose processes on the under side, projecting when in position beneath and beyond the apex of the maxilla, and another similar but shorter seta on the inner side. The maxillipeds or the *first pair of feet* have a stout two- or three-jointed base, and terminate in a corneous joint. In females, this corneous joint is short and acute. In males, it is quite long, slender, and bends around. Moreover, in male individuals, the large penult joint of the base has a tuft of short setæ on the inner side. It is evidently used in grasping the female in coition.

The *natatories* are eight in number, or four pairs. They are lamellar, and the last pair is the smallest.

The *nervous system*, in the species examined, contains a single, large oblong ganglion, which embraces the œsophagus anteriorly (see fig. 2 *a*, *g*, Pl. 88). The pigment of the large eyes is often directly over the anterior part of the ganglion; the nerves passing to the eyes, or those of the first pair, were distinguished. One pair of nerves, from the anterior margin of the ganglion, branches in the front portion of the head; a third pair, of large size, was seen going to the anterior antennæ; a

fourth pair, smaller, to the second pair of antennæ. The ganglion subdivides behind the œsophagus, and after continuing a short distance and widening, gives off four nervous cords from each side, one to each pair of natatories, the outer to the first pair; from the inner of the four a branch passes from the inner side to the abdomen. The nerves going to the mouth organs were not distinguished.

The particles in the circulating fluid were not observed, even with a magnifying power of two hundred diameters.

The stomach is a large cavity, of very different shapes in different species, and sometimes occupies a large part of the cephalothorax. It connects with the mouth by a slender œsophagus; it graduates into an intestinal canal, without a separating sphincter.

The genital system of the male consists of two ovoid or pyriform seminal glands, united at the hinder apex, and placed nearly over the mouth; from these glands a duct passes backward to the first abdominal segment, where it terminates in a small oval gland or mass, which appears to have a corneous exterior (fig. 2 *a*, and *f*, Plate 88), with the interior transparent, except a slightly obscured vermiform centre. The efferent duct was not distinctly seen.

In females, the ovaries are in the form of a branching or reticulated vessel, occupying either half of the cephalothorax, and extending often quite to the front margin. Besides the two main subdivisions, there are in some cases, at least, two smaller intermediate branches, lying nearer the medial line of the animal, and extending less far forward. The eggs are often brightly coloured.

The Sapphirinæ were met with both in the torrid and temperate zones, and in some regions were very abundant. Nothing can exceed the beauty of some species, and especially the males. On account of their extreme brilliancy and rich reflected tints they may be seen at great depths on a sunny day, and as each becomes visible only when the position is right for the observer's eye, the water seems to flash with moving gems; they even rival the richest opal and sapphire, and the most brilliant combination of metallic hues. They swim with a graceful motion, often turning over and over, changing their tints, and disappearing to reappear again, through their varying motions. Blue is a common colour; but with this shade, fire-red, carmine, and bright yellow are often commingled. Some females have a nearly black colour, giving smalt blue reflections; while others are faintly

tinted, or are quite colourless. The species were not observed to be phosphorescent.

The genus Sapphirina was established by Thompson,* after a species collected near the Cape of Good Hope. His description is, however, imperfect; only the male was seen, and the peculiar character of the eyes is not mentioned. Templeton has described a species (*S. fulgens*, from the same region), with little additional information respecting the general characters of the Sapphirinæ.† This species is mentioned by Milne Edwards to have been found by M. Raynaud in the Atlantic. Tilesius had described a species previously under the name of *Oniscus fulgens*.‡ It is impossible to identify these species without fuller descriptions or better figures.

In Meyen's Zoological Observations on a voyage of circumnavigation,§ there is a species of Crustacea figured (pl. xxvii.), which appears to be a male Sapphirina. The figure is drawn much enlarged, and combines observations of minute accuracy with others of doubtful character. The species may belong to a different genus; yet, the obvious errors are so great, that we suspect the species will prove on further examination to be a true Sapphirina. The conspicilla on the front (having the same position as in our species) are described as concavities or dimples (*Grübchen*); the minute ovoid spot between the lenses within, which are certainly wholly internal, and probably a pair of eyes, is called the mouth (*Mund*); the ovoidal glands at the lower extremity of the genital system, are considered the *phosphorescing organs* (*Leuchtorgane*); and the nervous ganglion, as made out in the figures, is probably the pair of male genital glands. A series of spreading setæ radiate from where the mouth is situated; and these differ so widely from any organs in the Sapphirinæ, that we might suppose the animal of a different family, were it not for the evident errors pointed out; and moreover, as these organs are wholly abnormal in character, we suspect that they are merely the setæ of the anterior antennæ, seen in an upper view, the organs themselves being concealed under the margin of the cephalic segment.

* Zoological Researches, p. 46, pl. 8, fig. 2.

† Trans. of the Entomol. Soc. of London, i. 194, pl. 21, fig. 8.

‡ Neue ann. Watterausch, i. 10, pl. 213, fig. 24.

§ F. J. F. Meyenii, Obs. Zoolog. in Itin. Circum Terram institutas, accedunt Guil. Erichsonii et H. Burmeisteri Descriptiones et Icones Insectorum, A. Meyenio in ista Expeditione Collectorum; from the 16th volume of the Nova acta Cæs. Leop. Car. Nat. Cr., page 156, pl. xxvii.

1. *Conspicilla contigua.*

SAPPHIRINA IRIS.

Antennæ posticæ abbreviatæ, digito dimidii articuli 2di longitudine. Lamellæ caudales tenuiter divaricatæ; setis tribus, duabus apicalibus dimidio styli longioribus, alterâ externâ. Feminæ:—*Corpus gracillimum valde elongatum (latitudine maximâ plus quintuplo longius). Conspicilla fronte insita. Abdomen 6-articulatum, segmento primo sequentibus vix angustiore.* Maris:—*Corpus lineari-ellipticum, anticè rotundatum. Conspicilla inferiora, fronte remotiuscula.*

Posterior antennæ short, finger half as long as second joint. Caudal lamellæ slender, divaricate, setæ three in number, two apical longer than half the stylet, the other external. *Female:*—Body slender, more than five times as long as broad. Conspicilla of moderate size, situated on the front. Abdomen six-jointed, segments subequal, first hardly narrower than the following. *Male:*—Body linear-elliptical, rounded in front, last segment mostly concealed beneath the preceding; anterior scarcely oblong, posterior angles of the segments obtuse. Conspicilla inferior, a little removed from the front, in contact.

Plate 87, fig. 1 *a*, *female*, enlarged; *a'*, one of the anterior antennæ; *b*, posterior antenna; *c*, anterior feet or maxillipeds. Fig. 2 *a*, *male*, enlarged; *a'*, anterior antennæ; *b*, posterior antennæ; *c*, anterior feet; *d*, seminal glands and ducts.

South Pacific, latitude 41° south, longitude 76° 24′ west. Found in the cavity of a Salpa.

Length, one-third of an inch. Transparent, with every muscle visible. A brilliant play of colours, purple, carmine, fire-red, yellow, &c.

The female is much more slender than the male. In the latter, the length is nearly three times the greatest breadth; in the former, more than five times. The caudal stylets are quite similar in the two, in each the length being nearly four times the breadth, and their diver-

gent position is the same. The posterior antennæ are also alike. The anterior feet, or maxillipeds, differ; in the *male*, the second joint has a prominence on the inner side covered with very short setæ, and the last joint is very long and slightly curved; in the *female*, the second joint is without the prominence, and the terminal joint is a spine not longer than the second joint.

The abdomen of the female is nearly half narrower than the cephalothorax, and more than half as long. First segment of abdomen not shorter than the following; bearing short appendages on either side. Second segment having the posterior angles a little prominent and obtuse; the three following acute at posterior apex.

In the female, the ovary forms an open reticulation on either lateral half of the cephalothorax, extending into the head nearly to the front margin. In the *male* (see figure 2 *a*), the seminal glands are ovate oblong, united at apex, and lie over the stomach. The ducts extend backward, and terminate in the anterior abdominal segment.

I was unable with a lens magnifying two hundred and fifty diameters to detect anything with reference to the circulation.

SAPPHIRINA ANGUSTA.

Digitus antennarum posticarum articulo 2do valde (non duplo) brevior. Lamellæ caudales elongatæ, subovatæ, apice interno prominulo, subacuto; setis quatuor, duabus apicalibus dimidio lamellæ brevioribus, aliis duabus externis brevioribus. Feminæ:—*Corpus valde elongatum (latitudine maximâ fere quadruplo longius). Conspicilla fronte insita. Abdomen 6-articulatum, segmento primo angustiore, tertio, quarto, quintoque lunatis et latere acutis, primo secundoque fere æquis.*

Finger of posterior antennæ much longer than second joint. Caudal lamellæ elongate, more than twice as long as broad, subovate, prominent and subacute at inner apex; setæ four, two apical not half as long as lamella, other two external, shorter. *Female:*—Body much elongate, more than twice the breadth in length. Conspicilla very large, in contact, placed on the front. Abdomen six-jointed, segments subequal, the first a little shorter and narrower, the first two obtuse laterally, the following three lunate and acute behind.

Plate 87, fig. 3 *a*, animal, much enlarged, showing external and internal ovaries, with the eggs bright blue; *b*, posterior antenna.

South Pacific, latitude 43° south, longitude 78° 45′ west, April 3, 1839; also (the specimen figured), on the Lagulhas Bank, latitude 35° 50′ south, longitude 23° east, April 11, 1842.

Length, one-eighth of an inch. Transparent, except the eggs, which are rich blue; there are slight opalescent colours in certain lights, and the surface in one specimen was sparsely punctate with black dots. The conspicilla are very large, so as to occupy the front margin; and the anterior antennæ project laterally some distance behind the conspicilla. The anterior articulation of the cephalothorax is less distinct (as usual) than the following. The appendages to the first segment of the abdomen are oblong cylindrical, and terminate in two unequal divergent setæ. The eggs of the external ovaries were large, and the bags did not extend quite as far as the extremity of the abdomen; twenty or twenty-four eggs in each. The ovaries within extend quite to the front of the animal. They are in four lines; the two inner are not half the length of the cephalothorax, and containing eggs of smaller size than the others; the two outer spread laterally, or ramify in each of the segments, and also either side of the mouth; after reaching the front, they return back for a short distance along the margin of the animal.

The duct in the caudal lamellæ was distinct, and some shreds were observed externally at the extremity of each.

SAPPHIRINA ELONGATA.

Digitus antennarum posticarum tenuis, dimidio brevior quam articulus 2dus. Lamellæ caudales latæ, breviter ovatæ, apice interno vix prominulo, setis quatuor, totis dimidio lamellæ brevioribus. Feminæ:— *Corpus angustè elongatum, valde convexum. Conspicilla fronte insita. Abdomen 5-articulatum, segmento primo parvulo, secundo majore, sed valde minore quam sequens, sublunato.*

Finger of posterior antennæ half shorter than second joint. Caudal lamellæ broad, short ovate, breadth more than half the length, inner apex hardly prominent, setæ four, all shorter than half the

lamellæ. *Female:*—Body very narrow and nearly cylindrical. Cephalothorax more than three times as long as broad, posterior angles obtuse or subacute, anterior segment very long. Conspicilla very large, situated on the front. Abdomen five-jointed, first segment very short and much the narrowest, second larger, but much smaller than the following, sublunate.

Plate 87, fig. 4 *a*, animal, enlarged; *b*, posterior antenna.

Pacific, latitude 15° north, longitude 179° east, December, 1841.

Length, one-tenth of an inch. Not coloured.

This species is near the preceding; yet the body is more convex or more cylindrical, and the abdomen is but five-jointed, with the first segment much shorter and narrower than the second, instead of having the two nearly equal, and the second is as much smaller than the third. Moreover, the caudal lamellæ are proportionally much broader, the length being one and a half times the breadth. The caudal setæ are not half as long as the lamellæ. The cephalothorax has four distinct segments, and the first of the four is more than twice as long as broad.

SAPPHIRINA METALLINA.

Lamellæ caudales fere rectangulatæ, apice subtruncatæ, setis quatuor apicalibus subæquis, parcè brevioribus quam lamellæ. Maris:—*Corpus valde depressum, angustato-ellipticum, 9-articulatum, segmento ultimo tecto, primo oblongo, quarto dimidio breviore quam quintum. Conspicilla fronte insita.*

Caudal lamellæ oblong, subrectangular; four terminal setæ, which are scarcely shorter than the lamellæ. *Male:*—Body much depressed, narrow elliptical, nine-jointed, last segment concealed below, first a little oblong, fourth half shorter than fifth; segments of thorax and abdomen lunate, and acute laterally or subacute. Conspicilla of moderate size, situated on the front.

Plate 87, fig. 5 *a*, animal, enlarged; *b*, under view of anterior part; *c*, caudal lamella.

Pacific, near Gilbert's Island, Kingsmill Group, 1° 26′ north, longitude 173° 10′ east, April 19, 1841, 6 h. A. M.

Length, one-tenth of an inch. Colours, bright metallic, varying between bright blue and fire-red through yellow, changing with the position of the animal. By transmitted light, blue, carmine, and purple, in blotches or patches.

The body is rounded alike at the two extremities. The setæ of the anterior antennæ are some of them longer than the organ. The last thoracic segment is much shorter but not narrower than the antepenult or following segment. The last segment of the body is concealed beneath the preceding, and the latter is so excavate behind that the caudal lamellæ project but little beyond it. The setæ of the lamellæ are all terminal or nearly so, the extremity being truncate, and so also the outer angle.

SAPPHIRINA CORUSCANS.

Digitus antennarum posticarum paulo brevior quam articulus 2dus, tenuis. Lamellæ caudales subovatæ, ad apicem rotundatæ, apice interno setam brevem gerente, setis aliis quatuor, totis brevibus (lamellâ fere quadruplo brevioribus). Maris:—*Corpus depressum, elongato-ovatum, posticè angustatum, segmento primo (fere duplice) parce oblongo, aliis segmentis fere consimilibus. Conspicilla fronte insita, prominentia.*

Finger of posterior antennæ a little shorter than second joint, slender. Caudal lamellæ ovate, rounded at apex, twice as long as broad, inner apex bearing a short seta, the other setæ four, all very short (about one-fourth as long as lamellæ). *Male:*—Body depressed, long ovate, narrowed behind, first segment (appearing faintly double) slightly oblong. Conspicilla large and prominent, situated on the front.

Plate 87, fig. 6 *a*, animal, natural size; *b*, posterior antenna.

Pacific, latitude 18° 10′ south, longitude 125° 30′ west, August 8, 1839.

Length, one-sixteenth of an inch. Colours by reflected light, richly variegated and changeable, with an extremely brilliant lustre, like tinsel.

The body gradually tapers from the second segment backward. The first segment is about as long as broad. The conspicilla on the front are very large. The third and fourth joints of the posterior antennæ are together about three-fifths the second, and very slender.

SAPPHIRINA INÆQUALIS.

Digitus antennarum posticarum articulo 2do non brevior, tenuis, unguiculo brevi. Lamellæ caudales oblongæ, subovatæ, apice interno prominulo, subacuto, setis quatuor, dimidio lamellæ non longioribus. Feminæ: —*Corpus elongatè ovatum, segmentis cephalothoracis tribus posticis dissimilibus, segmento ultimo breviore et latere acuto, penultimo obtuso. Conspicilla fronte insita. Abdomen* 6-*articulatum, segmento primo fere obsoleto aut tecto, secundo utrinque posticè acuto.*

Finger of posterior antennæ not shorter than the second joint, slender, claw short. Caudal lamellæ oblong, subovate, twice as long as broad, inner apex a little prominent, subacute, setæ four, not more than half as long as lamella. *Female*:—Body long ovate, cephalothorax with the last three segments dissimilar, antepenult segment having the posterior angles obtuse, penult laterally subtruncate, obtuse, last lunate, acute. Conspicilla small, situated on the front. Abdomen six-jointed, first segment nearly concealed, second having the posterior angles acute.

Plate 87, fig. 7 *a*, animal, enlarged; *b*, posterior antennæ.

Pacific, latitude 43° south, longitude 78° 45′ west, April 3, 1839.

Length, one-twelfth of an inch. Colour, a little reddish. Anterior segment of the cephalothorax has an imperfect articulation across, and the anterior part is nearly as long as broad, and shaped like the letter

D. The last segment is fully as broad as the preceding, but shorter and sublunate. Inner apex of caudal lamellæ slightly prominent. Pigment of eyes deep blue.

SAPPHIRINA OVATA.

Digitus antennarum posticarum fermè longitudine articuli 2di, articulis duobus digiti subœquis. Lamellæ caudales graciles, lanceolatæ, parce divaricatæ; setis 4–5, *unâ internâ, unâ aut duabus apicalibus, et aliis duabus externis, totis dimidio lamellæ valde brevioribus.* Feminæ:— *Corpus valde depressum. Cephalothorax ovatus, segmento antico paulo oblongo, segmentis duobus posticis latere rotundatis, ultimo breviore. Conspicilla fronte insita. Abdomen elongato-ellipticum,* 5-*articulatum, segmento primo non angustiore.*

Finger of posterior antennæ not shorter than the second joint, the two joints of the finger nearly equal. Caudal lamellæ slender lanceolate, nearly as long as the abdomen, sparingly divaricate, setæ four to five, less than half as long as lamellæ, one of them internal, one or two apical, two external. *Female:*—Body nearly flat; cephalothorax ovate, length not twice the breadth, first segment a little oblong, last two segments laterally rounded, last shorter. Conspicilla of moderate size, on the front. Abdomen long elliptic, five-jointed, the first (second?) segment longer and not narrower than the second, second, third, and fourth sublunate and acute.

Plate 87, fig. 8 *a*, animal, enlarged; *b*, posterior antenna.

Balabac Passage, north of Borneo, East Indies, February 8, 1842.

Length, one-twelfth of an inch. Colour, reddish.

The first of the four segments of the cephalothorax is longer than broad. It has a faint articulation across, leaving an anterior segment nearly as long as broad. The first (normally first) segment of the abdomen was probably concealed by the last segment of the thorax. The segments are but slightly prominent on either side. Setæ of the anterior antennæ not longer than half the antenna.

SAPPHIRINA SPLENDENS.

Digitus antennarum posticarum tenuis, articulo 2do vix brevior. Lamellæ caudales ovato-rotundatæ, apice interno acuto; setis quatuor, duabus apicalibus dimidio lamellæ vix brevioribus, aliis externis. Maris:—*Corpus valde depressum, ovatum, segmento primo (vix duplice) transverso, aliis longitudine subæquis, latere obtusis. Conspicilla fronte insita.*

Finger of posterior antennæ slender, very nearly as long as second joint. Caudal lamellæ rotund-ovate, quite short, length once and a half the breadth, inner apex acute, setæ four, two apical half as long as the lamellæ, the others external. *Male:*—Body ovate, flat, eight-jointed, segments laterally obtuse, anterior like the letter D, shorter than broad, and having an obsolete articulation across, the others subequal, laterally obtuse. Conspicilla of moderate size, situated on the front.

Plate 87, fig. 9 *a*, animal, enlarged; *b*, posterior antenna (sketch not finished); *c*, caudal lamellæ.

Pacific, thirty miles west of Assumption, one of the Ladrones, latitude 19° 30′ north, longitude 144° 30′ east, December 31, 1841.

Length, one-fifteenth of an inch. Presents bright metallic reflections. This species is peculiar in its very short caudal lamellæ, of nearly ovate form; in its articulations having the posterior lateral angles obtusely rounded, and in its conspicilla in contact on the front. The lamellæ are much shorter than in the following species with contiguous conspicilla.

SAPPHIRINA OVALIS.

Digitus antennarum posticarum crassus, articulo 2do fere longior, articulis digiti valde inæquis. Lamellæ caudales ovatæ, setis quinque, unâ internâ, duabus apicalibus, et aliis externis, totis paulo brevioribus

quam lamellæ. Feminæ:—*Corpus valde convexum. Cephalothorax ellipticus, 5-articulatus, segmento antico non oblongo, postico parvo. Conspicilla fronte insita. Abdomen 5-articulatum, segmento primo minore, latere truncato, tertio quartoque lunatis, 2do sublunato.*

Finger of posterior antennæ rather stout, as long as second joint or slightly longer, the two joints of finger very unequal. Caudal lamellæ ovate, nearly twice as long as broad, setæ five, one internal, two apical, the others external, all shorter than the lamellæ. *Female:* — Body much convex. Cephalothorax elliptical, five-jointed, first segment not oblong, posterior segments laterally obtuse, the last abruptly narrower than the preceding. Conspicilla situated on the front, of moderate size. Abdomen five-jointed, first segment short, laterally truncate, third and fourth lunate, acute, second sublunate.

Plate 87, fig. 10 *a*, animal, enlarged; *b*, posterior antenna.

South Pacific Ocean, one hundred and fifty miles south of Tongatabu.

Colour, deep azure blue reflections from a black ground. The anterior segment of the cephalothorax is about as long as broad. The last segment is half shorter and nearly half narrower than the preceding. The first abdominal segment bears as usual lateral appendages.

This species resembles the following; but the caudal lamellæ are shorter and their setæ much longer; moreover, the finger of the posterior antennæ is not shorter than the preceding joint; and the claw of these organs is much less than half the finger in length.

SAPPHIRINA DETONSA.

Digitus antennarum posticarum tenuis, articulo 2do paulo brevior, unguiculo dimidii digiti longitudine. Lamellæ caudales approximatæ, subovatæ, latitudine plus duplo longiores, setis brevissimis (obsolescentibus). Feminæ:—*Corpus valde convexum. Cephalothorax ellipticus, 5-articulatus, segmento primo non oblongo, aliis latere obtusis. Con-*

spicilla fronte insita. Abdomen 5-articulatum, segmento primo fere obsoleto aut tecto, secundo latere obtuso, tertio quartoque lunatis.

Finger of posterior antennæ slender, finger three-fourths the second joint, claw half the finger in length. Caudal lamellæ approximate, subovate, oblong, length exceeding twice the breadth, setæ very short (obsolescent). *Female:*—Body much convex. Cephalothorax oval, five-jointed, anterior segment scarcely shorter than the breadth, posterior segments laterally obtuse, diminishing in breadth to the last. Conspicilla of moderate size, situated on the front. Abdomen five-jointed, breadth sparingly less than the length, first segment very short, second laterally obtuse, third and fourth lunate, acute.

Plate 87, fig. 11 *a*, animal, enlarged; *b*, under view of anterior segment, showing how far the upper shell is reflexed; *c*, posterior antenna.

Pacific Ocean, in the Paumotu Archipelago, near Honden Island, latitude 15° south, longitude 138° 45′ west, August 19, 1839.

Length, about one-sixteenth of an inch. Translucent. Colour, brownish by transmitted light, and bright blue by reflected light.

The last four segments of the cephalothorax rather rapidly and regularly diminish in breadth, so that the last of the four is about half as broad as the first. The first of the abdominal segments bears a pair of short appendages. The second is much larger, but it is narrower than the third and a little longer; it is not acute laterally. The caudal lamellæ are as long as the last three abdominal segments. The setæ are not over a fourth the length of a lamella. The abdomen is very short for its breadth.

SAPPHIRINA INDIGOTICA.

Digitus antennarum posticarum tenuis, fere articuli 2di longitudine, et unguiculo fere dimidii digiti. Lamellæ caudales subovatæ, apice interno vix prominulo, setis quatuor, duabus apicalibus, aliis externis, totis dimidio lamellæ vix brevioribus. Feminæ:—*Corpus valde con-*

vexum. Cephalothorax ellipticus, 5-articulatus. Conspicilla fronte insita. Abdomen 6-articulatum, segmento primo parvulo, tertio quarto quintoque lunatis.

Finger of posterior antennæ slender, nearly as long as second joint, claw about half as long as finger. Caudal lamellæ subovate, inner apex hardly prominent, setæ four, two apical, the others external, all a little exceeding half the lamellæ in length. *Female:*—Body very convex. Cephalothorax oval, five-jointed, first articulation obsolete, posterior segment obtuse on either side. Conspicilla of moderate size, situated on the front. Abdomen oblong, six-jointed, first segment small, third, fourth, fifth lunate.

Plate 87, fig. 12 *a*, animal, enlarged; *b*, posterior antenna.

North Pacific Ocean, latitude 28° north, longitude 177° east, May 20, 1841.

Length, about one-sixteenth of an inch. Opaque. Colour, deep blue, with rich ultramarine reflections.

The first segment of the cephalothorax, which is separated from the second by an obsolete articulation, is not quite as long as broad. The first abdominal segment is very short, and bears appendages. Caudal lamellæ subovate, as usual.

SAPPHIRINA ORIENTALIS.

Digitus antennarum posticarum tenuis, fermè articuli 2di longitudine, unguiculo minus dimidio digiti. Lamellæ caudales breviter ovatæ, prope apicem internum dente acuto armatæ, setis quatuor, duabus apicalibus, aliis externis, totis brevibus, vix dimidii lamellæ longitudine. Maris:—*Corpus valde depressum, subovatum, 10-articulatum, segmento antico latiore et paulo transverso, aliis sensim angustioribus. Conspicilla fronte insita.* Feminæ (?):—*Corpus convexum. Cephalothorax ellipticus, 5-articulatus, segmento antico non transverso, postico ad latera truncato, angulis posticis acutis. Conspicilla fronte insita. Abdomen 6-articulatum, segmento primo minore, lateribus truncatis, secundo lateribus rotundatis, tribus sequentibus lunatis.*

Finger of posterior antennæ rather slender, very nearly as long as the second joint, the claw hardly half the length of the finger. Caudal lamellæ distinctly shorter than twice their length, ovate, having a tooth on inner side near apex, setæ four, scarcely half as long as the lamellæ, two apical the others external. *Male:*—Body flat, subovate, ten-jointed, first segment the broadest and somewhat transverse, last nine segments gradually decrease in breadth, the tenth is concealed beneath the ninth. Conspicilla on the front. *Female:*—Body convex. Cephalothorax oval, five-jointed, first segment hardly longer than the breadth, posterior having the sides nearly rectangular, and at middle behind a little prominent. Conspicilla of moderate size, in contact, on the front. Abdomen six-jointed, oblong, first segment quite small, sides truncate, second with sides rounded, third, fourth and fifth lunate, acute.

Plate 87, fig. 13 *a*, female, enlarged; *b*, part of posterior antenna; *c*, caudal lamella. Fig. 14 *a*, male, enlarged; *a'*, posterior antenna; *b*, anterior antenna; *c*, under view of anterior part of animal.

East Indies, Sooloo Sea, southwest of the island of Panay, January 29, 1842.

Length, one-tenth of an inch. Colour of female, deep blue black. Colour of male, bright opal tints; imperfectly transparent.

It is not certain that the male and female here described are of the same species. The only evidence of this consists in their having been collected on the same day, and their having similar anterior and posterior antennæ, conspicilla, and caudal lamellæ.

The body of the male is broadest at the first articulation, and from thence the sides are straight convergent. The length is twice the greatest width, or nearly so. The segments are laterally obtuse, excepting the two or three last, which are acute or nearly so. The length of the caudal lamellæ is one and two-thirds the breadth, which is a little shorter in proportion than in the female.

2. *Conspicilla non conjuncta.*

SAPPHIRINA OVATO-LANCEOLATA.

Digitus antennarum posticarum dimidio articuli 2di paulo longior, articulis duobus digiti valde inæquis. Lamellæ caudales latitudine duplo longiores, non divaricatæ, setis quinque, totis brevibus, unâ brevissimâ ad apicem internum insitâ. Maris:—*Corpus ovato-lanceolatum,* 10-*articulatum, segmento antico vix oblongo, tribus penultimis lunatis et ad latera subacutis aut obtusis. Conspicilla subremota, inferiora et fronte remota.* Feminæ:—*Corpus ovato-lanceolatum, abdomine (articulo primo brevissimo excluso) vix angustiore. Cephalothorax* 4-*articulatus, segmento antico fere duplice, aliis inter sese similibus, latere obtusis. Conspicilla remotiuscula, fronte insita. Abdominis segmenta secundum tertium quartumque latè sublunata et latere subacuta.*

Finger of posterior antennæ much shorter (nearly half) than second joint, the two joints of the finger nearly equal. Caudal lamellæ twice as long as broad, not divaricate, furnished with five setæ, all short, one at inner apex very short. *Male:*—Body ovato-lanceolate, ten-jointed, first segment hardly oblong, three before the last lunate, and sides subacute or obtuse. Conspicilla subremote, situated on the inferior surface remote from the front margin. *Female:*—Body ovato-lanceolate, a little convex. Cephalothorax four-jointed, twice as long as broad, obtuse behind, rounded in front, first segment nearly divided by an articulation, hardly oblong, others similar to one another. Conspicilla a little separate, of moderate size, situated on the front. Abdomen five-jointed, first segment very short and narrow, second broadest and large, second, third, and fourth lunate, fourth much shorter than the fifth.

Plate 87, fig. 15 *a*, female, enlarged; *b*, posterior antenna; *c*, anterior foot or maxilliped. Fig. 16 *a*, male of same, enlarged; *b*, under view of head.

Atlantic, off the harbour of Rio Janeiro, abundant, November, 1838; also, November 19, 1838, in latitude 23° south, longitude 41° west.

Length of female observed, one-sixteenth of an inch; of males, one-seventh of an inch. Females, nearly colourless, not diaphanous. Males, very brilliant with opaline reflections of various rich colours, but mostly blue, and appearing like resplendent blue gems deep in the water, flashing on the eye as they change their positions.

The *female* has five joints to the cephalothorax, the first articulation not very distinct; the first segment is about as long as broad. The second abdominal segment is the broadest. The caudal lamellæ have five setæ, one at the inner apex quite short, the two apical rather less than half the lamella in length; the outer situated quite near the base of the lamellæ. The conspicilla are either on the front, or mostly on the lower surface of the head; they are much nearer to one another than in the male, but are not in contact. Length of the anterior antennæ equalling about half the breadth of the cephalothorax; setæ more than half the length of the antennæ.

The *male* has nearly the same breadth anteriorly as the female. The last or tenth segment is much narrower than the penult, and is situated in the convexity of the penult, not projecting beyond it; the articulation is not very distinct. Anterior antennæ five-jointed. The posterior antennæ and caudal lamellæ are as in the female. Stomach small, somewhat triangular in form, the anterior angles being prolonged forward.

SAPPHIRINA GEMMA.

Digitus antennarum posticarum articulo 2do parce brevior, tenuis, articulis duobus digiti valde inæquis, unguiculo brevi. Lamellæ caudales subellipticæ, latitudine duplo longiores, ad apicem internum minutè apiculato, setis quatuor, brevibus, duabus apicalibus, aliis externis. Feminæ:—*Corpus gracillimum, elongatum. Cephalothorax* 5-*articulatus articulatione primâ fere obsoletâ, segmento antico parce oblongo, posticis inter sese similibus, sensim minoribus. Conspicilla remotiuscula, inferiora, prope frontem insita. Abdomen valde angustius,* 6-*articulatum, segmentis primo secundoque subæquis, sequentibus vix lunatis.* Maris:—*Corpus oblongo-subellipticum* 10-*articulatum, segmento antico paulo transverso, posticis latere non acutis. Conspicilla remotiuscula, inferiora et fronte remota.*

Finger of posterior antennæ slender, nearly as long as second joint,

its two joints very unequal, claw quite short. Caudal lamellæ subovoval, twice as long as broad, at inner apex a minute point, setæ four, short, not half as long as lamellæ, two apical, the others external. *Female*:—Body very slender, long, length more than three times greatest breadth. Cephalothorax five-jointed, first articulation nearly obsolete, segments not having the posterior angles acute, sides truncate, first anterior segment a little oblong, the others gradually smaller. Conspicilla small, a short distance from the front. Abdomen narrow, six-jointed, first and second segments subequal, the following hardly lunate. *Male*:—Body ten-jointed, linear-elliptical, length about two and a half times the breadth; first segment not oblong, the three posterior not acute laterally, the last nearly concealed. Conspicilla rather distant, remote from the front.

Plate 88, fig. 1 *a*, female, enlarged; *a'*, anterior antenna; *b*, *b'*, posterior antenna, different views; *c*, anterior feet (or maxillipeds); *d*, *e*, maxillæ; *f*, maxillæ in place. Fig. 2 *a*, male, enlarged, showing nervous system (reddish), digestive system (greenish), genital system (bluish), &c. (*a*, inner prolate lenses of eyes; *b*, *b'*, nervous system; *c*, *c'*, genital system; *d*, œsophagus; *f*, conspicilla); *a'*, prolate lenses and pigment, with eyes intermediate; *b*, anterior antenna; *c*, posterior antenna; *d*, first pair of feet; *e*, same, in place; *f*, lower extremity of genital system (same with *c'* in 2 *a*); *g*, nervous ganglion, with its branches.

Lagulhas Bank, south of Cape of Good Hope, April 11 and 12, 1842. Probably the same, twelve miles northeast of New Zealand.

Length, one-eighth of an inch. Female, colourless; bags of eggs, dull bluish. Male, with very brilliant blue reflections, dazzling in the sun's rays, with various other bright colours as the animal changes its position. The water was spangled with them for several hours while on the Lagulhas Bank. By transmitted light, deep yellow, rose, carmine, and fire-red tints. The female has the cephalothorax two and a half times as long as broad. Joints obtuse and similar. Eggs of external ovarian sacs small and very numerous.

The male is lamellar. The last segment is placed partly under the preceding and is half narrower. The inner angle of the caudal

lamellæ is not prominent, and has a very minute acute point. The hairs of the anterior antennæ are not as long as the organ.

This species may possibly be the *Sapphirina indicator.*

SAPPHIRINA BELLA.

Digitus antennarum posticarum tenuis, fermè articuli 2di longitudine, articulis digiti fere æquis, unguiculo parvulo. Lamellæ caudales divaricatæ, angustæ, lanceolatæ, setis quatuor, duabus apicalibus, aliis externis, totis perbrevibus. Maris:—*Corpus ovatum, 9-articulatum, segmento ultimo tecto, antico parce oblongo, ad latera totis obtusis. Conspicilla parvula, remotiuscula, inferiora, prope frontem insita.*

Finger of posterior antennæ slender, about as long as second joint, two joints of finger nearly equal, claw quite short. Caudal lamellæ slender, divaricate, narrow lanceolate, three times as long as broad, setæ four, two apical, the others external, all very short. *Male:*—Body long ovate, about twice as long as broad, lamellar, nine-jointed, last segment concealed, first sparingly oblong. Conspicilla quite small, separate, a little distant from the front.

Plate 88, fig. 3 *a*, animal, enlarged; *b*, prolate lenses, with the intermediate eyes; *c*, posterior antennæ; *d*, caudal lamella and part of segment of abdomen, to which it is attached.

Pacific, near Hall's Island, Kingsmill Group, April 13, 1841, at 4 A. M.

Length, one-fifteenth of an inch. Transparent. Purple and carmine in blotches, changing a little with the position of the animal.

The outline of the body is even, and *all* the segments are laterally obtuse and rounded. The first segment is like the letter D in outline. The setæ of the caudal stylets are much shorter than half the stylet. The tips of the anterior antennæ were barely seen in an upper view, as they project but slightly.

SAPPHIRINA OPALINA.

Digitus antennarum posticarum tenuis, articulo 2do fere longior, ungui-

culo brevi. Lamellæ caudales suborbiculatæ, apice interno producto, acuto, setis dimidio lamellæ vix longioribus. Maris :—*Corpus ovatum, 10-articulatum, articulatione primâ fere obsoletâ, segmento postico tecto, quatuor penultimis latere ad angulos posticos acutis. Conspicilla remotiuscula, fronte insita.*

Finger of posterior antennæ slender, not shorter than second joint, claw short. Caudal lamellæ suborbicular, breadth but little less than length, inner apex most prominent, acute, setæ hardly longer than half the lamellæ. *Male:*—Body ovate, length nearly twice the breadth, flat, ten-jointed, the tenth concealed, first semicircular, posterior four laterally acute, first articulation nearly obsolete. Conspicilla on the front, a little remote.

Plate 88, fig. 4 *a*, male, enlarged; *b*, third pair of natatories; *c*, fourth pair of natatories; *d*, anterior part, showing the relative position and forms of the antennæ (a^1, a^2) and (*b*), the mouth organs and first pair of legs in natural position; *e*, mouth organs, with one of the legs removed; *f*, same, both legs removed; *g*, same, one of outer maxillæ removed; *h*, same, both of outer and one of inner maxillæ, removed; *i*, one of inner maxillæ and mandible; *k*, *l*, outer maxilla, in different positions.

Atlantic, latitude 1°–0° north, longitude 17°–18° west, November 1 and 2, 1838, specimen figured in figs. 4 *a*, *b*, *c*; latitude 4° 30′ south, longitude 25° west, specimens affording figures *d* to *l*, on May 13, 1842.

Length, one-eighth of an inch. Colours brilliantly opaline, tints varying with the position of the animal; bluish, reddish, purple, yellow, and milk-white are the most common.

Setæ of the anterior antennæ about as long as the joints. The finger of the posterior antennæ has the first joint about half as long as the second. Claw of posterior antennæ not half as long as preceding joint. The inner margin of the stylets is very nearly straight.

Swims with a very graceful waving motion, turning over and over.

SAPPHIRINA VERSICOLOR.

Digitus antennarum posticarum tenuis, articulo 2do vix longior, ungui-

culo longiusculo (dimidium digiti longitudine fere æquante). Lamellæ caudales latæ, latitudine breviores, apice interno producto et acuto, setis quatuor, brevissimis. Maris:—*Corpus ovatum,* 10-*articulatum, segmento antico transverso, semicirculari, aliis longitudine subæquis, quatuor penultimis ad latera minutè acutis. Conspicilla remotiuscula, fronte insita.*

Finger of posterior antennæ slender, hardly longer than second joint, claw rather long, half as long as finger. Caudal lamellæ broad, shorter than breadth, inner apex produced and acute, setæ four, very short. *Male:*—Body ovate, scarcely twice as long as broad, ten-jointed, last segment concealed, first segment semicircular transverse, the sides from thence straight, the segments subequal in length, with the posterior angles rounded; the abdominal segments also rounded, but having at the middle either side a minute acute prominence. Conspicilla on the front, a little remote.

Plate 88, fig. 5 *a*, animal, enlarged; *b*, posterior antenna; *c*, internal lenses and intermediate eyes, in relative position.

Off Rio Janeiro, latitude 24° south, longitude 43° west, January 9, 1839.

Length, one-tenth of an inch. Colours, like the preceding.

Resembles the preceding, but has the sides posterior to the first segment an even straight line, not curved, and the acute point on the abdominal segments is situated near the middle of the sides, which are rounded behind. The caudal lamellæ are shorter in proportion; the claw of the posterior antennæ longer, being more than half the length of the preceding joint.

SAPPHIRINA TENELLA.

Digitus antennarum posticarum tenuis, articulo 2*do longior, unguiculo parvulo. Lamellæ caudales latitudine duplo longiores, setis dimidio lamellæ valde brevioribus, unâ ad apicem internum fere obsoletâ.* Feminæ:—*Cephalothorax ovatus,* 5-*articulatus, articulatione primâ fere obsoletâ, segmento antico non transverso, posticis inter sese similibus, an-*

gulo postico subacuto. Abdomen angustum, 6-articulatum, segmento primo brevissimo, secundo latere obtuso, tribus sequentibus lunatis. Conspicilla remotiuscula, fronte insita. Maris :—*Corpus elongate ovatum, 10-articulatum, posticè segmentis sensim minoribus, segmento antico semicirculari, lateribus obtusis. Conspicilla remotiuscula fronte insita.* Maris *corpus diaphanum pulchrè versicolor;* feminæ *subdiaphanum, incoloratum.*

Finger of posterior antennæ slender, longer than second joint, claw small. Caudal lamellæ twice as long as broad, setæ much shorter than half the lamellæ, one at inner apex nearly obsolete. *Female:*—Cephalothorax ovate, five-jointed, first articulation nearly obsolete, anterior segment not transverse, the posterior similar to one another, posterior angle subacute. Abdomen narrow, six-jointed, first segment very short, second laterally obtuse, the three following lunate. Conspicilla rather remote, situated on the front. *Male:*—Body long ovate, ten-jointed, segments posteriorly gradually smaller, anterior segment semicircular, sides obtuse. Conspicilla rather remote, situated on the front.

Plate 88, fig. 6 *a*, male, enlarged; *a'*, view, showing outline of stomach; *b*, posterior antennæ; *c*, leg of first pair. Fig. 7 *a*, female, enlarged; *a'*, anterior antennæ; *b*, posterior antennæ; *c*, leg of first pair.

Atlantic, latitude 20° to 23° south, longitude 38° 45′ to 41°; five individuals taken, November 17 and 19, 1838; also latitude 24° south, longitude 43°, just south of Rio Janeiro, January 9, 1839; also latitude 4½° south, longitude 25° west, May 13, 1842.

Length of female, one-twelfth of an inch; of male, one-fifteenth of an inch. Male, nearly transparent; colours, bright and of light tints, variable. Female, nearly colourless, and less transparent than the male. Eggs of external sacs dull-greenish; in other specimens eggs of internal ovaries pale blue or wine-yellow.

The antennæ have the second joint largest; the third hardly half the second. Claw of posterior antennæ quite short. The stomach in the male occupied the larger part of the cephalothorax, and had five deep lobes in each side, which were attached by muscles. The ovaries

of the female were convoluted on either side of the medial line of the cephalothorax.

Figures 8, *a*, *b*, plate 88, represent a velvety blue-black specimen of a female, which is near the above in general form. The abdomen differs in having the first and second segments equal in length nearly, the first much the narrower; the following three lunate segments much shorter in proportion to the length; the caudal lamellæ shorter than twice the length. The cephalothorax is much convex, and ovate in outline, or nearly oval. The posterior antennæ have the second joint one and one-half times the first; the finger about as long as the second; the claw short.

This species is near the *S. fulgens* of Edwards (Crust., iii. 415).

SAPPHIRINA OBESA.

Lamellæ caudales latè subellipticæ, latitudine non duplo longiores, setis brevissimis, fere obsoletis, unâ ad apicem internum vix dispiciendâ. Feminæ:—*Cephalothorax latè subovatus, convexus, 5-articulatus, segmento antico transverso, ultimis duobus duplo brevioribus quam tertium, quarto ad angulos rotundato, quinto ad angulos subacuto. Conspicilla remotiuscula, fronte insita. Abdomen 5-articulatum, segmento primo brevissimo, tribus sequentibus lunatis.*

Caudal lamellæ broad suboval, not twice as long as broad, setæ very short, nearly obsolete, one at inner apex scarcely distinguishable. *Female:* — Cephalothorax broad subovate, convex, five-jointed, rounded in front, segments laterally obtuse, first shorter than broad, last two half as long as third, fourth with the angles rounded, fifth having the angles acute. Conspicilla situated on the front, a little separate. Abdomen five-jointed, first segment very short, having appendages, next three lunate, acute, last longest.

Plate 88, fig. 9, animal, enlarged.

Pacific, off Hopper Island, Kingsmill Group, latitude 0° 30′ north, longitude 174° east, April 15, 1841.

Length, one-sixteenth of an inch. Colour, brownish, without

iridescence. The cephalothorax is broadest at posterior part of first segment, where there is an imperfect angle in the outline. The penult segment is rounded on either side behind, and the last is nearly truncate; these last two are of nearly equal length, and each is about half shorter than either of the two preceding.

SAPPHIRINA OBTUSA.

Lamellæ caudales elongatæ, non divaricatæ, setis dimidio lamellæ valde brevioribus. Feminæ: — *Cephalothorax convexus, 4-articulatus, ad frontem subtruncatus, segmento antico oblongo, lateribus fere parallelis angulis posticis rotundatis, segmentis aliis dissimilibus, secundo latere truncato, tertio rotundato, quarto (vel ultimo) ad medium lateris angulato. Conspicilla fronte insita, parce remotiuscula. Abdomen angustum, 5-articulatum, segmento primo parvulo, tribus sequentibus sublunatis, lateribus obtusis.*

Caudal lamellæ oblong, not divaricate, setæ quite short, much shorter than half the lamellæ. *Female:*—Cephalothorax convex, elongate, about twice as long as broad, four-jointed, subtruncate in front, segments laterally rounded, anterior oblong, not narrow behind, obtuse, second truncate either side, third rounded, fourth or last angulate on either side at middle, and rounded at the posterior angles. Conspicilla situated on the front, nearly in contact. Abdomen narrow, five-jointed, first segment quite narrow and small, three following sublunate, sides elongate, obtuse.

Plate 88, fig. 10, animal, enlarged.

Pacific, latitude 43° south, longitude 78° 45′ west, April 3, 1839.

Length, one-fifteenth of an inch. Colour, reddish, with some yellow. The legs are often seen, in an upper view, projecting below and either side of the basal portion of the abdomen.

Subfamily MIRACINÆ.

Genus MIRACIA.

Corpus subcylindricum. Frons duas appendices parvulas falciformes subtus gerens. Antennæ anticæ flexiles, appendiculatæ. Pedes antici mediocres, monodactyli, digito tenui. Pedes duo proximi biremes, lateraliter paulo porrecti. Appendices quatuor abdominis basales elongatè setigeræ. Setæ caudales elongatæ.

Body subcylindrical. Front with two small falciform appendages. Anterior antennæ flexible, appendiculate. Anterior feet of moderate size, monodactyle, finger thin. Next pair of feet two-branched, laterally extended. Four appendages of abdomen near base long setigerous. Caudal setæ elongate.

The Miraciæ have the general structure of the Setellæ, being similar to them in their abdomen, antennæ, abdominal and thoracic feet, though the body is stouter anteriorly, and not pointed in front. They differ from them in the large conspicilla, which occupy the front of the head. As the parts were opaque, excepting these oblate cornea, an intermediate pair of eyes could not be distinguished. In the specimens of one species (female, and we think also male), the anterior segment of the body was much stouter than the following. In another species, the specimen seen had the body uniformly even in size, though gradually tapering posteriorly.

The Miraciæ occur in the tropical part of both the Atlantic and Pacific Oceans. They move less by leaps than is common with the Cyclopoidea, having usually a continuous motion. The body is very flexible, and goes wriggling along, but with great rapidity.

Miracia efferata.

Corpus 10-*articulatum, segmento antico valde latiore, aliis sensim attenuatis. Conspicilla fronte insita, maxima, valde prominentia, contigua. Antennæ anticæ mediocres,* 7-*articulatæ, articulis tertio quinto septimoque brevibus. Styli caudales oblongi, setis duplo longioribus.*

Body ten-jointed, anterior segment much the stoutest, the others gradually diminishing. Conspicilla situated on the front, very large and prominent, in contact. Anterior antennæ of moderate size, seven-jointed, third, fifth, and seventh joints short. Caudal stylets oblong, setæ full twice longer than stylet.

Plate 88, fig. 11, female, enlarged.

Atlantic, latitude 7°–4° north, longitude 21° 30′–20° west, October 18 to 25, 1838; also, 4° 30′ south, longitude 25° west, May 13, 1842.

Length, one-sixteenth of an inch. Colour, deep blue, with some yellow along the ventral portion, and the intestine often deep red. The conspicilla stand out nearly like transparent glassy hemispheres on the front. The antennæ are stouter than in the following species; the fifth joint a little arcuate; the fourth joint the longest. Eggs of the ovarian sac were generally rich ultramarine blue; in one specimen, bright red. Caudal stylets about as long as two preceding segments of abdomen, and the setæ about two-thirds the length of the abdomen.

MIRACIA GRACILIS.

Corpus gracile, sensim posticè attenuatum, 10-articulatum, segmento antico non latiore. Conspicilla maxima, paulo prominentia, fronte insita. Antennæ anticæ tenuissimæ, articulis secundo quarto duobusque ultimis brevibus. Styli caudales oblongi, setis quadruplo longioribus, fere corporis longitudine.

Body slender, gradually diminishing, ten-jointed, the first segment not stouter than the following. Conspicilla situated on the front, very large, but little prominent. Anterior antennæ very slender, second, fourth and last two joints short. Caudal stylets oblong, setæ four times as long as stylets, or nearly as long as the body.

Plate 88, fig. 12 *a*, animal, enlarged; *b*, appendage to beak; *c*, another variety.

South Pacific, latitude 32° 24′ south, longitude 177° east, northeast

of New Zealand, April 9, 1840; also, April 14, off Sunday Island, in the same region.

Length, one-sixteenth of an inch. Colour of head, very deep blue (nearly black); of the rest of the body, bright grass-green in one specimen, excepting yellowish along the venter; in another, bluish, with the intestine deep red; stylets, sienna-yellow. One blue specimen had an egg attached, showing it to be a female. The two anterior antennæ extend obliquely forward, making an acute angle with one another. These organs are very slender, and have a few short hairs at apex of first and second joints, and a long setiform appendage at apex of third joint, which is the longest joint of the organ. This joint evidently corresponds normally to the *fourth* in the preceding species, and is the third, because the normal first was obsolete. The last two joints are subequal. Two very short hairs from under margin of last joint near apex. The characters here specified are entirely those of the Setellæ.

The first pair of legs is very slender, and has three very short moveable setæ at apex, which are not longer than the third (or last) joint. First pair of natatories much smaller than the following three, and, as in the preceding species, one branch is two-jointed, while the other is three-jointed. Two caudal setæ are very long and scabrous; the others are minute.

Tribe II. DAPHNIOIDEA.

The Daphnioidea are distinguished by having a large carapax covering the whole body exclusive of the head, and not closing completely below, and by the posterior antennæ being exsert; also, by having four to six pairs of foliaceous or subnatatory appendages, corresponding to the natatory legs of the Cyclopoidea, although of different form. The abdomen is usually incurved, and is acutely furcate at extremity. The superior antennæ consist of but one or two joints,

except in the group Bosminidæ, in which they are multiarticulate; often they are quite obsolete. The inferior antennæ, on the contrary, are prominent organs, ending in two or three few-jointed branches. The foliaceous legs are partly branchial in character, and have in most genera a small appendage, especially adapted for this function.

There is usually a pair of minute appendages, or, at least, a pair of setæ, near the base of the abdomen, having a dorsal position.

Although approaching the Cyproidea in general habit, the presence of the pairs of subnatatories serves to distinguish them, the corresponding organ in the Cyproidea being obsolete. This character is of more importance than the existence of a separate head in the Daphnioidea, although the latter is the more obvious character.

We do not undertake to draw out an account of the structure of the animals in this tribe, as our own observations have been comparatively few; and these will be given with the descriptions of the species.*

The known species of Daphnioidea belong to four families, distinguished by the number of pairs of legs and the antennæ. These are the PENILIDÆ, with six pairs of legs and obsolescent anterior antennæ; the DAPHNIDÆ, with five pairs of legs and obsolescent anterior antennæ; the BOSMINIDÆ, with five pairs of legs and multiarticulate anterior antennæ; the POLYPHEMIDÆ, with four pairs of legs.

These groups appear to be based on important characteristics. The presence, as in the *Bosminidæ*, of multiarticulate superior antennæ, in a tribe which through nearly all its species has these antennæ obsolescent, is a characteristic of considerable importance.

The *Polyphemidæ* constitute a trenchant group, remote from the other Daphnioidea. They carry in front a large head, full of eyes; the legs are subterete, rather than foliaceous, and are destitute of the branchial appendage, and moreover they are not wholly covered by the shell; the body behind inclines downward, and leaves a very large cavity for the young or ova.

The Daphnidæ and Penilidæ are more nearly related, as they are mostly similar in the characters of the legs, and in most points of structure. Yet they differ in the number of legs, and these legs are rather narrower in the Penilidæ than in the Daphnidæ. The poste-

* A general review of the subject, with many original observations, is contained in Baird's British Entomostraca. The extended and thorough investigations of E. Schödler, on the Acanthocercus rigidus (Archiv f. Nat., 1846, 301–374 pp.), have thrown great light upon the structure of this species, as well as the Daphnioidea generally.

rior antennæ also diverge from the Daphnia character, the branches having uniformly three joints each, in the Daphnidæ, and one or both of the branches with less than this number in the Penilidæ.

M. E. Schödler, in his paper on the *Acanthocercus rigidus*, suggests the subdivision of the Daphnioidea based on the number of legs, as a natural grouping of the genera.

The Lyncei are separated from the Daphnidæ as a distinct family by Dr. Baird: yet the species are identical in all proper family characteristics,—in the general form of body, in the number of organs, their structure, and all points, except such as may be a basis for subordinate divisions. The only characters mentioned by Dr. Baird in the characteristic of the family "Lynceidæ" not included in that of the "Daphniadæ," are, the existence of a black spot in front near the eye; the convolution of the intestine; and a distinct articulation at the base of the abdomen. But the "black spot" according to Schödler, exists in most (if not all) of the Daphnidæ: he has shown its connexion with an opening in the basal portion of the anterior antennæ, and concludes that it is connected with the organ of hearing, being probably the *otolites*. The convolution of the intestine is of little importance as a basis for a family division. The genus *Acanthocercus*, for example, is closely similar to Baird's *Macrothrix*, so closely that it is referred to Macrothrix by Baird; and yet it has a convoluted intestine, like the Lyncei. If this be right, the same genus may include species of both kinds of intestine.

The families of the tribe Daphnioidea, and the genera as yet known, may be distinguished as follows:—

Fam. I. PENILIDÆ.*

Pedes foliacei numero duodecim, angustiores. Antennæ anticæ obsolescentes.

G. 1. Sida, *Straus.*†—Antennarum posticarum ramus longior 3-articulatus, alter 2-articulatus. Caput grande, infra non acute productum. Antennæ 1mæ juxta capitis basin insitæ.

* Dana, Proc. Amer. Acad. Sci., ii. 47, 1849; family *Daphniadæ*, subfamily *Sidina*, Dr. W. Baird, Brit. Entomost., 106; *Sididæ*, Gray, Cat. Brit. Crust. Brit. Mus., 93, 1850.

† *Sida*, Straus, Mém. sur les Daphnia in Mém. du Mus. d'Hist. Nat., v., 38.

G. 2. DAPHNELLA, *Baird.**—Antennarum posticarum rami ambo 2-articulati, ramo breviore interdum prope basin articulationem 3tiam imperfectam habente. Caput oblongum, infra non productum, antennas anticas medio gerens.

G. 3. PENILIA, *Dana.*†—Antennarum posticarum rami ambo 2-articulati. Caput breve, infra acute elongato-productum, antennas anticas obsolescentes versus apicem gerens. [Species marinæ.]

? G. 4. LATONA, *Strauss.*‡—Antennæ posticæ ramis tribus 1-articulatis confectæ.

FAM. II. DAPHNIDÆ.§

Pedes foliacei numero decem, latiores. Antennæ anticæ 1–2-articulatæ.

1. *Tubum cibarium medio non convolutum. Caput majusculum.*

G. 1. DAPHNIA, *Müller.*—Corpus plus minusve oblongum. Antennæ anticæ minutæ, fere celatæ. Testa cellulis linearibus reticulata.

G. 2. CERIODAPHNIA, *Dana.*—Corpus fere globosum, capite brevi. Antennæ anticæ minutæ (raro elongatæ?) Testa cellulis hexagonis et pentagonis subtilissimè areolata.

G. 3. MOINA, *Baird.*||—Caput infra globosum. Antennæ anticæ longiusculæ, apud capitis latus inferius pendentes.

G. 4. MACROTHRIX, *Baird.*¶—Caput infra subacutum vel obtusiusculum, antennas anticas longiusculas pendentes ad rostri extremitatem gerens. Seta articuli 1mi unius rami longa, alias superans.

2. *Tubum cibarium medio convolutum.*

a. Caput majusculum, ac in Daphniis.

G. 5. ACANTHOCERCUS, *Schödler.***—*Macrothrici* similis.

* Baird, Brit. Entomost., 109.

† Proc. Amer. Acad. Sci., ii. 47.

‡ The genus Latona is placed in this division by Schödler, on account of a general resemblance to *Sida*, with a query as to its correctness.

§ Dana, Proc. Amer. Acad. Sci., ii. 1849; *Daphnita*, Gray, Cat. Brit. Crust. Brit. Mus., 88. *Daphniadæ* (in part), of W. Baird, Brit. Entomost., 62.

|| W. Baird, Brit. Entomost., 100; *Pasithea*, Koch, Deutschl. Crust. The name Pasithea is rejected by Baird, because of its being previously used twice in Zoology.

¶ W. Baird, Trans. Berw. Nat. Club, ii. 149, 1845, Ann. Mag. N. H., xi. 87, 1843, xvii. 412, 1846, Brit. Entomost., 103.

** E. Schödler, Archiv f. Naturgeschichte, 1846, p. 301. It is probable that this genus should be united to Macrothrix.

b. Caput breve.

G. 6. EURYCERCUS, *Baird.**—Caput quoad rostrum paulo productum et infra incurvatum. Antennæ anticæ rostro vix breviores. Abdomen perlatum.

G. 7. LYNCEUS, *Müller.*†—Caput quoad rostrum valde productum et infra incurvatum, lateraliter visum tenuiter acutum (apice raro inflexum). Antennæ anticæ minutæ, prope rostri basin insitæ et rostro plus dimidio breviores. Abdomen latitudine mediocre.

G. 8. ALONA, *Baird.*‡—Caput quoad rostrum minus productum et paulo divaricatum. Antennæ anticæ rostri apicem fere attingentes. Abdomen latitudine mediocre.

FAM. III. BOSMINIDÆ.

Pedes foliacei numero decem. Antennæ anticæ elongatæ et multiarticulatæ.

G. 1. BOSMINA, *Baird.*§—Caput infra rostriforme, ad rostri apicem antennas anticas gerens. Antennæ posticæ sat breves.

FAM. IV. POLYPHEMIDÆ.‖

Caput grande, oculis repletum. Pedes numero octo, fere teretes. Antennæ anticæ obsolescentes.

G. 1. POLYPHEMUS, *Müller.*—Corpus apud thoracem posticum deflexum posteaque quoad abdominem reflexum et tenue, extremitate setis duabus longis armatâ. Caput discretum. Ramus antennarum posticarum unus 4 alter 3-articulatus.

* This genus as adopted includes *Chydorus*, *Peracantha*, and *Pleuroxus* of Baird (Brit. Entomost.), which scarcely differ except in the form of the shell.

† Baird, Brit. Entomost., 123.

‡ Trans. Berw. Club, ii., Ann. and Mag. Nat. Hist., ii., Brit. Entomost., 131. We include with Alona, the genera *Acroperus* and *Camptocercus* of Baird. The last is distinguished by having a very narrow elongated abdomen which is also flexible. In the genus Alona, as adopted, the beak diverges from the body, and the inferior side makes a large angle (between 60° and 90°), with the shell below or adjoining; while in Lynceus the beak curves parallel with the shell, and makes a very small angle with it; other and better grounds for generic divisions may hereafter be detected.

§ Trans. Berw. Nat. Club, 1845, Ann. Mag. N. H., xi. 412, Brit. Entomost., 105.

‖ Baird, Trans. Berw. Nat. Club., ii. 149, 1845., Brit. Entomost., 111.

G. 2. EVADNE, *Loven.**—Corpus postice deflexum, abdomine non reflexo, capite vix discreto. Testa postice subacuta. Rami antennarum posticarum 3-articulati.

G. 3. PLEOPIS, *Dana.*—Corpus postice non deflexum, fere rectum; abdomen crassum extremitate furcatum, setis nullis. Testa postice rotundata. Rami antennarum posticarum 3-articulati.

FAMILY PENILIDÆ.

GENUS DAPHNELLA, *Baird.*

THE legs in this genus are much narrower than in the Daphnidæ. They have two branches, and differ not very much from the natatory legs of other Entomostraca. The first pair has both branches narrow and two-jointed; the longer as well as the basal part is ciliated below. The fourth pair has the shorter branch considerably the broadest and lamellar, and it is furnished with a few distant setæ, approximating to the form in Penilia. The abdomen is but little inflexed. The dorsal setæ are situated on a common prominence, and are rather long.

The head is not shorter than its breadth, either in a lateral or vertical view, and is arcuate or slightly angled below; it bears the superior antennæ from its lower side remote from the base of the head. One of the branches of the posterior antennæ (the shorter, when they differ in length) has the second joint short, as in Penilia, and the first joint of the same branch very near base has an appearance of another articulation;† the other branch has the first joint shorter than the second, unlike Penilia. It is an interesting fact, that the fresh waters of the Feejee Islands should afford species of this genus as well as those of Great Britain.

* Zoologisk Bidrag, 1; Edwards, Crust., iii. 390; Goodsir, Edinb. Jour., xxxiii. 366; Baird, Brit. Entomost., 114.

† The branch which is three-jointed in Sida is the other one, not that in which the terminal joint is short.

Daphnella angusta.

Corpus lateraliter aut superne visum angustum, non tumidum, dorso rectum. Caput discretum, vix oblongum, parce angustius. Antennæ 1mæ perbreves; 2dæ corpore breviores, ramis subæquis, rami unius *articulo 2do duplo longiore quam 1mus,* alterius *articulo 2do breviore quam dimidium 1mi. Setæ abdominis dorsales dimidio corporis breviores.*

Body narrow, whether seen from above or in profile, a little higher posteriorly, not tumid, back straight. Head separated by a constriction, hardly oblong, a little less than the body in height. Anterior antennæ quite short; posterior pair shorter than the body, the branches subequal, the second joint of one branch twice as long as the first joint, and second of the other branch half the first joint of same. Dorsal setæ of abdomen not half as long as the body.

Plate 89, fig. 1 *a*, dorsal view, enlarged; *b*, side view; *c*, anterior antennæ; *d*, first pair of legs; *e*, fourth pair, magnified three-fourths more than the figure of the animal; *f*, dorsal abdominal appendage.

Fresh-water pools, Vanua Lebu, Feejee Islands.

In a dorsal view, the head is short oval, and the eye is at the front extremity; the body behind is narrow oval or ovate, with the posterior extremity truncate or slightly excavate. The minute anterior antennæ are seen in an upper view, either side of the head. In profile, the eye is at the extremity of the front. Only the tips of the caudal extremity project beyond the shell. The short spines at the extremity of the abdomen are nearly straight, not a sixth of the length of the animal.

Genus PENILIA, *Dana.*

Caput fere discretum, infra elongate rostratum et acutum. Antennæ posticæ grandes, birameæ, ramis duobus 2-articulatis. Abdomen non inflexum, 2 stylis corneis elongatis confectum et extus non spinulosum.

Head nearly separate, below long rostrate and acute. Posterior antennæ large, two-branched, the two branches two-jointed. Abdomen not inflexed, ending in two long corneous stylets and exteriorly not spinulous.

This genus includes two marine species, very similar in character, one obtained by the author at Rio Janeiro, and the other in the East Indies. The shell is very large, having great vertical breadth, and is open widely below; the lower margin is sinuous and elegantly denticulate, and terminates behind either side in an acute point. The posterior margin is also sinuous, and over the middle of the back, as seen from above, is arcuately excavate; the lower part of this margin is denticulate. The head is but imperfectly separated by a suture from the part behind; it has a long vertical front, and ends below in an acute point or beak. The anterior antennæ are very small, and are situated towards the extremity of the beak on its inner or posterior side. The posterior antennæ are quite large. The branches are nearly equal in length, and the second joint is very short, the first being long. The eye is small. The thoracic legs are narrow and of peculiar form (fig. 3, *e*, Pl. 89), unlike the other Daphnioidea described. There are two branches: one, the longer, nearly terete, three-jointed, furnished on the lower side, like the base of the organ, with a fringe of longish hairs; the other, having an orbicular extremity, which is set around with five to seven long setæ, each having an articulation not far from its base.

The abdomen is two-jointed; the first of the segments is about as broad as long, and has at the dorsal apex a pair of small appendages, each furnished with a long seta. The rest of the abdomen, exclusive of the terminal stylets, is oblong, subterete, gradually diminishing in breadth, and without spinules below.

The egg cavity is rather large, the back of the animal being considerably convex; the largest number of embryos observed was six.

Penilia avirostris.

Testa posticè ad medium profundè excavata. Setæ appendicum abdominis dorsalium stylis caudalibus multo breviores, basin stylorum fermè attingentes.

Shell posteriorly over middle of back deeply excavate. Setæ of dorsal abdominal appendages not as long as caudal stylets, barely reaching to base of stylets.

Plate 89, fig. 2 *a*, side view of animal, enlarged; *b*, dorsal view.

Harbour of Rio Janeiro, December 24, 1838; abundant.

Length, one-twentieth of an inch.

In dorsal view, head obtuse, very low triangular, sides of body arcuate, posterior angles of shell prolonged, acute, nearly as remote as greatest breadth of animal; centre of posterior margin deeply rotund-excavate. In side view, back very much inflated, and within this part there were six immature young. The head is lengthened downward, appears acute, and terminates in a short acute appendage (rudimentary anterior antennæ). The lower margin of the shell is rounded anteriorly, then nearly straight but undulate, and both this and the lower half of the posterior margin is set with minute teeth. The antennæ have a long subcylindrical base, and two smaller and somewhat shorter branches; the branches are subequal, consist of a long slender joint and a very short apical, and bear a few setæ at apex, hardly as long as the branch.

The abdomen extends beyond the carapax; it has a subcylindrical form, and terminates in two curved setæ, longer than the abdomen. From near the base of dorsal part of abdomen, there is a pair of minute appendages, slender in form, bearing one or two slender setæ; the tips of the setæ extend nearly to apex of abdomen, or not beyond it.

Penilia avirostris, DANA, Proc. Amer. Acad. Sci., ii. 47, 1849.

PENILIA ORIENTALIS.

Testa postice ad medium parce excavata. Setæ appendicum abdominis dorsalium longissimæ, apicem stylorum caudalium superantes.

Shell shallow excavate posteriorly over middle of back. Setæ of dorsal abdominal appendages very long, reaching even beyond apex of caudal stylets.

Plate 89, fig. 3 *a*, dorsal view, enlarged; *b*, side view; *c*, ventral view; *d*, antenna; *e*, one of the natatory legs.

East Indies, at the eastern entrance of the Straits of Sunda. Collected, March 5, 1842.

This species is near the preceding, and at first appeared to be identical with it. But the dorsal abdominal setæ are more than twice the length in that species, while the stylets at the extremity of the abdomen are shorter in proportion, being a little shorter than the abdomen. These stylets have an appearance of a suture near base, and there are two very short setæ on the outer side at this suture or pseudo-articulation. The front in an upper view is straight truncate, or scarcely triangular. The anterior margin of the shell below the head is much longer, and rounds with a much broader curve into the inferior margin. It forms an acute angle with the posterior side of the rostrum, while in our drawing of the *P. avirostris* there is a short neck below, separating the two. The concavity at the middle of the posterior margin of the shell is quite shallow, and the acute posterior angles of the shell are less prolonged as seen in a dorsal view.

The setæ of the antennæ are a little longer than the branch; the second joint of the branches is about one-third as long as the first. The *mouth* consists of a pair of stout *mandibles*, situated transversely, with broad dentate extremities. No palpus was detected. Posterior to the mandibles, there is a pair of slender maxillæ, having at apex a few short spines.

The dorsal cavity contained three large embryos.

Penilia orientalis, DANA, Proc. Amer. Acad. Sci., Boston, ii. 47.

GENUS DAPHNIA, *Müller*.

We separate from this genus the species having the shell reticulate, with hexagonal or pentagonal cells.

DAPHNIA AUSTRALIENSIS.

Valde tumida, paulo oblonga, capite per constrictionem vix discreto, pone

medium altior, posticè subtriangulata, obtusa, margine supero-postico subtilissimè denticulato. Caput breve, infra truncatum et non rostratè productum, supernè visum *triangulatum, obtusum. Rami antennarum posticarum subœqui, setis sat longis. Testa reticulata, areolis angustissimè linearibus, obliquis, prope marginem valde latioribus.*

Very tumid, a little oblong, head hardly separated by a constriction, body higher posterior to middle, behind subtriangular, obtuse, on posterior part of back minutely denticulate. Head short, beak horizontally truncate; seen from above, triangular, obtuse. Posterior antennæ having the branches longer than base, subequal, setæ rather long. Shell reticulated, the cells long linear and parallel, running obliquely, much larger at the margin.

Plate 89, fig. 4 *a*, side view of female, enlarged; *b*, profile of male; *c*, vertical view of head; *d*, abdomen in part, with stomach and intestine; *e*, enlarged view, showing areolation of shell.

From fresh-water pools, near Sydney, New South Wales.

Greatest height of male, half the whole length; of female, three-fourths the length. In the latter, the body behind is obtuse triangular; in the former, the dorsal side of the angle rounds into the back; on both there are minute spines along this supero-posterior portion of the shell. The beak is truncate below, and the truncation, though horizontal, is excavate at middle. The eye, as seen in a vertical view is placed at a very short distance from the front margin. The abdomen terminates in a pair of slightly curving spines, and also six other pairs of spines of decreasing size, none of which are more than half as long as the terminal. The setæ of the antennæ are minutely plumose.

Daphnia australiensis, DANA, Proc. Amer. Acad. Sci., ii. 48.

DAPHNIA MACRURA.

Gracilis, elongata, testâ postice aculeato-productâ, aculeo tenui, paulo breviore quam corpus. Caput grande, corpore non humilius, supra non discretum, infra nec rostratum; fronte latere viso *rotundato,* supernè

viso *bene acuto. Testa apud margines dorsales infero-posticosque et spinam caudalem subtilissimè denticulata. Rami antennarum posticarum æqui.*

Slender elongate, produced behind into a long spine, which is but little shorter than the body; head large, not separate, below not produced into a beak, equalling the body in height; front in side view rounded, in upper view acute. Dorsal and infero-posterior margin minutely denticulate. Branches of the inferior antennæ equal.

Plate 89, fig. 5 *a*, side view, enlarged; *b*, upper view of head, in outline.

From fresh-water pools, near Sydney, New South Wales.

The slender body, long aculeate prolongation of the shell behind, and the large non-rostrate head, acute in a dorsal view, are strong characteristics. The dorsal line, from the head to the tip of the caudal elongation, has an uninterrupted gentle concave curvature, and the same bends around the front of the head. The head in profile is convex subtriangular, and the outline is continuous with the outline of the venter, excepting a slight emargination. The height of the body is nearly the same before and behind, and is scarcely greater at middle than elsewhere.

Daphnia macrura, DANA, Proc. Amer. Acad. Sci., ii. 48.

GENUS CERIODAPHNIA, *Dana.*

Corpus fere globosum, capite brevi, instar rostri infra vix productum. Antennæ anticæ minutæ (raro elongatæ?). Testa cellulis hexagonis vel pentagonis areolata.

Body nearly globose, head quite short and not produced into a beak below. Anterior antennæ minute (rarely elongate?). Shell areolate, with hexagonal or pentagonal cells.

This genus includes the *Daphnia rotundata* and allied species.

Ceriodaphnia textilis.

Subglobosa, paulo oblonga, pone medium paulo latior, posticè breviter subtriangulata, obtusa. Caput breve, infra brevissimè acutum, supernè visum *breviter subtriangulatum, obtusum. Rami antennarum valde inæqui, setis paucibus et brevibus.*

Subglobose, a little oblong, broader posterior to middle, behind low triangular, obtuse. Head short, very short acute below, form as seen from above short subtriangular, obtuse. Posterior antennæ with branches very unequal, setæ few and short.

Plate 89, fig. 6 *a*, side view of animal, enlarged; *b*, dorsal view.

Fresh-water pools at Sandal-wood Bay, Vanua Lebu, Feejee Islands.

The length is about one-fourth greater than the breadth in both a side and vertical view. The outline of the back in a *side view* is a flattened curve; the head is large, but very short, with the front convex but flattened, and the small acute beak below, is situated very near the body. The body behind is rather low triangular, with the apex small truncate, or a little concave; there is here an opening through which, when the animal is at rest, the divergent setæ of the dorsal abdominal appendages are exserted. The longer branch of the posterior antennæ is as long as the basal portion, and one and a half times the length of the shorter branch.

The shell is very neatly reticulate with hexagonal cells. There is a distinct depression between the head and the back.

Daphnia textilis, Dana, Proc. Amer. Acad. Sci., ii. 47.

Genus LYNCEUS, *Müller.*

Lynceus latifrons.

Valde tumidus: latere visus, *rotundatus, capite non discreto, brevissimo*

rostrato, rostro gracili, acuto, ad corpus strictè appresso; supernè visus, *antice latissimè truncatus, fronte parce angustiore quam corpus, posticè breviter triangulatus et obtusus.*

Very tumid: in side view rotund, head not separate, very short, beaked, beak slender and close to body, acute; in upper view animal very broad truncate anteriorly, the front therefore nearly as broad as body, behind low triangular and obtuse.

Plate 89, fig. 7 *a*, side view of animal, enlarged, the heart at *h*; *b*, upper view.

Fresh-water pools, on Vanua Lebu, Feejee Islands.

The form of this species corresponds with that of the Chydorus of Baird; a subgenus which may be sustained, but should rest on better characters than those published. The front margin (as seen in an upper view) is more than three-fourths the greatest breadth of the body. The slender pointed beak is very close to the body, and no distinct head was made out. The eye is just above the beak. In profile, the length exceeds very slightly the height, and the curve behind is nearly a regular semicircle. The abdomen is broad and has a truncate apex; there are two minute setæ near dorsal base at an abrupt narrowing of this part of the animal; and at apex there are two spines about as long as breadth of abdomen, besides others which are much shorter.

Lynceus latifrons, DANA, Proc. Amer. Acad. Sci., ii. 48.

FAMILY POLYPHEMIDÆ.

GENUS PLEOPIS, *Dana.*

Corpus quoad thoracem abdominemve non deflexum, rectiusculum. Abdomen crassum, extremitate furcatum, setis apicalibus nullis. Testa postice rotundata. Antennarum posticarum rami 3-articulati.

Thorax not deflexed, nearly straight and in same line with abdomen. Abdomen stout furcate at extremity, with no setæ at apex. Branches of posterior antennæ three-jointed. Shell rounded behind.

The abrupt downward bend of the thorax of Polyphemus and Evadne is one of their most striking characteristics, and in Polyphemus the abdomen is quite slender, and takes again the longitudinal position. But in Pleopis, the whole is nearly straight and stout. The head is very large and occupied with eyes, as in other Polyphemidæ; and there is a suture separating it from the following part. The legs of the second pair were terete; four joints were observed, an oblong basal, and the following part, but slightly longer, consisting of a long joint and two minute apical, and bearing a few longish setæ. The legs of the fourth pair were much shorter and rather stouter. The three joints of the terminal portion of the leg were nearly equal in length; their setæ were about as long as in the second pair. The shell is very tumid behind and subglobose, instead of being pointed as in Evadne.

The name of the genus, from πλεος, *full*, and ωψ, *eye*, alludes to the large head filled with eyes.

Pleopis brevicaudis.

Caput oblongum, conoideum, corpore postico parce brevius, antice latius et subglobosum. Antennæ oblongæ, basi crasso, ramis duobus subæquis, 3-articulatis, parce setigeris. Pedes crassi. Abdomen breve et crassum, apice parce exsertum, furcatum, acutum.

Head oblong conoid, largest and globular anteriorly, but slightly shorter than body. Antennæ oblong, base stout; branches two, subequal, three-jointed, sparingly setigerous. Abdomen short and stout, tip but slightly exsert, furcate and acute.

Plate 89, fig. 8 *a*, lateral view of animal, enlarged; *b*, second pair of feet; *c*, fourth pair of feet.

In the Atlantic, latitude 41° south, longitude 62° west, near Rio Negro. Collected, January 25, 1839.

Length, one-thirtieth of an inch.

The antennæ have a long basal portion, with the branches a little shorter than this base. The body is much narrower at the junction of the head and thorax than elsewhere. The eyes are enclosed within a cornea beneath the shell, which admits of some motion, mostly rotary. The heart is an oval organ, situated near the dorsum, in the anterior portion of the thorax. The large cavity over the body within the shell was empty.

Polyphemus brevicaudis, DANA, Proc. Amer. Acad. Sci., ii. 49.

TRIBE III. CYPROIDEA.

THE Cyproidea differ from all other Crustacea, excepting the Lernæoids and Rotatoria, in the absence of the pairs of appendages belonging to all the normal cephalothoracic segments posterior to the eighth, that is, to the six posterior of these segments. The last two of these six pairs are obsolete in all the Lophyropoda; and in the Cyclopoidea and Daphnioidea, the first four of them are natatory or foliaceous, together with also another pair, next anterior in most species. The pairs of appendages present in the Cyproidea, posterior to the mandibles—in number *four* pairs—are divided variously between the mouth and legs. The modes observed are as follows:—

1. One pair of maxillæ and three pairs of legs, as in *Cythere*.

2. Two pairs of maxillæ and two pairs of legs, as in *Cypris*, *Conchœcia*, and *Halocypris*.

3. Three pairs of maxillæ and one pair of legs, as in *Cypridina*. The outer pair of maxillæ may be called maxillipeds, yet they are more like maxillæ in form.

The posterior legs may be true feet, as in Cythere, Conchœcia, and Halocypris, or slender organs fitted for action in the ovarian cavity, as in Cypris and Cypridina.

On Plate 90, we have arranged the several appendages of the diffe-

rent genera in parallel lines, for comparison. Figures 1 *a*, 2 *a*, 3 *a*, 4 *a*, 5 *a*, represent the anterior antennæ; *b*, the posterior antennæ; *c*, the mandibles; *d*, the first pair of maxillæ; *e*, *f*, *g*, the three following pairs of members. Figures 1 *a*, *b*, *c*, *d*, *e*, *f*, *g*, are of a *Cypris;* 2, of a *Cythere;* 3, of a *Cypridina;* 4, of a *Conchœcia;* 5, of a *Halocypris.*

The *anterior antennæ* are subterete organs, varying in number of joints from *three* to *seven*, and are furnished with more or less setæ, especially at apex. In Conchœcia and Halocypris, in which the number of joints is but three, one of the setæ at apex is quite long, and incrassated towards its extremity.

The *posterior antennæ* are of two types. In the fresh-water and sea-shore species (Cypris and Cythere), they are rather slender, simple subpediform organs, consisting usually of five joints, with setæ at the extremity and also a tuft, in the genus Cypris, at the apex of the third joint; and in Cythere, two or three finger-like spines at apex, and a very long slender two-jointed spinous process proceeding from the apex of the second joint (fig. 2 *b*, Pl. 90). In the marine or oceanic species, the organs are two-branched, and the basal joint is very stout, being thick and subtriangular, sometimes as broad as long; it is filled with muscles, for moving the rest of the organ, which is especially fitted for natatory purposes. The terminal portion consists of an oblong cylindrical joint, and a multiarticulate extremity of five to seven short joints, furnished with long plumose setæ. There is also a second branch from below the apex of the large basal joint; this branch is short and two-jointed.

The five joints in the second type are represented normally as follows. The large basal joint corresponds to the second, or to the first two of the normal joints, as it bears the accessory branch, which is an appendage normally to the *second* joint of an antenna or leg. The next joint corresponds to the third in Cypris; the last five or seven, forming the multiarticulate extremity, to the fourth and fifth in the first type. The setæ at the extremity of these organs in Cypris pertain to the fourth and fifth joints; and in Conchœcia to the representatives of these joints. We have numbered the joints in correspondence with these views, to aid the comparison with one another, and also with the organs of the Cyclopoidea on Plate 70.

The mandibles are also of two types. The one characterizing the fresh-water and sea-coast species (Cypris and Cythere) has a denticulate apex, and bears a palpus on one side remote from the extremity, in the usual way, the palpus (the proper termination of the mandi-

bular leg) appearing like an appendage to the mandible. The other type, characterizing the oceanic species, has the mandibular leg like an ordinary leg in form, the first or mandibular joint bearing the next at or near its apex, and the second joint (first of the so-called palpus of other species) often aiding by a denticulate process in the mandibular function. The structure in Limulus is here represented, and the true relation of the part called the palpus is well shown. In both types the terminal portion of the leg is prominent, and acts like a leg, though largest and stoutest in the second type. In the first type, the first joint of the palpus (second of the organ) bears an accessory branch, which is wanting in the second type.

The number of joints in the organ, counting the mandible as the first, is *five* in both types, as will be seen on Plate 90.

The *first pair of appendages* following the mandibles, is in all the Cyproidea a pair of maxillæ. They consist of two to four joints, and have in the fresh-water species a plate above the base ciliated with long plumose setæ. This plate is kept in constant vibration, evidently to produce a current of water over the body, for the purpose of aeration. The body of the organ fig. 1 *d*, 2 *d*, Plate 90, terminates in four or five linear lobes ending in a brush of setæ, the outer of which lobes is two-jointed and articulated at base. These two joints are properly therefore the two terminal joints of the maxilla; and the preceding part appears also sometimes to consist of two joints, the second of the two bearing the lobe next to the jointed one. The ciliated plate was not observed distinctly in the marine species, and probably does not exist, although a similar one is found attached to the following pair.

The *second pair* varies much in character. In the marine species it is furnished with a large plate at base, edged with long plumose hairs; which plate is wanting in Cypris and Cythere; and besides this plate and the setigerous maxillary joint to which it belongs, there is also at times a slender three-jointed appendage ending in one or two long setæ. In Cypris, on the contrary, the organ has a maxillary process interiorly, and a lateral or posterior one-jointed branch, with few short setæ at apex. In *Cythere*, these organs are represented by a pair of slender five-jointed legs, ending in a long slender claw, similar to the two following pairs.

The *third pair* is a proper leg in each of the genera, excepting Cypridina. In Cypris and Cythere it is long and slender; in Conchœcia and Halocypris it is shorter, and has a few setæ at apex; in

Cypridina it is a broad maxilla, setigerous at its inner margin, and having a single broad lateral joint edged with a few setæ.

The *fourth pair* is a slender five-jointed ovarian leg, in Cypris; a pediform leg, like those of the preceding pair, in Cythere; a flexible linear or vermiform ovarian leg, in Cypridina; and a short two- or three-jointed leg, ending in some shortish setæ, in Conchœcia and Halocypris.

Besides these appendages, Conchœcia and Halocypris have a moveable spicula, either dart-like in form or cylindrical, situated between the anterior antennæ, and arising apparently from the same base as these organs. It may be projected out of the shell.

The *eyes* in the Cyproidea are either two simple eyes on a single spot of pigment, or two distinct compound eyes. The latter is the case only in the genus Cypridina.

From this partial review of the organs in the Cyproidea, it is apparent that there are two types of species, distinguished more especially by the second antennæ and mandibles, though also distinct in other organs. One includes Cypris and Cythere, which belong to fresh waters or sea-shores; the second, the other genera, which are confined apparently to the purer ocean waters. These groups or families we distinguish as the CYPRIDÆ and HALOCYPRIDÆ. Each of these families includes two known subfamilies; the first, *Cyprinœ* and *Cytherinœ;* the second, *Cypridininœ* and *Halocyprinœ.* These subdivisions and the included genera may be characterized as follows:—

FAM. I. CYPRIDÆ.

Antennæ 2dæ subteretes, 3–5-articulatæ. Mandibulæ apice productæ et denticulatæ et lateraliter palpigeræ, palpo ab mandibulæ apice remoto. Oculi pigmento unico minuto conjuncti, lenticulis duobus sphericis. Pedes duo vel plures tenuiter pediformes.

SUBFAM. 1. CYPRINÆ.*—Pedes numero quatuor; anteriores tenues pediformes, posteriores debiles. Abdomen elongatum stylis duobus confectum.

G. 1. CYPRIS, *Müller.* — Antennæ 2dæ ad articuli 3tii apicem bene setigeræ. Species natatoriæ.

* *Cypridæ,* Baird, Brit. Entomost., 139.

G. 2. CANDONA, *Baird.** — Antennæ 2dæ ad articuli 3tii apicem vix setigeræ. Species gressoriæ.

SUBFAM. 2. CYTHERINÆ.†—Pedes numero sex, toti tenues, consimiles, pediformes.

G. 1. CYTHERE, *Müller.*‡—Testa tenuis, lævis. Cauda brevis.

G. 2. CYTHEREIS, *T. R. Jones.*§—Testa rugulis vel tuberculis ornata. [Animal ignotum. An hujus sedis.]

FAM. II. HALOCYPRIDÆ.

Antennæ 2dæ basi crassissimo, articulo 2do cylindrico, apiceque 5–7-articulato elongate setigero, instructæ. Pedes mandibulares bene pediformes, articulo 1mo (mandibulâ verâ) juxta ejus apicem articulum 2dum (1mum palpi) gerente, instar pedis veri, processu articuli 1mi mandibulari sæpe cum alio processu articuli 2di pro mandibulæ usu conjuncto. Oculi sive in pigmento unico mediano conjuncti, sive pigmentis duobus et remotis.

SUBFAM. 1. CYPRIDININÆ.|| — Frons sæpe rostratus. Maxillæ numero sex et pedes duo tantum.

G. 1. CYPRIDINA, *Edwards.*—Pedes duo flexiles, vermiformes, articulis distinctis nullis. Oculi duo remoti, compositi.

SUBFAM. 2. HALOCYPRINÆ.—Maxillæ numero quatuor, et pedes quatuor; maxillæ 2dæ palpo pediformi instructæ. Pedes mandibulares crassæ, apice paulo setigeræ. Spiculum inter antennas 1mas exsertile. Testa clausa antice incisa.

G. 1. CONCHŒCIA, *Dana.*¶—Oblonga. Pedes mandibulares articulis tribus ultimis inflexi, articulo 2do multum oblongo.

G. 2. HALOCYPRIS, *Dana.*—Curta. Pedes mandibulares non inflexi, articulo 2do parce oblongo.

* Trans. Berw. Nat. Club., ii. 152, 1845; Ann. Mag. Nat. Hist., 1846, xvii. 415; Brit. Entomost., 159.

† *Cytheridæ*, Baird, Brit. Entomost., 162.

‡ *Cytherina*, Lamk., Römer, etc.; *Cypridina*, Bosquet, Entomost. de la Craie de Maestricht; *Bairdia*, M'Coy.

§ T. R. Jones, Entomost. of Cretaceous Formation, 1849; *Cytherina*, Römer, Jahrb, &c., f. Min., 1838.

|| *Cypridinadæ*, Baird, Brit. Entomost., 176.

¶ Dana, Proc. Amer. Acad. Sci., ii. 51, 1849. *Asterope?* Philippi, Archiv f.

Family CYPRIDÆ.

The two subfamilies of Cypridæ, *Cyprinæ* and *Cytherinæ*, are mentioned on page 1280. Although agreeing in the general character of the antennæ, the maxillæ, and the mandibles, and thus distinguished from the Halocypridæ, they have many important points of distinction. Part of these have already been mentioned. The characters of the genus Cythere will be gathered from figures 9 *a* to 9 *l*, Plate 89, and those of Cypris, from Plate 90.

In *Cythere*, the superior antennæ are only five-jointed, and they are furnished with a few naked setæ. In the species examined by the author, they were used somewhat like feet. The second pair are more decidedly pediform, and instead of having hair-like setæ at apex, there are two stout finger-like spines, lying side by side, besides another shorter below. The organ has four distinct joints, besides the terminal spine; and as the outer of these spines appears to have an obsolete joint near its base, it probably corresponds to two normal joints, like the finger in Corycæus. In this way the full number of joints, *six*, is made out. The spiniform lateral appendage proceeds from the apex of the second joint, and therefore corresponds normally to the second branch; it is as long as the rest of the organ, and has a joint towards its extremity. Very near the apex it is abruptly narrowed, as shown in figure 9 *a*. The mandible is closely alike in Cypris and Cythere. The palpus in each is four-jointed, and bears a branch from the first of these joints, this being normally the second joint of the organ, as the mandible is properly the first joint.

Naturg., vi. 186, 1840. "Testa bivalvis corpus abscondens antice subtusque incisa. Antennæ duæ simplices, apice penicillatæ. Oculi duo. Pedes 4, compressi subfoliacei. Fila peculiaria ad retinenda ova. Cauda compressa uncinis pluribus terminata." This description, in the eyes, the antennæ, legs, and caudal extremity, agrees with the species of Cypridina, as observed by the writer; and where it differs from the description of Edwards, as in the caudal extremity, that description appears to be incorrect. The species was obtained by Philippi, at Naples, and is named A. elliptica.

The maxillæ are also very similar in the two genera. The number of plumes ciliating the moveable plate was fourteen in the species of Cythere, studied by the author, the same as found by Dr. Baird.*

In the following pairs of legs the two groups diverge from one another. Yet still the type in Cythere is indicated in Cypris; for the legs of Cythere are similar in general structure to the first pair in Cypris. The form is slender, and they end in a long spiniform claw. But in Cypris, the pair corresponding to the first pair in Cythere is a very short maxilliped, having a maxilliform process anteriorly, and a short single-jointed process behind. The last pair in Cypris, instead of being a proper leg, like the preceding pair, as in Cythere, is reflexed so as to pass up into the egg-cavity.

The three pairs of legs in Cythere are quite similar, and increase in size from the first to the last, as shown in fig. 9 *a*. They are supported at base by a framework of corneous processes lying on the skin of the side of the body, as shown in figure 9 *k*, one process being articulated with the base of each leg, and another process on the venter forming the support on that side.

The abdomen affords the most striking distinction between the groups. In the Cyprinæ it has a furcate styliform extremity, each branch having a few setæ at and towards apex on the upper side (fig. 7 *c*, Plate 90). In the Cytherinæ, it bears two large fleshy lobes, which lie side by side, and have on the margin a single stout spine, or small setigerous joint. Figures 9 *a*, *e*, *f*, *g*, *h*, *i*, Plate 89, represent this structure in the Cythere Americana, D. In figure 9 *a*, the female abdomen is seen in place, and in fig. 9 *e*, the male abdomen. The specimens were put in boiling water, in order that the shell might be easily removed for the study of the animal within; the process was perfectly successful, and in one case, the abdomen was found thrown out of the shell, as shown in figure 9 *f*. These figures represent a side view, and exhibit only the lateral surface of one of the lobes; *c*, in these figures, is the proper caudal extremity of the animal, the lobes being below and anterior to this; *s*, is the spine on the margin of the lobe, and *a*, the anterior angle. In the course of the dissections, the abdomen was made to lie open, as in fig. 9 *g*; here the two lobes are simply opened—the letters *s*, *a*, showing the corresponding parts, and their relation to the abdomen in place (fig. 9 *e*). In another case, one lobe was pushed

* Brit. Entomost., p. 166.

partly off from the other, and appeared as seen in figure 9 *h*. These figures represent also the corneous processes, which lie in the surface of these fleshy lobes; those of figure 9 *g* are on the inner surface of the lobes. Figure 9 *i*, represents another view obtained, in which the caudal extremity (*c*) was observed pushed above the rest, as if a distinct piece, for a greater length than simply the small appendage. This appendage was a little pubescent at extremity and was not distinctly jointed. In the female form, figure 9 *a*, the caudal appendage was two-jointed (fig. 9 *a* and 9 *l*), and instead of the stout spine on the margin of the lobes, there is a small joint bearing two naked setæ (*s*, fig. 9 *a*).

In some instances, after putting the females in hot water, they came out with simply the extremity of the abdomen exserted, the caudal appendage and the joint on the margin below (*s*), with the part intervening, being outside the shell.

The shell in the Cytherinæ is much thicker than in Cypris, and is marked with granules or lines. In the species referred to for the above illustrations, the surface under a high magnifier has the appearance represented in figure 9 *c*. There is a translucent margin around, which is narrow in the part of the shell below the mouth organs. The rest is too opaque to permit a view of any organs or parts beneath. Through the translucent margin there are at intervals minute ducts, which terminate each in a short hair on the margin, as seen in figs. 9 *b*, 9 *c*. The hinge in Cythere consists of a large number of minute truncate teeth ranging along the dorsal margin (fig. 9 *a*).

Subfamily CYPRINÆ.

Genus CYPRIS, *Müller*.

The separation of the Candona of Baird from Cypris is based on the habits of the species—their crawling over aquatic plants—and the absence of a tuft of long setæ from the apex of the third joint. Our *C. albida*, beyond, was observed to have the habits of a Candona, and may possibly be of that genus.

CYPRIS SPECIOSA.

Oblonga, subovata, anticè angustior, subtus fere recta, vix excavata, alioque bene arcuata, latior et plus duplo longior quam alta; ad marginem anticum pubescens, posticum breviter ciliata. Flava et lætè viridis, areis flavis paucis imperfectis viridi circumdatis.

Oblong, subovate, narrower anteriorly, below straight or scarcely excavate, the margin in other parts regularly arcuate, broader than high, and length more than twice the height; pubescent on the anterior margin, short and sparsely ciliate behind. Colour yellow and green, consisting of a few large irregular areas, more or less perfectly surrounded by broad bands of bright green, and margin also green.

Plate 90, fig. 6, animal, enlarged.

Pool of standing fresh water, near Rio Janeiro, Brazil. Collected in December, 1838.

The antennæ were usually extended out as far as one-third the length of the shell, or rather more. The last joint of the first pair of legs is long. The colours are so arranged that there is an irregularly polygonal area of yellow near the centre of the side, and six or seven other imperfect areas around; the latter above and below are short and broad, elsewhere long. The green colour is a bright grass-green.

Cypris speciosa, DANA, Proc. Acad. Nat. Sci., ii. 49.

CYPRIS CHILENSIS.

Latere visa, *subovata, pone medium parce altior, subtus paululo arcuata, dorso vix gibbosa, triplo longior quam lata, duplo longior quam alta, marginibus antico infero posticoque pubescentibus. Antennæ anticæ 7-articulatæ, setis dimidio corporis vix longioribus.*

Subovate (in a side view), a little the highest behind the middle,

below slightly arcuate, and on the back scarcely at all gibbous, length three times the breadth and twice the height, front, back and lower margins pubescent. Eye placed near the margin. Anterior antennæ seven-jointed, setæ as long as half the body, or a little longer.

Plate 90, fig. 7 *a*, side view, enlarged; *b*, upper view of shell; *c*, side view of animal, shell removed. Also, figure 1 *b*, second pair of antennæ; *c*, mandibular foot; *e*, maxilla of second pair; *f*, first pair of legs.

From small fresh-water pools, to the southwestward of Valparaiso. Collected in May, 1839.

Length, one-sixteenth of an inch. Form, in a vertical view, narrow ovate, with the extremities obtuse. Colour, brownish yellow. Swims freely.

The figures referred to exhibit the characters of the several organs. The *anterior antennæ* are seven-jointed. The basal joint is largest; the third longer than the second; the following four gradually diminishing and bearing the long setæ. These antennæ may be curved backward by the animal along the back of the shell. The *posterior antennæ* are large and stout, five-jointed, the joints oblong and subequal, excepting the apical, which is very short and small. The third joint is rather longer than the fourth, nearly twice as long as the second. The organ terminates in several stout hairs, which are rather longer than the penult joint. The apex of the third joint is also furnished with several long and stout hairs.

The *mandibular feet* consist of the mandible, proceeding from a stout base, and a four-jointed extremity, commonly called the palpus. The mandible is a narrow corneous process, curving inward and dentated at apex. The second and fourth of the following joints are short, and the last two are furnished with short setæ.

The *first pair of maxillæ* are lobed below and furnished with a number of short and stout setæ. Attached to the base, projecting above, along the side of the animal, there is a broad lamellar appendage, somewhat oblong triangular in form, but with curving sides, which is coarsely pectinated on its posterior convex side, and furnished with long and stout setæ.

The *second pair of maxillæ* consist of a short base, supporting two broadly divergent extremities; one slender, directed forward, terminating in a few short setæ; the other stouter, though of about the same length, directed backward, and with a single spine at apex. There are three short setæ on the posterior margin of the base.

The *first pair of feet* are five-jointed excluding the long arcuate spiniform joint in which they terminate. The third joint is much smaller than the second, and about equals the fourth and fifth; the fifth is the shortest; the terminal is one-third longer than the three preceding together.

The *second pair of feet* is as long as the preceding, and consists of five joints. The fourth is much the largest; the fifth is nearly half shorter, and appeared to have at apex two very short claws.

The abdomen terminates in two long slender stylets; each has a stout naked seta at apex, which is a little shorter than the stylet, and also two shorter setæ from the margin near apex, and also another short additional one at apex.

Cypris chilensis, DANA, Proc. Amer. Acad. Sci., ii. 50.

CYPRIS PUBESCENS.

Brevis; latere visa *latissimè fabiformis, subtus recta, extremitatibus latè et æque rotundatis, dorso bene arcuato;* supernè visa *latè ovata, fronte subacuta; ad totam superficiem pubescens. Antennæ anticæ 7-articulatæ, setis vix longioribus quam 5 articuli ultimi simul sumti. Antennæ posticæ crassiusculæ, articulo ultimo fere dimidii penultimi longitudine, setam longam ad apicem gerente, penultimo ad apicem elongatè setigero. Pallidè olivacea.*

Short; in a side view, very broad fabiform, straight below, and extremities broadly and equally rounded, back irregularly arcuate; in an upper view broad ovate and subacute in front; whole surface pubescent. Anterior antennæ seven-jointed, the setæ about as long as last five joints. Posterior antennæ rather stout, the last joint nearly half as long as the preceding and bearing a long seta at apex; apex of preceding joint long setigerous. Colour, pale olive-green.

Plate 90, fig. 8 *a*, side view, enlarged; *b*, upper view; *c*, anterior antenna; *d*, posterior antenna; *e*, first pair of legs.

From fresh-water pools near Sydney, New South Wales. Collected in March, 1840.

The length of the shell is about one-fourth greater than the height, and the breadth and height are nearly equal. The eye is situated about two-fifths the length from the front. The last four joints of the anterior antennæ gradually diminish in size, and each is but slightly longer than broad.

Cypris pubescens, DANA, Proc. Amer. Acad. Sci., ii. 50.

CANDONA (?) VITIENSIS.

Elongatè subfabiformis; latere visa *plus duplo longior quam alta, subtus recta, dorsum arcuata, ante medium paulo altior, extremitate anticâ latius rotundatâ;* supernè visa *subelliptica, ante medium vix latior, anticè subacuta, posticè rotundata, latitudine duplo longior quam lata; totâ superficie pubescens. Antennæ anticæ 7-articulatæ, articulis quinque ultimis inter sese longitudine fere æquis, setis antennâ brevioribus. Antennæ posticæ crassæ, articulo ultimo dimidio breviore quam precedens, setis brevibus, setâ longâ penultimâ unicâ quoque alterâ antepenultimâ simili.*

Oblong subfabiform; in side view, length more than twice the height, below straight, back arcuate, a little highest just anterior to middle, front most broadly rounded; in upper view suboval, slightly broadest across the eye, front subacute, rounded behind, breadth about half the length; whole surface pubescent. Eye situated close to the margin. Anterior antennæ seven-jointed, the last five joints nearly equal, a short spine at apex of antepenult, penult and last with setæ, the setæ about two-thirds as long as the antenna. Posterior antennæ stout, the last joint about half the preceding and bearing short setæ; a long seta to apex of the penult and antepenult joints.

Plate 90, fig. 9 *a*, side view, enlarged; *b*, vertical view; *c*, anterior antenna; *d*, posterior antenna.

From fresh-water pools near Nailoa Bay, on Vanua Lebu, of the Feejèe Group, abundant; also, at Sandal-wood Bay. Collected in July, 1840.

Length, one-fortieth of an inch.

The two lenses of the eyes were distinctly seen; they were spherical and on the same spot of pigment. The apex of the third joint of the posterior antennæ, instead of having a cluster of setæ, is furnished with only a single long seta. We therefore, yet with some hesitation, place the species under Candona.

Cypris vitiensis, DANA, Proc. Amer. Acad. Sci., ii. 50, 1849.

CANDONA? ALBIDA.

Latere visa, *breviter subelliptica, extremitatibus fere æqua, latè rotundata, subtus recta, supra obsoletè gibbosa; triplo longior quam lata non duplo longior quam alta, margine pubescente. Oculus margine superno remotus. Albido-margaritacea, posticè et supernè paulo brunnea.*

Short subelliptic (in profile view), extremities very nearly equal, broadly rounded, margin below straight, very slightly gibbous above, length full three times the breadth, much less than twice the height, margin pubescent. Eye distant from the upper margin. Colour, pearl-white, behind and along the back, a little dark brown.

Plate 90, fig. 10, animal, enlarged.

In small fresh-water pools, to the southwestward of Valparaiso. Collected in May, 1839.

Length, one-twenty-fourth of an inch. This species was seldom seen swimming in the water. It usually was crawling along the stones of the bottom or sides of the pool. Its white colour, by reflected

light, is peculiar. It is more opaque than the following species. The height is about two-thirds the length.

Cypris albida, DANA, Proc. Amer. Acad. Sci., ii. 49.

FAMILY HALOCYPRIDÆ.

SUBFAMILY CYPRIDININÆ.

GENUS CYPRIDINA, *Edwards.*

THIS genus differs from Cypris in the beaked front, and in the fact that the feet corresponding to the first pair in Cypris is here foliaceous, or properly a pair of maxillæ. The ovarian feet are longer and much more flexible, bending like a worm; and they are furnished with setæ about the extremity, the terminal of which are reversed. Besides, the mandibular feet are elongate and fitted for prehension at the extremity; the posterior antennæ end in a pencil of plumose setæ from several short joints, and are subnatatory, while the anterior antennæ are furnished at apex with a few unequal straight setæ, that may be diverged or brought together.

The mandible is a small process on the basal joint of the mandibular feet, and it appeared to have but little strength or firmness. Other characters of the genus will be gathered from the descriptions and figures of the following species.

This genus was established under the name *Cypridina* by Milne Edwards, and imperfectly described by him in a note to l'Hist. des Anim. sans Vertèbres de Lamarck, 2d edit., t. 5, p. 178, and Hist. des Crustacès, par M. Milne Edwards, iii. 409. It appears to include the *Asterope* of Philippi (Archiv für Naturgeschichte, vol. vi. 1840, p. 186, taf. iii.), which is described as differing only in the caudal extremity. Since all our species agree with Philippi's specimens, we infer that there must be an error in Edwards's description. Some new species have recently been added to the genus by Mr. W. Baird, in

the Annals and Magazine of Natural History, 2d Ser., i. 21, and vii. 430; see also, Brit. Entomost., p. 176.

CYPRIDINA LUTEOLA.

Compresso-ovoidea; latere visa, *latè elliptica, anticè breviter rostrata, rostro ultra marginem testæ infero-anticum non saliente, marginibus aliis arcuatis, postico non gibboso;* supernè visa, *angusto-ovata, anticè acuta, posticè rotundata. Digitus pedis mandibularis ad basin crassus, sensim attenuatus. Antennæ anticæ ad apicem 4–5-setigeræ, setis antennâ non longioribus.*

Compressed ovoid; in lateral view nearly oval, broad, front short rostrate, but not projecting beyond anterior margin of shell. The margin elsewhere arcuate throughout, the posterior side not at all gibbous; in an upper view, narrow ovate, acute in front, rounded behind. Finger of mandibular foot quite stout at base and tapering to apex. Setæ at apex of the anterior antennæ not longer than the organ, four or five in number.

Plate 91, fig. 1 *a*, side view of animal, enlarged; *a'*, natural size; *b*, vertical view; *c*, side view of animal, with the shell removed, enlarged (*d*, eye; *e*, anterior antenna; *f*, second pair of antennæ, the extremity thrown back upon the basal portion; *g*, mandibular feet; *h*, buccal mass, showing profile of processes; *i*, first pair of maxillæ; *k*, second pair of maxillæ; *l*, third pair of maxillæ; *m*, ovarian feet; *n*, caudal extremity); *d*, eye; *d'*, lens of the eye; *e*, anterior antenna; *f*, part of plume of posterior antennæ; *g*, part of mandibular foot, with mandibular process at *g'*; *h*, buccal mass and organs, under view (*g*, mandibular feet; *i*, first pair of maxillæ; *k*, second pair of maxillæ; *l*, third pair of maxillæ; *r*, *t*, processes on the anterior part of the buccal mass, seen on figure 1 *c*, forming upper and under prominences of *h*; *s*, fleshy process, the intermediate prominence on *ch*); *i*, first pair of maxillæ, same with *ci* and *hi*; *i'*, same, reversed; *k*, second pair of maxillæ, same with *ck* and *hk*; *l*, third pair of maxillæ, same with *cl* and *hl*; *m*, extremity of ovarian feet; *n*, larger of caudal spines.

Sooloo Sea, harbour of Soung; taken at 8 P. M., February, 1842.

Length, one-twelfth of an inch. Colour, yellowish.

The shell in a side view appears very slightly flattened behind, and the outline of the beak does not project beyond the general outline of the front. This beak is short and quite narrow in profile. The length of the shell is not one and a half times its breadth.

The *eyes* consist of spherical lenses upon a mass of dark pigment. A distinct cornea was seen, extending over the whole, and having a simple undivided surface; and also within the cornea one of the humours, as shown in fig. 1 *d*. One of the lenses was seen to have an equatorial line, which had the appearance shown in figure *d'*, as if minute oval and rounded pieces had been chipped out. It extended over the outer side of the lens, as seen in the right lens on figure *d*.

The appendages consist, as represented in figure *c*, of two pairs of antennæ, one of mandibular feet, three of maxillæ, one ovarian pair of legs, besides the caudal extremity.

The *first pair of antennæ* (*ce* and *e*) has seven joints, the last two minute, and the third and fifth shorter than the others. These organs are geniculated between the first and second joints, which are nearly equal in length; in *ce*, there is only an end view of the basal joint. There are one or two short setæ at the apex of the second and fourth joints; at apex of fifth, two plumose setæ nearly as long as last four joints of organ; at apex of sixth and seventh, four longer naked setæ, which spread widely at the will of the animal; they are hardly as long as the last six joints of the organ.

The *second pair of antennæ* (*cf*) has a very large subtriangular base. The longer branch (the only one observed) consists of an oblong cylindrical joint, and seven short joints, the latter together about equalling the preceding one. Each of the short joints is furnished with a long plumose seta, longer than the branch. These setæ are delicately articulate, as shown in fig. *f*.

The *mandibular feet* (*cg*, *g*, *hg*) are geniculate at the second articulation. The first joint bears on one side a thin and flexible short-ciliate process, which is the true mandibular process, although so weak and small. The second joint is stout and oblong, and bears a few naked setæ, besides a longer which is setulose in tufts. The third is short. The fourth (or finger) is long, and tapering from a stout base; it is furnished on its sides with several setæ, some half as long as the joint. The claw at the extremity is small.

The *buccal mass* (*ch*, *h*) in a ventral view has large obtuse promi-

nent processes (*ht*) at either anterior angle, and another (*hr*) centrally in front; also two just posterior to the front central process on the under surface (*hs*) which are soft fleshy.

The *first pair of maxillæ* (*i, ci, hi*) are stout oblong appendages, having a short thick base, with an oblong one-jointed extremity. The base appears to have two articulations across its upper extremity, and the inner side; there are three lobes on this side which bear clusters of stout setæ. The extremity of the maxilla is obtuse, and there is a tuft of stout setulose setæ at apex, besides three on the outer margin below.

The *second pair of maxillæ* (*k, ck, hk*) are thick and stout organs, with a broad truncate summit, and a very small joint at one apex, which bears two small one-jointed processes. The extremity and edge are tufted with stout setulose setæ, and the lower side bears a very broad and oblong lamina, which is elegantly fringed with long plumose setæ. A side view is shown in figures *k* and *ck*, and a ventral view in *hk*.

The *third pair of maxillæ* (*l*) in a ventral view is seen between the preceding pair, as shown in figure *h*, at *l*. In figure *c*, a side view, it is seen to project below the second pair of maxillæ. The organ consists of an oblong subrectangular base, and a broad joint proceeding from its side. There are several setulose setæ at the apex of the base, and others at the apex of the second joint. Both joints have the apex very broad, and that of the base is somewhat lobed. The setæ are setulose, those of the base tufted setulose.

The *feet*, or next pair of appendages, are very long and slender vermiform. About the extremity there are several setæ, which are articulated through their apical half, and furnished at the articulations with minute and very short reversed setules. The apical of these setæ are longest and reversed. At the apex of the organ there is a minute spirally incurved spine.

The *abdomen* (*cn*) is two-jointed; the basal segment very short. The extremity is very oblique, and furnished with two sets of corneous setæ, eight or ten in each.

CYPRIDINA PUNCTATA.

Compresso-ovoidea, punctata; latere visa, *latè elliptica, posticè gibbosa, infra supraque æquè arcuata, anticè breviter rostrata, fronte promi-*

nulâ, ultra testam infero-anticam saliente, rostro acuminato; supernè visa *angusto-elliptica, extremitatibus rotundatis. Spinulæ caudales decem.*

Compressed ovoid, punctate; in side view broad oval, upper and under margins strongly and equally arcuate, behind gibbous, anteriorly short rostrate, the front a little prominent beyond the front margin of shell below, the beak narrow, acuminate; in upper view narrow oval, extremities rounded. Caudal spinules ten in number.

Plate 91, fig. 2 *a*, lateral view of animal, enlarged; *b*, upper view.

Sooloo Sea, harbour of Soung, along with the preceding.

Colour, faint yellowish. The shell has a punctate appearance arising from the surface being uneven and having clear spots scattered over it. The dorsal and under sides, in a side view, are very strongly and evenly arcuate. Behind there is a rounded gibbosity, abrupt on its upper side. The front is more prominent in this species than the shell below the beak.

The length, in a side view, is less than one and a half times the breadth; in a vertical view, it is more than twice the breadth.

CYPRIDINA OLIVACEA.

Subovoidea; latere visa, *oblongo-subelliptica, dorso parcè arcuata, posticè truncata et sparsim ciliata, anticè rostrata, rostro ad apicem rectangulato, fronte ultra testam infero-anticam paulo saliente;* supernè visa, *elongatè ovata, anticè obtusa, posticè subtruncata. Antennæ anticæ setis corpore longioribus ad apicem instructæ. Spinulæ caudales octo.*

Subovoid; in side view, oblong elliptic, the back but little arcuate, the posterior margin truncate and sparsely ciliate, front rostrate, the beak rectangular at apex, projecting a little beyond front margin of shell below; in upper view, long ovate, obtuse in front, subtruncate behind. Anterior antennæ having two long setæ at apex, longer than the body. Caudal spinules eight, four in each series.

Plate 91, fig. 3 *a*, side view of animal, enlarged; *a'*, same, natural size; *b*, upper view.

Sooloo Sea, in the harbour of Soung, with the preceding.

Length, one-tenth of an inch. Colour, clouded with deep bluish green.

The hinder margin is straight with rounded angles, and the beak, instead of being slender acute, is rectangular at apex in profile. The outline of the back is much less arcuate than that of the venter. The very long setæ of the anterior antennæ are characteristic.

The length of the body in a side view is nearly twice the breadth; and in a vertical view, a little more than twice the breadth.

CYPRIDINA GIBBOSA.

Latere visa, *angusto-subovata, infra supraque arcuata, posticè valde gibbosa, anticè breviter rostrata, rostro acuto, fronte ultra testam infero-anticam paulo saliens. Antennæ anticæ tribus setis longis aliisque brevioribus apice instructæ, setis antennâ paulo brevioribus. Spinulæ caudales sexdecim.*

In side view, narrow, irregular ovate, arcuate above and below, lower half of posterior part large gibbose, anterior extremity short rostrate, beak small and acute, the front above somewhat prominent or more in advance than the part of the shell below the beak. Anterior antennæ with three long setæ at apex and others shorter, the setæ not quite as long as the antenna. Caudal spines sixteen (eight on each side).

Plate 91, fig. 4 *a*, side view of animal, enlarged; *b*, anterior antenna; *c*, posterior antenna; *d*, mandibular feet; *e*, abdomen.

In the Pacific, latitude 15° 20′ south, longitude 148° west. Collected, September 10, 1839.

Length, one-twentieth of an inch. Nearly colourless, but *brightly phosphorescent*. Contents of the stomach, reddish.

The length in a side view is very nearly twice the height. The gibbosity behind is much larger and more prominent than in the *punctata*. The eyes have a quivering motion. The eggs occupied all the space over and posterior to the abdomen, behind the eyes.

CYPRIDINA FORMOSA.

Compresso-ovoidea; latere visa, *breviter elliptica, infra supraque valde arcuata, fronte rostrato, rostro subacuto, ultra marginem testæ infero-anticam vix saliente, margine postico interrupto, non gibboso;* supernè visa, *angusto-elliptica, extremitatibus obtusis. Antennæ anticæ elongatè setigeræ, setis antennâ parce longioribus. Pedes mandibulares articulis 3tio 4toque tenuibus. Spinulæ caudales decem.*

Compressed-ovoid; in side view short oval, above and below strongly arcuate, behind with an interruption in the margin but not gibbous, in front rostrate, beak acute, front scarcely prominent beyond the margin of the shell below; in upper view, narrow oval, obtuse at the extremities. Anterior antennæ long setigerous, setæ a little longer than the antenna. Mandibular foot with the third and fourth joints slender. Caudal spines about ten.

Plate 91, fig. 5 *a*, lateral view of animal, enlarged; *a'*, natural size; *b*, dorsal view; *c*, lateral view, with valve of shell removed, showing members; *d*, first pair of antennæ; *e*, second pair of antennæ; *f*, mandibular foot, with mandibular process at *d'*; *g*, ciliated plate from second pair of maxillæ; *h*, third pair of maxillæ.

Collected off Upolu, one of the Samoan Islands, 9 P. M., February 26, 1841.

Length, one-tenth of an inch. Colour, purplish, with scattered dots of deep purple.

The front over the beak scarcely projects beyond the outline of the shell below the beak. The interruption in the margin behind is very narrow, and abrupt upward. The length in a side view hardly one-fourth greater than height; greatest height just posterior to middle. In vertical view, length about three times greatest breadth. The

eyes contain each twenty to twenty-five facets. The flagellum of the second pair of antennæ consists of seven short joints. The mandibular process is a thin horny prominence, ciliated or pubescent at the margin. The third pair of maxillæ consists of two joints, the second is transverse subovate and margined with hairs. The ovarian feet are nearly as in the *luteola*. They are very flexible and worm-like in their twisting motions. Found, by dissection, an ovary containing eggs; but there were no external eggs beneath the shell.

This is a beautiful species.

Subfamily HALOCYPRINÆ.

The two genera in this subfamily have, in most points, a similar structure.

They differ widely from the preceding in the antennæ and mandibles, and the posterior feet. Moreover the eyes are not compound: these organs were not very distinctly made out, but in one species were believed to be distinguished as two simple eyes near the medial line, just posterior to the base of the tentacles. The fleshy exsertile spiculum between the anterior antennæ is also peculiar to the genus. Moreover, the shell has an opening in front, through which the antennæ may be exserted without opening the valves of the shell.

The *anterior antennæ* in the species seen consist of three joints, the third of which is shortest, and bears at apex several long setæ, one or more of which are curved.

The exsertile spiculum is in one genus dart-like at the extremity, and in the other obtuse acicular. It proceeds from between the bases of the antennæ, and is exserted at the will of the animal.

The *second pair of antennæ* resemble those of the Cypridinæ. They have a very large basal joint, muscular within, bearing at the extremity two branches: one short and one- or two-jointed, the other consisting of an oblong basal joint and five (or seven?) very short joints furnished with long plumose setæ.

The *mandibular feet* are five-jointed; the first and second are rather long, and at right angles with one another; the other three are much shorter, with several setæ at apex, which are unilaterally setulose; these last are abruptly inflexed in one of the genera (Conchœcia), while the organ is nearly straight in the other (Halocypris). At the

apex of the first joint, and often also at the adjoining base of the second, there is a corneous prominence with a broad denticulate apex, which is mandibular.

The first pair of maxillæ consist of a stout base, much prolonged laterally and terminating in several spines; this part bears from the basal portion a three-jointed extremity in the genus Halocypris, if not also in Conchœcia; the second joint of which is broad and stout, and both this and the third are furnished with several setæ.

The *second pair of maxillæ* (or *the maxillipeds*), as observed in a species of Halocypris, have a basal joint, like the first pair both in form and in its spinigerous extremity. To the basal part of this base, there is attached a small lamina, which is edged with long setæ, and also a slender oblong three-jointed extremity, which bears at apex one or two very long bent or curved setæ. This appendage extends backward like the following pairs of legs, instead of forward and inward like the corresponding part of the first pair of maxillæ.

The two pairs of feet are slender, the anterior much the longer; one or both have a lamina at base edged with setæ, and also several setæ at apex.

The caudal extremity is very much like this part in the Cypridinæ.

Genus CONCHŒCIA, *Dana.*

Testa oblonga. Pedes mandibulares articulis tribus ultimis inflexi, 2do multum oblongo.

Oblong in form. Mandibular feet having the last three joints inflexed, the second straight and much elongate.

The species referred to this genus have a short projecting beak, and an oblong body, subrectangular in outline, though rounded at the lower anterior angle. The opening in the shell in front, through which the antennæ and spiculum are protruded, is quite large. The anterior antennæ are long and slender, and consist of three joints; the first half the whole organ in length, the last short. The setæ are straight, except towards apex, where they are curved. One is quite stout and denticulate on the inner side; two are very slender, and one of the two a little shorter; a third is flexed from its base directly backward parallel with the base of the antenna.

Conchœcia agilis.

Supernè visa, *elongatè ovata, anticè rotundata, posticè fere acuta;* latere visa, *oblonga, subrectangulata, antice paulo altior, fronte instar rostri producta, postice recte truncata, et angulo superno acutè rectangulato. Spiculum saggitto-capitatum. Pes mandibularis articulo 2do valde oblongo, recto, articulis sequentibus sensim attenuatis.*

In an upper view, long ovate, rounded in front, acute behind; in a side view oblong rectangular, a little higher anteriorly, front prolonged forward beak-like, straight truncate behind, with the upper angle sharp rectangular. Spiculum sagitto-capitate. Mandibular feet five-jointed, second joint straight and oblong, the following gradually more slender.

Plate 91, fig. 6 *a*, under view of animal, enlarged; *b*, side view; *c*, ventral view, the shell open; *d*, the anterior antennæ, with *d'* the spiculum between them; *e*, mandibular feet.

In the Atlantic, latitude 4° north to 0°, longitude 20° 10′ to 17° 30′ west; latitude 0° to 6° south, longitude 17° 30′ to 24° west; collected, October 25, 26, 27, 29, and November 2, 3, 5, 8, 1838. Abundant.

Length, one-twentieth of an inch. Colour, a little greenish.

The anterior antennæ when fully exserted, have the tips of the setæ extending forward to a distance greater than one-third the whole length of the body; but the apical joint scarcely projects beyond the shell. The bases of these organs are situated together on a fleshy mass, about one-third the length of the animal from the front margin. The terminal setæ are four in number, as described in our remarks on the genus.

The spiculum is very slender, but has an enlarged sagittate extremity, with a subacute apex. Along the centre a longitudinal line was distinguished, which appeared to indicate that it was tubular. It resembles in position, and possibly in function, an analogous organ in the *Argulus.**

* See Memoir on the *Argulus Catostomi*, by the author in conjunction with E. C. Herrick, American Journal of Science and Arts, xxxi. 297, 1837.

The second pair of antennæ have the five short terminal joints together a little shorter than the preceding one; and whole length of the five and the one preceding not one-fifth the length of the animal. The large basal joint is longer than half the shell. The setæ at apex are about two-fifths the length of the animal.

These two pairs of antennæ and the spiculum, are usually protruded through the front opening, as in fig. 6 *a*, and the posterior antennæ are the organs employed in the exceedingly rapid motions of the animal.

The mandibular feet are five-jointed, and the three terminal joints are usually bent inward and backward, so that the organs lie like the exterior maxillipeds of a Decapodous Crustacean. The second joint is little more than half as long as base of second pair of antennæ. The first joint is placed transversely, and the adjoining parts of the two on the inner side are prominent and corneous (brownish, or brownish-red), so as to act together like a single mandible.

First pair of maxillæ lie obliquely just behind the base of the mandibular feet, and have short setæ at apex. The whole of this organ was not distinctly seen.

A second pair of maxillæ (or maxillipeds), has a large lamellar plate ciliated with setæ, attached to the base, and also a slender appendage three-jointed, having a long seta at apex, which projects backward.

CONCHŒCIA ROSTRATA.

Agili *similis; pedes mandibulares sensim non attenuati, articulis duobus apicalibus fere æquis, vix oblongis, setis longis; pedes penultimi duplo longiores quam ultimi, et elongatè setigeri.*

Near *C. agilis;* mandibular feet not becoming smaller to apex, the last two joints nearly equal in diameter, scarcely oblong, setæ long; penult feet twice as long as the next following, having three long setæ at apex.

Plate 91, fig. 7 *a*, posterior antennæ; *b*, mandibular feet; *c*, maxilla of first pair; *d*, second pair of maxillæ; *e*, first pair of legs; *f*, second pair of legs.

In the Pacific, north of the Equator, near Hall's Island, one of the Kingsmill Group.

This species closely resembles the preceding, and may be the same. Yet the form of the mandibular feet and also of the posterior legs, differs so much from the drawings of the Atlantic species, that I have made them separate. The form of the shell is the same, and so also the form of the spiculum and the anterior antennæ. The setæ of the mandibular feet were unilaterally setulose, and this is probably a common character. The relation of the organs *d*, *e*, *f*, in the drawing, was fully ascertained, the last-mentioned being the posterior. A third pair of feet still posterior to these was not observed. *d* represents a part of the second pair of maxillæ.

Genus HALOCYPRIS, *Dana*.

Corpus curtum. Pedes mandibulares fere recti et non inflexi, articulo 2do parce oblongo.

Form short. Mandibular feet not inflexed and folded upon itself, but straight nearly, second joint sparingly oblong.

The second joint of the mandibular feet, instead of being straight, is much bent, its basal part being parallel for a short distance with the preceding joint, and the apical half nearly at right angles with it. The third joint is not longer than the second; and this and the following part remain straight. The contrast between the form in this genus and Conchœcia will be observed in the figures to be great and important. The spiculum in this genus as far as observed is terete, instead of sagitto-capitate. Moreover, the anterior antennæ are shorter, the setæ somewhat bent, and the incrassate one was not denticulated towards the extremity.

Halocypris inflata.

Supernè visa, *brevissimè ovata, fronte rotundata, posticè subacuta;* latere visa, *subrotundata, dorso fere recta, literæ* D *formâ similis, angulis*

rotundatis, fronte obsolete prominulo. Antennæ anticæ 3-articulatæ, setis longis, unâ subclavatâ, nudâ. Antennæ posticæ 7-articulatæ, articulo secundo plus duplo longiore quam 5 ultimi simul sumti. Pedes mandibulares 5-articulati, articulo secundo brevi, non longiore quam tertius, basi elongate producto, primo ad apicem pariter producto, his processibus duobus denticulatis instar mandibulæ.

In upper view, very short ovate, rounded in front, subacute behind; in side view, subrotund; nearly straight along the back, like the letter D in shape, with the angles rounded, the front not at all or very slightly prominent. Spiculum cylindrical. Anterior antennæ three-jointed, setæ long, one subclavate and naked. Posterior antennæ seven-jointed, second joint more than twice longer than five last together. Mandibular feet five-jointed, second joint short, not longer than third, base laterally very much prolonged, and apex of first joint alike prolonged, the two processes together acting as a mandible.

Plate 91, fig. 8 *a*, dorsal view of animal, enlarged; *b*, side view; *c*, ventral view, shell wide open (*d*, anterior antennæ, with the spiculum between; *e*, posterior antennæ; *f*, mandibular feet; *g*, maxilla of first pair; *h*, second pair or maxillipeds; *i*, *k*, feet of two pairs; *m*, muscle for closing shell); *d*, anterior antenna, with spiculum; *e*, posterior antenna; *f*, mandibular feet; *g*, *h*, maxillæ of two pairs; *i*, *k*, legs of two pairs.

In the Atlantic, latitude 1° south, longitude 18° west, November 5, 1838; also, latitude 11° south, longitude 12° west, May, 1842, at which time the dissections were made.

Length, one fifteenth of an inch. Nearly colourless, or a slight shade of dirty yellow, with a tinge of green. Less diaphanous than the *Conchœcia agilis*. Swims with rapidity.

This species resembles the following, but has not the front projecting, or but obsoletely so, and in an upper view the front is rounded.

The spiculum has an obtuse apex. The anterior antennæ have one seta much longer than the four others, and curved, and it is incrassate towards apex. The organ tapers a little, and is stouter than in the *Conchœcia agilis*. The second joint of the posterior antennæ is longer

in proportion to the following five, than in the *brevirostris*. The mandibular feet are nearly straight instead of being inflexed. The first pair of maxillæ have four joints, the basal laterally elongate and setigerous, the third very broad, the fourth small, with setæ. The second pair have a similar base to the first pair; besides, they have a rounded lamina at base, ciliated with long setæ, and also a slender three-jointed appendage (a termination), the first joint of which is long, and the others short, the apical much the shortest, and it terminates in two long but unequal bent setæ.

The two pairs of feet posterior to these organs are unequal in length; the anterior one-half longest, five-jointed, at base ciliated with long setæ, which act maxilla-like; the joints following the base oblong, and mostly naked, excepting the last, which is very short and bears a few setæ not a fourth as long as the leg. The posterior pair of feet have a few setæ at apex still shorter, and some also at base.

HALOCYPRIS BREVIROSTRIS.

Supernè visa *brevissimè elliptica, antice posticeque subacuta;* latere visa, *literæ* D *formâ similis, dorso fere recta, postice rotundata, fronte prominula et truncata. Antennæ anticæ setis inæquis, longiore curvatâ, prope apicem incrassatâ. Spiculum capite cylindricum. Antennæ posticæ 7-articulatæ, articulo secundo non duplo longiore quam sequentes simul sumti.*

In upper view, very short oval, extremities subacute; in side view, like the letter D in shape, nearly straight along the back, rounded behind, front a little prominent and truncate, setæ of anterior antennæ unequal, the longer curved and incrassate towards apex. Spiculum with a long nearly cylindrical head. Posterior antennæ seven-jointed, second joint not twice longer than the following five together.

Plate 91, fig. 9 *a*, dorsal view of animal, enlarged; *b*, side view; *c*, part of second pair of antennæ.

In the Atlantic, latitude 23° south, longitude 41° 10′ west. Caught one individual, November 19, 1838.

Length, one-sixteenth of an inch. Body within the shell, white. The shell is marked with minute parallel ridges, seen only with a high lens.

The setæ of the second pair of antennæ were a little bluish, and nearly half as long as the shell. In profile, the upper part of the front margin, for about one-fourth of the height, projects a little beyond the outline below.

Anterior to the mouth there appeared to be a pair of simple eyes, the two rather distant.

LEGION II. PHYLLOPODA.

THE larger subdivisions or tribes in this section are mentioned and described on a preceding page. As no specimens were collected by us, we mention merely the known genera and their characteristics.

TRIBUS I. ARTEMIOIDEA.

FAM. I. ARTEMIADÆ.*

Cephalothorax multiannulatus usque ad caput, testâ nusquam tectus. Pedes numerosi, foliacei.

* *Branchipoda*, Leach; *Branchipiens*, Edw.; *Branchipidæ*, Burmeister, on Trilobites; *Branchipusidæ*, Baird, Trans. Berw. Nat. Club, 1845; *Branchipodidæ*, Baird, Brit. Entomost., 38. As the generic name Branchipus is not retained, it cannot properly be used for deriving the name of the family. The name Branchipus, moreover, is not more applicable to the species than it is to those of Limnadia or Apus, and there is not therefore any special reason for using it. We therefore derive the names of the tribe and family from another word. We take Artemia rather than Chirocephalus as the origin of these names, partly because it is shorter, but primarily because the peculiar head apparatus of Chirocephalus, to which the name alludes, is not a necessary distinction of the tribe or family, although characterizing the subfamily so-called. In the rejection of this generic name, we follow Dr. Baird (Brit. Entomost., 40), who shows that Schœffer's Branchipus was probably of another genus.

SUBFAM. 1. CHIROCEPHALINÆ.—Corpus gracile. Abdomen longum et multiarticulatum. Antennæ 2dæ breves sed percrassæ, *maris* prehensiles.

G. 1. CHIROCEPHALUS, *Prevost.**—Abdomen 9-articulatum, appendicibus duabus oblongis confectum. Antennæ 1mæ tenues; 2dæ *maris* varie appendiculatæ. Pedes foliacei viginti duo.

G. 2. ARTEMIA, *Leach.*†—Abdomen 6-articulatum, extremitate breviter bilobatæ. Pedes foliacei viginti duo. Antennæ 2dæ *maris* non appendiculatæ.

SUBFAM. 2. EULIMENINÆ.—Abdomen fere obsoletum. Antennæ quatuor fere filiformes.

G. 1. EULIMENE, *Latr.*—Pedes foliacei viginti duo.

FAM. II. NEBALIADÆ.‡

Cephalothorax testâ fere bivalvi bene tectus. Abdomen non inflexum, pauci-annulatum. Pedes plures posteriores biremes, ac in *Cyclopoideis*, reliqui anteriores foliacei, branchiales.

G. NEBALIA, *Leach.*—Antennæ quatuor. Pedes sexdecim anteriores foliacei instar branchiarum, octo posteriores biremes. Abdomen lamellis duabus confectum.

TRIBUS II. APODOIDEA.

FAM. I. APODIDÆ.§

Oculi duo compositi. Appendices duæ caudales longæ, rigidè setiformes.

G. 1. APUS, *Schœffer.*—Pedes duo antici teretes, ramosi, ramis multiarticulatis, reliqui foliacei branchiales, quoad pares numero sexaginta. Antennæ duæ breves, simplices.

* Prevost, Jour. de Phys., lvii. 37, 1803; *Ino*, Schrank, Faun. Boic., iii. 249, 1803; *Branchipus?* Schœffer, Elementa Entom.

† Leach, Dict. Sc. Nat., xiv.; *Artemisus*, Lamk., Hist. An. s. Vert. [2nd Edit.], v. 199; *Artemis*, Thompson, Zool. Res., 104.

‡ *Apusiens* (in part), Edwards, Crust., iii. 353; *Nebaliadæ*, Baird, Brit. Ent., 31.

§ Baird, Brit. Ent. 18; *Apusiens* (in part) Edwards, Crust. iii. 353.

Tribus III. LIMNADIOIDEA.

Fam. I. LIMNADIDÆ.*

G. 1. Limnadia, *Ad. Brongniart.*—Caput vix rostriforme, dorso tuberculum pyriforme gerens. Pedes toti foliacei. Abdomen extremitate appendicibus acuminatis quatuor armatum.

G. 2. Cyzicus, *Audouin.*†—Caput instar rostri productum, dorso non tuberculiferum. Pedum pares numero fermè 21, foliacei. Abdomen fere ac in *Limnadiâ.*

G. 3. Limnetis, *Loven.*‡—Antennæ internæ 2-articulatæ. Cauda brevis, truncata, appendicibus facie inferiore destituta. Pedum pares 12.

We add a few words on the above groups. The Artemioidea are closely related to the Mysidea; and if we look at this relation, we shall appreciate the propriety of uniting together in one group all the genera which we have so assembled. This relation is apparent in the general form of the body, the extended abdomen, and the caudal appendages. These appendages are simply two lamellæ, and the abdomen has the normal form, although abnormal in its number of articulations, while in Limnadia, Apus, and the allied, the abdomen is of a very different character. The carapax of Nebalia is much like the same in the Mysidæ and Erichthidæ, while the divided cephalothorax of Chirocephalus without a carapax, is but a step removed from other Mysidea. The Cyclopoidea, which of all Entomostraca are nearest to the Mysidea, have no free carapax, but instead an annulated cephalothorax analogous to that of Artemia and Chirocephalus, although with fewer segments.

Again, the relation of both Nebalia and Chirocephalus to the Mysidea is seen in the presence of pedunculated eyes, which is a remnant of the Podophthalmia structure in this lower order of Crustacea.

* *Apusiens* (in part), of Edwards, Crust., iii. 353.

† Audouin, Ann. de la Soc. Entomologique, vi. 1837, and Bulletin, Feb., 1837; *Estheria*, Rüppel, Mus. Senkenbergianum, ii. 119, 1837; *Isaura*, Joly, Ann. des Sci. Nat. [2], xvii. 293, 1842.

‡ Köngl. Vet. Akad. Handl., for the year 1845, Stockholm, 1847, 427. *Hedessa* of Liévin (see Branchiop. der Danziger Gegend. Ein Beitrag. zur Fauna der Provinz Preussen, 4to with eleven plates, Danzig, 1848, and Arch. f. Nat. 1849, 327), is very near *Limnetis.*

This is a peculiarity found in no other Entomostraca. It appears, therefore, that Nebalia is properly associated with Chirocephalus in a common tribe, and the two represent separate families in that tribe. Of the other Phyllopods, Limnadia is built on the Cypris type in its abdomen and other parts, and is far remote from Nebalia; and Apus on the Limulus type in many points of its structure, although different in its mouth. These, therefore, cannot with propriety be associated with Nebalia in a common group.

Dr. Baird, in his British Entomostraca, makes the higher subdivisions of the Phyllopoda, *family* divisions. The distinctions among them, as we have shown, are as great, at least, as those of the Cypris, Daphnia, and Cyclops groups in the Lophyropoda.

The homologies of the Limnadiæ may be elucidated by a comparison of the structure with that of Cypris. In Limnadia, and also Limnetis, an allied genus, the eighth and ninth pairs of legs have a slender appendage, which extends upward into the ovarian cavity over the back of the animal beneath the shell. In Cypris and Cypridina, the posterior pair of legs is adapted to the same function, and in the latter genus the organ is flexible, as in Limnadia.

Now, in both Cypris and Limnadia, there are a pair of mandibles and one of maxillæ, which of course correspond in the two genera. In Cypris, there are then three pairs of organs following, the last of which has the ovarian use alluded to. In Limnadia, pairs of foliaceous legs follow the maxillæ, the eighth and ninth of which have the ovarian appendage. If now each pair of legs in Cypris corresponds to *three* pairs in Limnadia, as suggested on page 41, the ovarian legs will have normally the same relation in both. The corresponding parts will be as follows :—

	I.	II.	III.	IV.	V.
Cypris,	mand.	max.	max.	1 pair feet.	ovarian feet.
Limnadia,	mand.	max.	3 pairs feet.	3 pairs feet.	3 pairs (2 ovarian).

It is altogether probable that this is the true relation of the parts. In this case, in Limnadiæ having eighteen or twenty-one pairs of feet, there will be three or four additional normal pairs of feet represented, beyond the Cypris number of appendages, making the number found in the Cyclopidæ; and when, as in Limnetis, there are but twelve pairs, three of which are posterior to the ovarian pairs, there is but a single pair represented additional to the Cypris number.

SUBORDER II.

CORMOSTOMATA.

THERE are two widely different types of structure among the suctorial Crustacea.

In one type, characterizing by far the larger part of the species, the general arrangement of the organs is identical with that in the Cyclopoidea, the only essential variation from that group being found in the mouth. There are species like the subcylindrical Cyclops, and others depressed, like the Sapphirinæ. The succession of parts, the natatory thoracic legs both as to form and number, and the particular structure of the abdomen, are represented exactly among the species; and a change in the mouth to the ordinary sessile form would bring the species strictly within the limits of the Cyclops section of Lophyropods. Only the lower divisions, in which the members are partly obsolete, would stand apart; and thus separated would still form a closely related group.

The second type—exemplified in Nymphon and Pycnogonum,—presents an Arachnoid form, and most nearly approaches in general outline the genus Cyamus among the Isopods. The abdomen is obsolete; the body short and annulate throughout without a carapax; the legs long and spreading, spider-like, and the only appendages to the thorax.

The species of the first type constitute the section PŒCILOPODA, those of the second, the section ARACHNOPODA.

The most important and fundamental point of distinction between the Pœcilopoda and the preceding group, next to the trunk form of the mouth, consists in the fact that throughout the characteristic species of Pœcilopods, the second maxillæ (or the maxillipeds) of the

Cyclopoidea are properly a pair of legs. The mouth has thus one pair less of appendages, including only a pair of mandibles and a pair of maxillæ; even the maxillæ are sometimes obsolete, and where present are often true maxillipeds.

I. PŒCILOPODA.

THE Pœcilopoda are intimately related to the Cyclopoidea. They diverge more and more widely from that group as the species descend in rank, and the lowest of them bear but a faint trace of the typical form or structure.

In *one* section, that most closely Cyclopoid, the eight natatory legs have the ordinary form, and the body is usually subcylindrical or subterete, without a proper carapax; moreover, the female carries the embryos externally in sacs or bags, as in Cyclops or Corycæus. These are the ERGASILOIDEA.

In a *second* section, the eight natatory legs are equally present, though often changed in part to apron-like appendages, the body is depressed and has commonly a large peltate carapax, and the female carries the embryos externally in two long tubes, containing the ova in a single series,—a mode of structure not found in the Cyclopoidea. Rarely, as in Argulus, there are no external tubes, the ova becoming free directly from the oviduct; but the structure of such species is still essentially the same, as in the Caligi. These are the CALIGOIDEA.

The variations in form among the natatory legs in the Caligoidea are very great, and these modifications, as we pass to lower forms, end in the obsolescence of these legs; and while the posterior part of the body thus loses its members, the anterior part often fails in the first pair of antennæ. Such are the LERNÆOIDEA. The body may be thick and short, or long and worm-like. The appendages are at times all obsolete, excepting one or two short jointless processes attached to the head or anterior part of the body. The eggs in the Lernæoidea are carried externally, sometimes in bags or sacs, as in the Ergasiloidea, and sometimes in slender tubes, as in the Caligoidea.

The Pœcilopoda thus form a continuous line downward from the higher Cyclopoidea. The line comes more especially through the Corycæidæ, and for the reason that these are the Cyclopoid species in which the posterior antennæ are prehensile. There are a few of the sucking Ergasiloidea, in which these antennæ are without a prehensile character. But in Ergasilus, the form is quite like that of Corycæus and Sapphirina; and in nearly all the lower groups, the prehensile structure is well developed, although under varied forms. These organs are clinging organs throughout the greater part of this section of suctorial Crustacea, and the principal organs of this character in a large number of species.

The three tribes of Pœcilopoda are hence characterized as follows:

I. ERGASILOIDEA.*—Cephalothorax annulatus, carapace non tectus. Truncus buccalis non mobilis, brevis, mandibulis interdum obsoletis (?). Pedes 8 postici bene natatorii ac in *Cyclopoideis*. Ova externa in sacculos gesta. Corpus sæpius non depressum.

II. CALIGOIDEA.†—Cephalothorax sive annulatus sive carapace tectus. Truncus buccalis mobilis, mandibulis armatus. Pedes 8 postici plus minusve natatorii, sæpe partim in laminis coaliti. Ova externa in tubos duos longos uniseriatim gesta, tubis raro obsoletis. Corpus sæpius valde depressum et peltatum.

III. LERNÆOIDEA.‡—Cephalothorax vix annulatus. Corpus sive breve et obesum sive elongatè vermiforme. Pedes natatorii obsoleti. Ova externa sive in sacculos aggregata sive tubos uniseriata.

* *Ergasiliens*, Edw., Crust., iii. 476.

† Includes the "*Peltocephales*" of Edwards, and his "*Dichelestiens.*"

‡ *Lernéides*, Edw., Crust., iii. 488; *Lernæoda* and *Penellina* united of Burmeister, Acta Ac. Cæs. Leop., xvii. 270.; *Lerneadæ*, Baird, Brit. Entomost., 307.

Tribe I. ERGASILOIDEA.

The Ergasiloidea may contain different families corresponding to the families among the Cyclopoidea. At present we recognise only three. One, Monstrillidæ, representing very closely the Setellæ and Antaridæ in the general form of the body, the abdomen and its appendages, although different in having no posterior antennæ. A second, Ergasilidæ, having the form of the Corycæidæ, together with their prehensile posterior antennæ. A third, the Nicothoidæ, most nearly related to the Harpactici. The large lateral appendages in Nicothoe are independent of its type of structure, and can hardly be more than a *subfamily* characteristic, separating them from other species that are destitute of these appendages.

The characteristics of these families and of the genera they comprise, are as follows :—

Fam. I. MONSTRILLIDÆ.

Corpus elongatum fere cylindricum. Abdomen 5–6-articulatum, segmentis 1mo et 2do appendicibus setosis munitis ac in *Setellâ*. Maxillæ, antennæ posticæ et pedes antici obsoleti, pedes octo maxime biremes.

G. Monstrilla, *Dana*.

Fam. II. ERGASILIDÆ.

Corpus breviusculum, cephalothorace crasso, abdomine stylis caudalibus minutis setigeris confecto. Antennæ posticæ subprehensiles ac in *Corycæo*, pedes octo postici bene biremes.

G. Ergasilus, *Nordmann*.

Fam. III. NICOTHOIDÆ.

Ergasilidis affinis. Antennæ posticæ perbreves vel rudimentariæ. [Corpus lobis tumidis prodigiosis lateraliter productum.]

G. Nicothoe, *Aud. et Edw.*

The genus *Bomolocus*, Nordmann, is of doubtful place. The general form is like that of Ergasilus, but only two antennæ are mentioned, and these are peculiar in having a spinous basal portion for attachment and a pauci-articulate flagellum.

The homologies of the Ergasiloidea will be inferred at once from a comparison of the animals with the series of parts in the Cyclopoidea (Cyclops or Corycæus).* The four pairs of natatories are in both groups appendages to the *eighth*, *ninth*, *tenth*, and *eleventh* normal segments. In Nicothoe, the three pairs of appendages preceding, are homologues of the maxillæ, maxillipeds, and first pair of legs (fifth, sixth, and seventh normal segments); while the buccal trunk includes or corresponds to the mandibles and lips (fourth normal segment). In Ergasilus, there are two pairs of antennæ, as in Corycæus, which completes the animal anteriorly, these corresponding to the second and third normal rings of other Crustacea. The second pair of antennæ are considered maxillipeds by Milne Edwards.

Van Beneden, in a recent paper on Nicothoe,† in which the embryology is quite fully illustrated, observes, that the species appears from its course of development to belong to a different type from Ergasilus. This genus and Caligus he refers to the same type with Cyclops, and considers Nicothoe as pertaining to another category.

* The appendagas in Corycæus and the allied genus Sapphirina are given in order on Plate 92, figures 1 *a*, *b*, *c*, etc., pertaining to *Sapphirina*, and 1 *a'*, *b'*, etc., to *Corycæus*.

† Mem. Acad. Roy., Belg., vol. xxiv.

Family MONSTRILLIDÆ.

Genus MONSTRILLA, *Dana.*

Cephalothorax fere cylindricus, 4-articulatus. Abdomen 5–6-articulatum. Antennæ duæ. Oculi duo simplices; quoque oculus inferior sicut Pontellis. *Truncus buccalis parvulus subconicus, maxillis pedibusve non munitus. Pedes octo, natatorii. Abdominis segmenta 1mum 2dumque appendices gerentia ac in* Setellis.

Cephalothorax nearly cylindrical, four-jointed. Abdomen five- to six-jointed. Two simple eyes; also an inferior eye, as in the *Pontellæ*. Antennæ two. Buccal trunk quite small, cylindrical, and not moveable at base. Maxillæ and anterior feet obsolete; four pairs of natatory feet. A pair of abdominal appendages to each first and second segments, besides caudal stylets.

Monstrilla viridis.

Gracilis, posticè attenuata. Oculi superiores remoti. Antennæ 5-articulatæ, setis antennâ brevioribus. Abdomen 5-articulatum, segmento secundo breviore quam primum vel secundum. Styli caudales oblongi, parvi, divaricati, setis 5 subæquis, diffusis.

Slender, attenuate posteriorly. Eyes remote. Antennæ five-jointed, setæ shorter than the antennæ. Abdomen five-jointed, the second segment shorter than first or third. Caudal stylets small, oblong, divaricate, setæ five, subequal, spreading.

Plate 94, fig. 1 *a*, animal, enlarged; *b*, profile view; *c*, buccal prominence, more enlarged; *d*, abdomen in profile, with last thoracic segment and natatory feet.

Sooloo Sea, Harbour of Soung; taken at 8 P. M., on the 3d of February, 1842.

Length, one-fifth of an inch. Colour, grass-green.

This specimen was taken for an imperfect individual, when first seen, on account of the absence of all the anterior organs between the mouth and the four pairs of natatory feet, as well as that of the posterior antennæ. But beyond these particulars it has no appearance of being an abortion. It cannot be young, for its size exceeds that of most of the Calanidæ. It has the head of a Pontella, and the abdomen of a Setella or Miracia. The buccal trunk is situated near the centre of the cephalothorax below; it is oblong conical and truncated at apex, as seen under a high magnifying power; and it contains a cylindrical sucker which opens at the apex. No mandibles were made out, and no appendages of any kind about the sucker. The shell of the venter anterior to the natatory legs is unbroken and smooth, excepting the buccal prominence.

The first segment of the cephalothorax is long and nearly linear. The antennæ are rather short, and are directed straight forward. The appendages to first segment of abdomen are small and short, those of the second long and vergiform, extending beyond the apex of the abdomen. The stylets and setæ are precisely as in the Pontellæ.

Tribe II. CALIGOIDEA.

The Caligoidea, although closely related, like the Ergasilidæ, to the Cyclopoidea, are more remote from that tribe in general form, and pass through wider variations of structure. These species are naturally grouped in three sections. One, the Argulidæ, differs from the other two in having no external oviferous appendages, the ova passing out free direct from the oviduct: they are characterized also by having no anterior antennæ; the posterior antennæ two-branched, the first pair of legs tubular and suctorial; the second pair unguiculate and not prehensile.

In the two remaining sections there are oviferous appendages, and these are alike in being simple tubes, with the ova in a single series; they have a pair of short anterior antennæ; moreover, the posterior

antennæ are simple, and more or less hooked or prehensile; the first pair of legs are slender pediform organs; the second pair are stout and prehensile. The species in one of these two sections, the CALIGIDÆ, have a broad peltate body, the anterior segment or shield covering a large part of the whole; and the second antennæ are very short and stoutly hooked, and concealed beneath the body. In the other section, the DICHELESTIDÆ, the body is narrow; the anterior segment is comparatively short; and the second antennæ are elongated, and project beyond the head.

The Dichelestidæ are related to the Ergasilidæ in some of their characters; and yet are more closely similar to the Caligidæ. The structure of the maxillæ, buccal trunk, and first pair of legs (or maxillipeds), is much like the same in the Caligidæ; the natatory legs have little of the perfection of those of Ergasilus, they approximating in the form of the four anterior, and in the abnormal character of the four posterior, to the structure in the Caligus type.

These characters, together with the tubular form of the oviferous appendages, fix their relations to the Caligidæ.

The Caligidæ exhibit a relation to the Corycæidæ, and especially to the flat Sapphirinæ, in their hooked second antennæ, and the general character of the legs, including the prehensile form of the second pair (the second pair of legs corresponding normally to the first pair in that family). This affinity is also strikingly seen in the fact that some species have the *spectacle-eyes* of the Sapphirinæ and Corycæi, as detected by the author.

The Argulidæ are similar to the Caligidæ in their posterior antennæ; but they are more remote from the Corycæidæ than either the Caligidæ or Dichelestidæ, since the anterior antennæ are wanting; the legs which correspond to the first pair in the Corycæidæ are not prehensile; the females carry no external bags or tubes of eggs. The division Peltocephala of Edwards, which includes the Argulidæ and Caligidæ and excludes the Dichelestidæ, is not therefore retained in our system. The mere form of the body, as shown in the Corycæidæ, is a character of inferior value.

The three families mentioned may be characterized as follows:—

Fam. I. ARGULIDÆ. — Corpus late depressum, peltatum. Antennæ 1mæ obsoletæ. Pedes 1mi tubulati, 2di unguiculati. Ova in tubis vel sacculis externis non gesta.

Fam. II. CALIGIDÆ.—Corpus late depressum, peltatum, segmento antico pergrandi. Antennæ 1mæ breves; sæpius 2-articulatæ, raro 3-articulatæ, 2dæ corpore tectæ. Pedes 1mi graciles, 2di prehensiles vel ancorales. Ova externa in tubis gesta.

Fam. III. DICHELESTIDÆ.—Corpus angustum, segmento antico parvo. Antennæ 1mæ breves, 5–10-articulatæ; 2dæ fere frontales ultra caput exsertæ. Pedes 1mi graciles, 2di prehensiles. Ova externa in tubis gesta.

We follow these general remarks on the relations of the Caligoidea and their subdivisions, by some details with reference to their structure and their homologies.

Segments of the body.—In the Corycæidæ, among the Cyclopoidea, the cephalothorax consists of one large anterior segment, and three posterior; and rarely there is another articulation, though less distinct, across the posterior part of the first of these segments. Each of the three posterior segments bears a pair of natatories, that is, the second, third, and fourth pairs of these organs; and when another segment is present in the body, it bears the first pair of natatories. This same structure is exhibited among the Caligoidea. In the species of Pandarus and Specilligus, Plate 95, there are four cephalothoracic segments distinct, the last two of the body alone being abdominal. One of the four is a large anterior segment, and the other three are posterior segments, pertaining to as many pairs of natatories. In Nogagus (Plate 94, fig. 9), the first of the three posterior is not distinct; and in the species of Caligus (fig. 1 *a'*, and 1 *h*, Plate 93), only the last is separate, the others being coalesced with the anterior segment. Caligus, however, presents the semi-articulation alluded to, just anterior to the first pair of natatories. The same is probably present in Specilligus, although not shown in the figure, and if so, this species has the full number found in any Sapphirina. Moreover, all the four posterior pairs of legs are true natatories in Specilligus, while in Caligus the third pair is an apron-like appendage, and the fourth is slender subpediform.

In Argulus, we find the four segments distinct (fig. 2 *a*, Plate 94), and also traces of the preceding or medial articulation.

The bizarre forms of some Caligoidea arise from the enlargement or

alate expansion of the shell of the second or third posterior cephalothoracic segments. In the Pandari (see Plate 95), some of the forms assumed by these segments are shown. The first of these three segments is prolonged backward on either side, and this prolongation, while it is of ordinary character in the P. brevicaudis, has peculiar shapes in the P. satyrus and P. concinnus; the other two segments are two-lobed behind, and the lobes have different forms. In Lepidopus (Plate 95, fig. 5 *a*), only the last two or three segments are seen, and the lobes are very large. In Dinematura (Plate 95, fig. 4 *a*) there are also but two; and while one is small and transverse, the second is very large, and divided nearly longitudinally into two halves.

The anterior segment, when the semi-articulation exists just anterior to the first pair of natatories (see fig. 1 *a'* and *h* of Caligus, Plate 93, and also fig. 2, Plate 94, of Argulus), is not entirely crossed by this articulation; but towards the middle of either half it bends backward and runs to the posterior margin; at the same time, a similar pseudo-articulation, or line admitting of flexure (E, fig. 1 *h*, Plate 93), extends forward towards the anterior antennæ, though seldom reaching more than half the way. These lines make a kind of a letter H on the back of the animal, as shown in the figures. The object of these semi-articulations is to enable the animal to draw the margin of the shell down to the surface upon which it may lie, for the purpose of close adhesion.

A long osseous process lies in the shell of the alar pieces, and enlarges a little at its termination (E, fig. 1 *h*, Plate 93), against the anterior branch of the longitudinal semi-articulation; its object is to afford a firm articulating surface for the purposes of the flexure which here takes place.

Besides the transverse semi-articulation in Caligus, near the middle of the cephalic segment, there is another a little less distinct near the anterior margin; it separates a frontal segment which bears laterally the anterior antennæ, and is normally the first antennary segment of the body. At the middle there are often two small papillæ. Like the longitudinal, it favours the attachment of the animal by this margin. For this movement there are strong muscles, and also towards either side (at C, fig. 1 *h*, Plate 93), an osseous articulating surface, forming the termination of a process lying longitudinally in

the segment behind. We state beyond a reason for considering this segment the basal portion of the anterior antennæ.

The margin of the large anterior portion in the Caligidæ is aided in attaching itself in two ways, which may occur either separately or together. These are, 1, minute spinules ranging along a line parallel with the lateral outline, often in colourless species near the inner limits of the narrow transparent margin of the body (fig. 1 *h*, *r*, Plate 93); 2, sucker-like disks fitted expressly to affix the body to the surface on which it may rest. There are often two of these sucker-disks on the anterior margin, and they have been mistaken for eyes; one is represented enlarged, in the figure just referred to. They vary from a circular to an elliptical form; and are thin fleshy disks, attached by their central portions. Posterior to the first pair of antennæ in the Caligidæ and opposite the second pair, there is often a *second* disk, either side; and sometimes a *third* exists near the latero-posterior margin.

Besides these means of affixing itself, independently of the regular appendages, there is in the young forms of some species, a slender organ, proceeding from the middle of the front, which ends in a small disk. In some species the stem is quite slender. The genus *Chalimus* is based on the presence of this organ. But Kröyer has shown that this organ is not a proper basis for a genus,* and the same view is more recently sustained by Dr. Fr. Müller.† In 1838, the author, in an account of the Caligus Americanus,‡ described the same appendage as occurring sometimes in this species. Plate 93, figures 1 *u*, *v*, *w*, represent its appearance in different states. 1 *u* represents an upper view of the front of the animal, just before a change of skin; *c*, *d*, is the front of the Caligus; *e*, *f*, the front of the inner new-formed shell; *m*, *n*, *o*, the appendage. In 1 *v*, the appendage *n*, *m*, *o*, is seen in profile, the corresponding parts being lettered alike in 1 *u*, and 1 *v*. In 1 *w*, the same appendage is represented, with the outer shell of the animal removed, and the organ drawn forward. In one instance, the author observed an animal having the appendage situated as in 1 *w*, except that it consisted of three of these appendages placed end to end; and probably it was formed at three successive moultings. In external appearance, this organ much resembled a muscle, as it was striated like them, though very coarsely.

* Tids., ii. 1837.

† Archiv für Naturgeschichte, 1852, 91.

‡ Amer. J. Sci., vol. xxxiv, p. 225.

The *abdomen* has from one to three segments; the number is usually two. In Argulus (fig. 2 *a*, *b*, Plate 94), only one segment is distinct; this one is deeply two-lobed behind, and at the bottom of the sinus separating the lobes there are two minute appendages, which are rudiments of a pair of caudal stylets. In Caligus, the abdomen has a large basal segment, following which there are one or two much narrower segments. The basal segment in females with eggs is larger than in males, and of different form; and at its posterior angles it bears the oviferous tubes. It hence follows that this basal segment is the homologue of the second, or first and second abdominal segments, in the Cyclopoidea; for the second is normally the egg-bearing segment throughout that tribe. In males, the posterior angles are often projecting, and are sometimes furnished with two or three very short setæ; the same setæ may occur in females.

In Dinematura, Cecrops, and Lepidopus, the abdomen has but two segments, and though very large, the second segment is quite small, and is situated beneath the preceding, near its extremity. The caudal stylets in Caligus and allied genera are much like those in the Cyclopoidea, and have the same number and arrangement of setæ. In Lepidopus, they appeared to be wanting, being represented by very small lobes on the hinder margin of the last abdominal segment.

Appendages of the body.—The figures on Plate 92, represent in parallel columns the different forms of these organs among the principal sections of the Caligoidea, together with the same in Sapphirina and Corycæus for comparison.*

The *anterior antennæ* in the Caligidæ are short, and consist usually of but two joints (L, in fig. 1 *a*, and 1 *r*, Plate 93). The first joint has a number of short setæ along the anterior margin, which are setulose, and each receives a branch of the antennary nerve. These setæ shrink up on drying, and thus differ from the setæ of the body. The second joint has only a few naked setæ; there is a single seta at the middle of the posterior side; also a lower and an upper apical set, the former of which are a little the longer and more acute. The frontal segment of the cephalothorax in Caligus and the allied genera is probably the basal portion of these antennæ, and if counted as such, the organs would be three-jointed. In Læmargus, this frontal segment is

* Of the figures of this plate, 1 *a*, *b*, etc., represent organs of Sapphirina; 1 *a'*, *b'*, etc., ibid. of Corycæus; 2, of Argulus; 3, of Caligus (3 *k'* of Calistes); 4, of Pandarus; 5, of Lepidopus; 6, of Dichelēstion; 7, of Chondracanthus.

wanting, and the antennæ are actually three-jointed, the basal joint in this case not extending along the front of the head.

In the Dichelestidæ, as in the Ergasiloidea, these antennæ are terete, and four- or five- to seven-jointed.

The *posterior antennæ* are short organs, consisting of two or three joints, the last either bent into a hook at the extremity, or furnished with short claws, or else curved and set with teeth along the margins; these different means adapting it for attaching the animal in its parasitic life. There is often a stout spine at base, directed backward; and also exterior to the base, or connected with it, another curved or hooked spine. This last spine may perhaps correspond to a second branch of these organs; for in Argulus, there is a terete second branch, of three or four joints, occupying nearly the same position, being just posterior to the stout hooked portion. This hooked joint has on its posterior side a slender two- or three-jointed appendage; but this appendage appears to be properly the termination of the organ, rather than a separate branch, for the branch always proceeds from the normal second joint, while the hooked portion is normally the third or fourth joint.

These antennæ are sometimes very different in the two sexes. In Caligi, the males end in a short joint furnished with two small claws (3 *b*, Plate 92), while in females, this terminal joint is wanting, and the preceding is slenderly prolonged to a bent point (3 *b'*).

The trunk-formed *mouth* is either short ovate, with a rounded extremity behind; or it is long and slender, and gradually tapers to a narrow point.

When of the ovoid form, as in Caligus (figs. 1 *a* and *p*, Plate 93), the trunk is a hollow organ, bounded above and below by distinct membranes, which represent the upper and under lips. It has a lunate opening between the approximate lips (*a a* and *b*, fig. 1 *p*).

The lateral and lower margin of the buccal trunk is formed by a slender bone (*c*, *b*, *c*, fig. 1 *p*), which forms a projection at *c*, where it suddenly curves around inward, and runs backward a short distance nearly parallel with the margin (*c*, 1 p^1). These bones form the sides to the *lower* membrane of the cavity of the mouth. At the anterior extremity of the buccal mass within, they are connected with several small bones, which run to the medial line of the mouth (*m*, *l*, and *n*, fig. p^1, and *r*, *s*, *t*, fig. p^5, an under view); these bones lie either on or in the lower membrane of the mouth. No portion of the