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128

REVIEW OF AUSTRALIAN ISOPODS OF THE CYMOTHOID GROUP.
PART I.

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[Read August 13, 1925.]

ISOPODA-FLABELLIFERA.

The Cymothoid families of the tribe Flabellifera form a connected group, embracing species which range from symmetrical, active forms, feeding upon fishes and other marine animals or acting as scavengers, to others specialized for a parasitic mode of life. The truly parasitic species are found in the Aegidae and Cymothoidae; most of the representatives of the two last-named families, at least in the adult stages, feed upon fishes.

The members of the group have the uropods lateral, each with a free, more or less lamelliform, exo- and endopod, and the pleon, as a rule, is composed of six distinct segments. This last condition does not obtain in the Australian genus *Ourozeuktes*, M. Edw., which has all six segments coalesced, nor in the American *Colopisthus*, Rich., which has but two distinct segments, the first five being fused into one short segment. Haswell states that in his genus *Codonophilus* the uropods are uniramous. An examination of the type of *Codonophilus* shows, however, that it is a very juvenile example of *Meinertia imbricata*, and that the uropods are normal, each having two lamelliform branches.

I desire to express my thanks to the Director of the Australian Museum, Sydney, for the opportunity of examining the specimens preserved in that institution (including the types of the species described by the late Prof. W. A. Haswell and by Mr. T. Whitelegge), and to the Curator of the Western Australian Museum for the loan of specimens from Western Australia. I am also indebted to various other collectors who have obtained specimens from South Australian waters. The collections housed in the Australian, South Australian, and Western Australian Museums include good series of specimens from the eastern, southern, and western coasts of Australia, but material from the northern waters is not plentiful. The families represented in Australian seas may be separated as follows:—

- a. Palp of maxillipeds free, the last two articles setose, not furnished with hooks.
- b. Distal part of mandibles usually stout, conspicuous. Inner lobe of first maxillae expanded at apex and furnished with three or four spines; outer lobe wide and capped with many strong spines. Second maxillae with three free, very setose lobes.
- c. Molar part of mandibles large. Last four pairs of peracopods ambulatory, with normal dactylus and claw, the merus, carpus, and propodus of fourth and fifth pairs not greatly expanded .. *Eurydicidae*
- cc. Molar part of mandibles small. Last four pairs of legs natatory, with dactylus rudimentary or absent; in the fourth and fifth pairs the merus, carpus, and propodus are greatly expanded and flattened, each being about twice as wide as long .. *Phoratopodidae*
(nov.)
- bb. Distal part of mandibles narrow, partly or quite concealed by upper and lower lips. Inner lobe of first maxillae without apical spines; outer lobe narrow, tapering from middle of length to apex, which is armed with a few spines (sometimes with some small and inconspicuous spines also), or with many tiny hooked spines. Second maxilla not having three distinct lobes, and usually with apex simple *Corallanidae*

- aa. Palp of maxillipeds embracing cone formed by distal parts of mouth organs, the inner upper margin and apex never setose, at least the apex furnished with outwardly curved hooks in the males and non-ovigerous females.
- d. Both pairs of antennae with well-defined peduncle and flagellum. Maxillipeds with palp five-jointed or two-jointed, the last joint in the latter case rather short, obtuse *Aegidae*
- dd. Antennae reduced, without clear distinction between peduncle and flagellum. Palp of maxillipeds always two-jointed, the last joint rather long and narrow, subacute *Cymothoidae*

The above is adapted in part from Hansen's key.⁽¹⁾ The first four families are herein dealt with; in the descriptions the seven free segments of the peraeon are referred to as the first to seventh peraeon segments, and the appendages of these somites as peraeopods. The localities given under "Loc." are those from which specimens now described were taken, and "Hab." indicates the general distribution of a species.

Family EURYDICIDAE.⁽²⁾

The antennae are usually unequal in length. The mandibles are usually wide throughout, their cutting edges more or less tridentate and meeting behind the large labrum; the movable lacinia is large, with many spines, and the molar process is large and triangular. The outer lobe of the first maxillae is wide and capped with many spines; the inner lobe bears three spines, usually plumose. Maxillipeds with palp free, wide and very setose. The last four pairs of peraeopods are ambulatory, and the others are, as a rule, prehensile.

KEY TO AUSTRALIAN GENERA.

- a. Front of cephalon not produced in an anteriorly dilated process; sides of fifth pleon segment usually more or less covered by lateral parts of preceding segment; outer margin of exopod of uropods furnished with hairs.
- b. Cutting edge of mandibles long *Cirolana*
- bb. Cutting edge of mandibles short *Neocirolana* (nov.)
- aa. Front of cephalon produced in a prominent and anteriorly dilated process; sides of fifth pleon segment free, not covered by preceding segment; outer margin of exopod of uropods naked *Excirolana*

CIROLANA, Leach.

Cirolana, Leach, Dict. Sci. Nat., xii., 1818, p. 347; Sars, Crust. of Norway, ii., 1899, p. 69; Stebb., Herdman's Ceylon Pearl Fish. Suppl. Rep., xxiii., 1905, p. 11 (syn.).

The *Cirolanae* are very agile in the water, and some of them, for a short period at least, display considerable activity on land also. They are eminently carnivorous and, at times, are encountered literally in swarms; fishes captured in nets are sometimes rendered useless through their depredations. Persons wishing to obtain vertebrate skeletons, and not desiring to undertake the unpleasant task of maceration, take advantage of the scavenging habits of the "sea lice," and submerge their specimens, in the flesh, at a place where these Isopods are abundant; the bones are rapidly and very cleanly denuded of all flesh.

Schioedte⁽³⁾ remarks that the Order Isopoda "occupies one of the highest steps to which the class of Crustacea upon the whole attains in the scale of development of the articulate type," and that the "Cirolanae represent, no doubt, the highest development of the Crustacean type amongst Isopoda."

Seven species and one variety have been previously recorded from our waters and seven species are now added to the list.

(1) See Stebbing, Hist. of Crust., 1898, pp. 340, 341.

(2) Stebbing, Herdman's Ceylon Pearl Fish. Suppl. Rep., xxiii., 1905, p. 10.

(3) Schioedte, Ann. Mag. Nat. Hist. (4), i., 1868, pp. 2 and 9.

KEY TO AUSTRALIAN SPECIES.

- a. Flagellum of second antennae not reaching to hinder margin of fifth peraeon segment.
- b. Apex of telson broadly rounded or subtruncate.
- c. Endopod of uropods with a prominent nick in outer margin .. *pumicea*
- cc. Endopod of uropods with outer margin entire.
- d. Exopod of uropods only about half as long as endopod .. *hermitensis*
- dd. Exopod of uropods very little shorter than endopod .. *arcuata*
- bb. Apex of telson narrowly rounded or subacute.
- e. Second antennae much longer than first antennae.
- f. End of peduncle of first antennae not reaching beyond middle of fourth peduncular article of second antennae.
- g. Frontal lamina sublinear.
- h. Basos of seventh peraeopods expanded, twice as long as greatest width.
- i. Form stout; posterior angles of coxal plates of third and fourth peraeon segments acute .. *corpulenta*
- ii. Form narrower; posterior angles of coxal plates of third and fourth peraeon segments rounded .. *tenuistylis*
- hh. Basos of seventh peraeopods greatly expanded, only one and one-half times as long as greatest width .. *woodjonesi*
- gg. Frontal lamina broad.
- j. Peraeon and pleon ornamented with rows of tubercles .. *pustulosa*
- jj. Peraeon and pleon without tubercles .. *cranchii*, var. *australiense*
- ff. End of peduncle of first antennae reaching to or beyond end of fourth peduncular article of second antennae.
- k. Flagellum of second antennae composed of twenty-five articles .. *lata*
- kk. Flagellum of second antennae composed of thirteen to fifteen articles.
- l. Eyes subquadrate .. *lata*, var. *integra*
- ll. Eyes elongate .. *laevis*
- ee. Second antennae scarcely or not longer than first antennae .. *lineata*
- aa. Flagellum of second antennae reaching back beyond hinder margin of fifth peraeon segment.
- m. Flagellum of first antennae not extending beyond end of peduncle of second antennae; coxal plates with oblique furrows.
- n. Frontal lamina broad; flagellum of second antennae not reaching to hinder margin of sixth peraeon segment .. *schioedtei*
- nn. Frontal lamina sublinear; flagellum of second antennae reaching to middle of length of pleon .. *vieta*
- mm. Flagellum of first antennae extending for more than half its length beyond end of peduncle of second antennae; coxal plates without oblique furrows .. *concinna*

The length of the flagellum of the second antennae is unknown in *C. pumicea*; if, when perfect specimens are obtained, this species should prove to belong to section *aa*, it is readily separated from *C. vieta*, *C. schioedtei*, and *C. concinna* by the shape of the telson and frontal lamina, the character of the peraeopods, the shape of the uropods, etc.

The position of *C. tenuistylis* in the key is also somewhat tentative, for the second antennae are damaged in the type specimens; I have placed it near *C. woodjonesi*, as it is evidently allied to that species. *C. concinna* and *C. vieta* also have the frontal lamina narrow, but otherwise cannot be confused with *C. tenuistylis*.

C. lata, *C. lata*, var. *integra*, and *C. laevis* are apparently allied forms; I have not seen the two last-named and, working with the descriptions alone, find it difficult to satisfactorily separate them.

Cirolana pumicea, n. sp.

♀. Form narrow, with sides subparallel, three and three-fourths longer than greatest width. Dorsal surface with evenly spaced, small, but very distinct punctures, intermixed with which are some coarse punctures. Cephalon twice as wide

as medial length; a strong, transverse, bisinuate ridge between the front angles of eyes defines the anterior margin, as seen in dorsal view; surface rugose. Eyes prominent, tumid, situate antero-laterally. Peduncle of first pair of antennae not as long as first three articles of second antennae together; articles of peduncle short, subequal in length; flagellum a little longer than peduncle, composed of seventeen articles and extending slightly beyond end of fourth article of peduncle of second antennae. First two articles of second antennae very short, together as long as the fourth article, which is shorter than the third; fifth article the most slender, a little longer than third article; flagellum missing. Frontal lamina complex; a horizontal basal part is subtriangular in shape, not adpressed, the anterior part projecting forwards and visible in dorsal view between bases of first antennae; from the dorsal face of the basal part a narrow piece extends perpendicularly upwards between the bases of the second antennae; this linear process is a little dilated anteriorly, narrowest at middle of length, and is again dilated

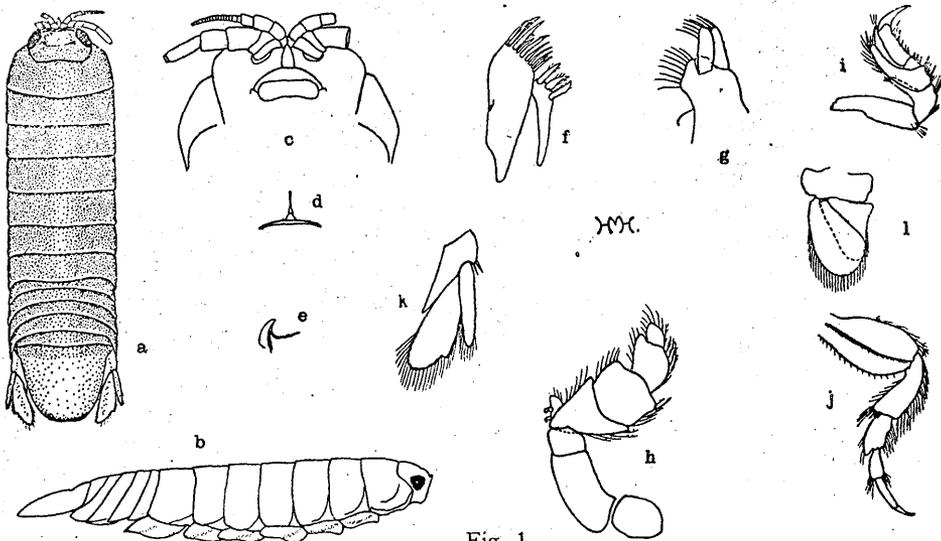


Fig. 1.

Cirolana punicea, type female; a and b, dorsal and lateral views (3 diam.); c, antennae, frontal lamina, clypeus and labrum in ventral view (7 diam.); d, anterior view of clypeus and frontal lamina, showing perpendicular process (7 diam.); e, lateral view of frontal lamina (7 diam.); f, first maxilla (14½ diam.); g, second maxilla (14½ diam.); h, maxilliped (14½ diam.); i and j, first and seventh pereopods (5 diam.); k, uropod (7 diam.); l, first pleopod (7 diam.).

towards the junction with the basal part. Clypeus wide and short, crescentic, much shorter than labrum. Second article of palp of mandibles twice as long as third. Outer lobe of first maxillae capped with twelve spines, two or three of the outermost seven being denticulate; inner lobe with three stout, plumose spines. Maxillipeds moderately stout, the basipodite about one-half as long as the five-jointed palp. First pereaeon segment embracing base of cephalon, longer than any of the other segments, which are subequal in length. Coxal plates each with a very indistinct, oblique furrow in addition to the submarginal furrow; plates of second to fourth segments rounded behind, not extending beyond hinder margins of their segments; those of fifth and sixth segments subacutely rounded posteriorly, reaching a little beyond level of hinder margins of their segments; last pair extending slightly beyond level of postero-lateral angles of first pleon segment, and with posterior angle acute. Pleon not at all narrower than pereaeon,

with all segments visible, the first a little shorter than the others, which are subequal in length; postero-lateral parts of fourth segment covering lateral portions of fifth segment; telsonic segment less than one-third wider than long; basal part tumid; lateral margins convexly rounded, evenly converging to the widely subtruncate and crenulate apical margin. Uropods extending to level of apex of pleon; protopod with two spines on outer margin near articulation of exopod, and with inner process not reaching to middle of length of endopod; exopod narrow, a little more than three-fourths as long as, and much less than half as wide as endopod, which is crenulately rounded posteriorly and has a prominent nick in the outer margin. Peraeopods stout; the outer distal part of the merus of the first three pairs is greatly produced, extending nearly to level of distal end of propodus, and with outer margin and apex armed with strong setae; outer distal part of ischium of these limbs similarly but less markedly produced; last four pairs furnished with spines, setae and plumose hairs, the basos of each with a longitudinal, median ridge; basos of fourth and fifth pairs expanded, that of sixth and seventh pairs much more expanded; basos of seventh pair greatly expanded, the length only twice the greatest width; merus of seventh pair nearly one-third longer than carpus and about three-fourths as long as ischium. Inner ramus of first pair of pleopods not much more than three-fourths of length of, and about same width as, outer ramus.

Colour.—Anterior ridge of cephalon, hinder margins of cephalon, peraeon segments, first to fifth pleon segments, and posterior four-fifths of telsonic segment, whitish; the remainder of the dorsal surface is thickly covered with black dots and thus appears of a greyish-black colour.

Length, 18 mm.

Loc.—New South Wales (Austr. Mus. Coll.). Type, female, in Australian Museum, Reg. No. G 5319.

Four mutilated specimens are before me. The posterior margin of the telson is not at all distinctly truncate in the type, and in two of the paratypes it is rounded.

The peraeopods of *C. pumicea* slightly resemble those of *C. japonensis*, Rich.,⁽⁴⁾ but the process of the merus of the first three pairs is much more marked and the cephalon and pleon are totally different.

Cirolana hermitensis, Boone.

Cirolana hermitensis, Boone, Proc. U.S. Nat. Mus., liv., 1918, p. 592, pl. xci., fig. 2.

The form is widely subovate, about twice as long as wide. According to Boone's figure the hind margin of the cephalon is trilobate. The flagellum of the first antennae reaches to just beyond the end of the peduncle of the second antennae, the flagellum of which reaches to the posterior margin of the third peraeon segment. The second to seventh peraeon segments are subequal in length. The greater part of the first pleon segment is concealed beneath the last peraeon segment; the telsonic segment has "the apex roundly truncate, crenulated, and ornamented with a row of spines." The uropods reach a little beyond the apex of the telson and the exopod is "oval and about half as long as" endopod.

Colour.—"The specimen is heavily banded crosswise with light brown stripes, with an equal light creamy area between them on the head, thorax, and first five abdominal segments; the sixth segment and uropoda are similarly marked but have the bands longitudinally placed."

Length, 9 mm.; width, 4.9 mm.

Hab.—Western Australia: Home Lagoon, Hermite Island, Montebello Islands.

(4) Rich., Proc. U.S. Nat. Mus., xxvii., 1904, p. 35, figs. 3-5.

I have not seen this species, and the above details are culled from Boone's description. *C. hermitensis* differs exceedingly from the other three species of the genus (*C. concinna*, *C. lineata*, and *C. schoedtei*) herein recorded from Western Australian waters.

Cirolana arcuata, n. sp.

♀. Form narrowly oval, three times longer than greatest width. Surface with very fine punctures. Cephalon about two and one-half times wider than medial length; anterior margin rounded, with a small, median, downbent, sub-triangular process, not separating first pair of antennae and not visible in dorsal view. Eyes moderately large. Peduncle of first pair of antennae as long as first three articles of peduncle of second antennae; second article slightly shorter than third and a little longer than first article; flagellum extending beyond end of peduncle of second antennae, composed of fifteen to seventeen articles. Second antennae reaching to level of hinder margin of third pereaeon segment; first two articles of peduncle short, together about as long as third article; fourth longer than third and about three-fourths the length of fifth article; flagellum half as

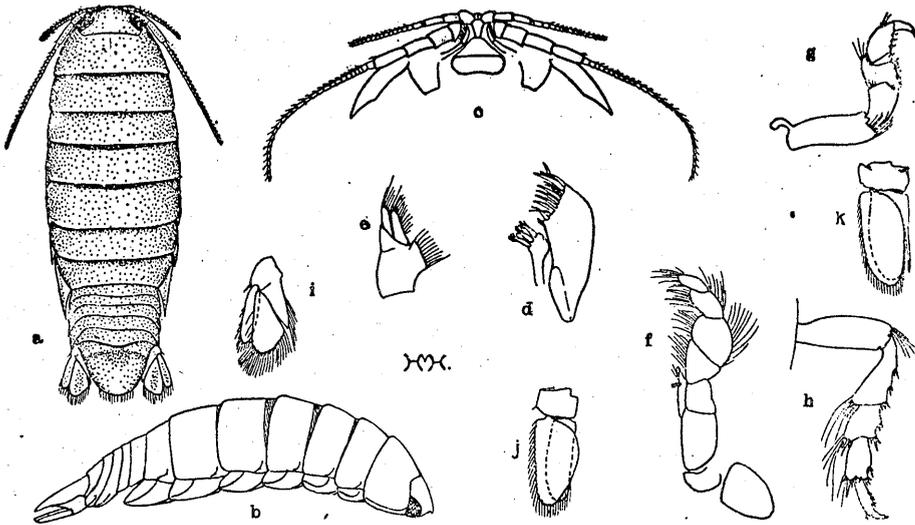


Fig. 2.

Cirolana arcuata, type female; a and b, dorsal and lateral views (4 diams.); c, antennae, frontal lamina, clypeus and labrum (6 diams.); d, first maxilla (22 diams.); e, second maxilla (22 diams.); f, maxilliped (22 diams.); g and h, first and fifth pereopods (7 diams.); i, uropod (7 diams.); j and k, first and second pleopods of male (7 diams.).

long again as peduncle, composed of twenty-three to twenty-six articles and a terminal style. Frontal lamina pentagonal, longer than wide, widest at about first fourth of length and with postero-lateral margins converging posteriorly. Clypeus rather long, its medial length subequal to that of labrum and with anterior part not adpressed but projecting outwards and forwards. Mandibles normal, the first and third articles of palp of equal length, each much more than half as long as second article. Outer lobe of first maxillae capped with eleven strong spines and one thinner spine; the three innermost spines are denticulate; inner lobe with three stout plumose spines. Maxillipeds narrow, elongate, the basipodite less than one-half the length of the five-jointed palp, the basal article of which is nearly as long as the second. First pereaeon segment embracing base of cephalon, longer than any of the others; second, third, and fourth segments subequal in

length, each a little shorter than fifth or sixth; seventh segment the shortest. Coxal plates each with a curved, oblique furrow in addition to the submarginal furrow; those of second and third segments rounded behind, not reaching beyond hinder margins of their segments; those of fourth segment extending very slightly beyond hinder margin of their segment, and with rounded posterior angles; last three pairs extending successively further beyond the hinder margins of the segments and with posterior angles subacute; those of seventh segment reaching to level of hinder margin of second pleon segment. All segments of pleon completely visible, the fifth a little longer than any of the others (which are subequal in length) and with lateral parts partly covered by postero-lateral portions of fourth segment; telsonic segment nearly half as wide again as medial length; lateral margins roundly converging to the rounded and crenulate posterior margin. Uropods extending slightly past apex of pleon; protopod with a spine on outer margin near articulation of exopod and with inner process wide and produced to well beyond middle of length of endopod; exopod narrowly suboval, rounded posteriorly, furnished with hairs and a few short spines on outer and apical margins; endopod more than twice as wide as, and a little longer than, exopod, rounded posteriorly, and with postero-lateral and apical margins furnished with long hairs and short spines. Peraeopods stout, armed with spines and moderately dense, long hairs; last four pairs armed with strong spines on inner and apical margins of ischium, merus, and carpus, and with a few short spines on inner margin of propodus; basos of seventh pair expanded, two and one-third times longer than wide; merus equal in length to carpus and more than one-half length of ischium. Outer ramus of first pair of pleopods nearly twice as wide as, and very slightly longer than, inner ramus.

Colour, in alcohol.—Yellow, dotted with prominent black chromatophores on dorsal surface of cephalon, peraeon, first to fifth segments of pleon and basal part of telsonic segment.

Length, 12.5 mm.

♂. A somewhat damaged example of this sex does not notably differ from the female. The flagellum of the second antennae consists of a lesser number of articles—twenty and a terminal style. The male appendage of the second pair of pleopods does not reach quite to the end of the inner ramus.

Length, 12 mm.

Loc.—New South Wales: Little Sirius Cove, Port Jackson (Austr. Mus. Coll.). Type, female, and allotype, male, in Australian Museum, Reg. Nos. P8200 and P8201.

Several specimens were taken in company with *Sphaeroma quoyana*. This species somewhat resembles *C. hermitensis*, but has the form more slender, the second to fifth peraeon segments not subequal in length, the first segment of the pleon not almost wholly concealed, the exopod of the uropods relatively longer and the hinder margin of the cephalon not at all trilobate.

Cirolana corpulenta, n. sp.

♀. Form widely suboval, less than two and one-fourth times longer than greatest width. Surface with rather fine sparse punctures arranged in transverse series and intermixed with a few large punctures. Cephalon twice as wide as medial length; anterior margin distinctly bisinuate, with a median subtriangular process, not completely separating the basal articles of the first antennae. Eyes moderately large, situate laterally. First antennae short, the end of flagellum not reaching to end of peduncle of second antennae; peduncle as long as first three articles of second antennae, the first article widest, extending in front at a right angle to remaining part of antennae; second article a little shorter than first, and scarcely more than one-half as long as third, the posterior distal part of

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which is produced into a lobe; flagellum a little shorter than peduncle, composed of eleven articles. Second antennae reaching almost to hinder margin of second peraeon segment; first two articles of peduncle short, together about as long as third article, the first longer than second; third article longer than fourth and scarcely as long as fifth; flagellum about one-fourth longer than peduncle, composed of eighteen articles and a terminal style. Frontal lamina linear, a little dilated anteriorly. Clypeus not much more than one-half as long as labrum. Mandibles normal, the first article of palp more than half as long as second and longer than third article. Outer lobe of first maxillae capped with seven stout simple spines of various lengths, one thin spine and one very short spine; inner lobe with three stout, plumose spines. Maxillipeds moderately slender, the basipodite a little more than one-third as long as the five-jointed palp. First peraeon segment embracing base of cephalon, distinctly longer than any of the others; second and seventh segments subequal in length, shorter than third, fourth, fifth, or sixth segments, which are subequal in length. Coxal plates each with an obliquely curved, shallow furrow, in addition to the submarginal furrow; plates

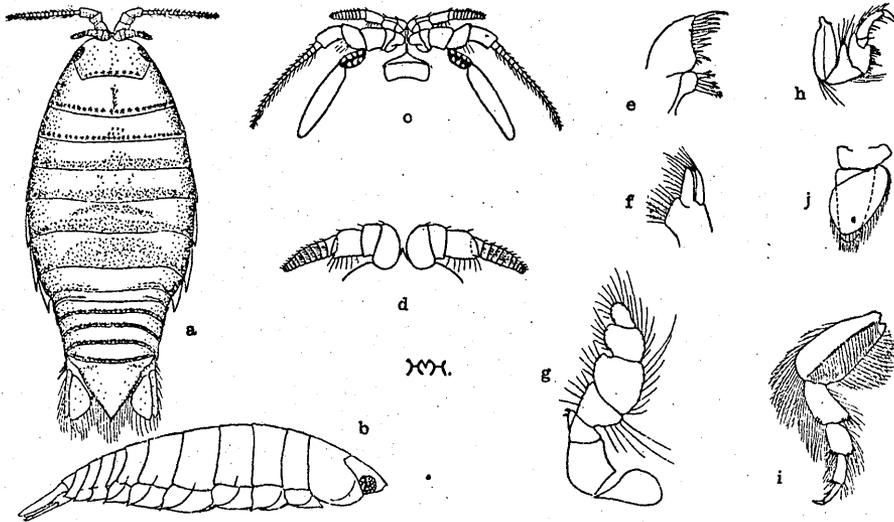


Fig. 3.

Cirolana corpulenta, type female; a and b, dorsal and lateral views ($4\frac{1}{2}$ diams.); c, antennae, frontal lamina, clypeus and labrum (8 diams.); d, first antenna (13 diams.); e, first maxilla ($14\frac{1}{2}$ diams.); f, second maxilla ($14\frac{1}{2}$ diams.); g, maxilliped ($14\frac{1}{2}$ diams.); h and i, first and seventh peraeopods (5 diams.); j, first pleopod (5 diams.).

of second to sixth segments subrectangular in shape, the first three pairs not or scarcely extending beyond hinder margins of their segments, and those of fifth and sixth segments extending but little past the level of hinder margins; plates of second segment obtusely rounded posteriorly and with lower anterior angle acute, those of third to sixth segments with a small acute point at posterior angles; plates of seventh segment extending back to level of postero-lateral angles of first pleon segment, and with acute posterior angles. All segments of pleon visible, the first the shortest; fifth segment slightly longer than fourth, which is a very little longer than third; telsonic segment about one-half as wide again as long; lateral margins slightly sinuate, converging to the acute apex; postero-lateral margins crenulate, furnished with short spines and plumose hairs. Uropods reaching to level of apex of pleon; protopod with three setae on outer margin

and with inner process reaching to middle of length of endopod, which is two and one-half times wider, and a little longer, than exopod; endopod acutely rounded posteriorly, with outer margin almost straight, slightly sinuate, and with posterolateral edges furnished with plumose setae and a few short spines; exopod narrowly rounded at apex; margins furnished with plumose hairs and a few short spines near distal end. Peraeopods stout; outer distal part of ischium and merus a little produced in first pair, and in second pair much produced; the outer apex of the merus of the second peraeopods extends past level of anterior margin of carpus, and the outer apex of the ischium reaches to middle of length of carpus; outer apex of merus of third pair a little forwardly produced, and outer part of ischium considerably expanded laterally and a little forwards, the outer apex reaching beyond apex of merus; last four pairs with long, mostly plumose, hairs, and with the basos expanded; basos of seventh pair only twice as long as wide, and with both lateral margins and median ridge furnished with long plumose hairs; merus of seventh pair about same length as carpus and more than half as long as ischium. Outer ramus of first pair of pleopods much wider and distinctly shorter than inner ramus.

Colour during life—White, with transverse series of black chromatophores near hinder margins of cephalon, peraeon segments, first to fifth pleon segments, and along lateral margins of peraeon; the chromatophores near the hinder margins of cephalon and first two peraeon segments, and along the lateral margins of peraeon, are larger than the others.

Length, 12 mm.

Loc.—South Australia: Port Willunga, on meat near shore (type loc., H. M. Hale), Brighton, from *Heterodontus phillipi* (H. Collyer). Type, female, in South Austr. Mus., Reg. No. C275.

A single specimen was obtained amongst a large number of specimens of *C. woodjonesi* taken from the body cavity of the Port Jackson shark. A small series, mostly of immature specimens, was obtained at Port Willunga in company with *C. woodjonesi* and *C. cranchii*, var. *australiense*. During life the three species can be very readily separated by the colour alone; *C. woodjonesi* is white without pigmentation, *C. cranchii*, var. *australiense*, is closely dotted with small black chromatophores, and *C. corpulenta* is characteristically marked with transverse bars of black chromatophores.

C. corpulenta approaches *Eurydice* in the structure of the first antennae, but in other respects is a typical *Cirolana*, for the peduncle of the second antennae is five-jointed, the inner plate of the basipodite of the maxillipeds is furnished with two hooks, the protopod of the uropods is well produced, and the peduncle of the first pair of pleopods is much wider than long.

The number of articles in the flagella of the antennae is a little variable, and in some specimens there are but eight articles in the flagellum of the first pair.

CIROLANA TENUISTYLIS, Miers.

Cirolana tenuistylis, Miers, Zool. "Alert," 1884, p. 303, pl. xxxiii., fig. b.

This species belongs to the group of *Cirolanae* having the frontal lamina elongate, at least three times longer than wide, the first antennae short and stout, the basos of the posterior peraeopods expanded, and the coxal plates each with a distinct, oblique furrow in addition to the usual submarginal furrow. The eyes are "subquadrate or somewhat rounded, with very large ocelli."

Length, 15 mm.

Hab.—North Queensland: Prince of Wales Channel.

C. tenuistylis is somewhat close to *C. woodjonesi*, but Dr. W. T. Calman has very kindly compared specimens of the last-named species with Miers' syntypes,

and informs me that the basos of the seventh peraeopods is less markedly expanded in *C. tenuistylis*, while the furrows of the coxal plates are considerably different. These furrows are not indicated in Miers' figure, and I am indebted to Dr. Calman for the accompanying sketches of one of the syntypes in the British Museum collection.

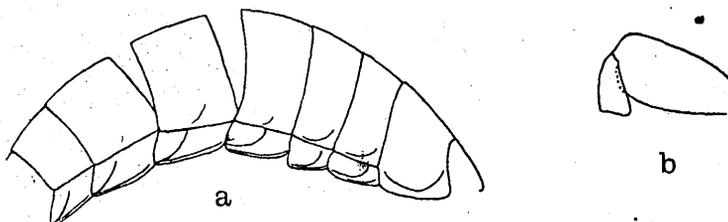


Fig. 4.

Cirolana tenuistylis, syntype; a, lateral view of pereon; b, basos and ischium of seventh peraeopod.

CIROLANA WOODJONESI, Hale.

Cirolana woodjonesi, Hale, Trans. Roy. Soc. S. Austr., xlviii., 1924, p. 71, pl. v., and text fig. 2.

♂. Form narrowly obovate, about three times longer than greatest width. Surface finely and sparsely punctate, the punctures arranged in transverse series. Cephalon twice as wide as medial length; anterior margin slightly bisinuate with

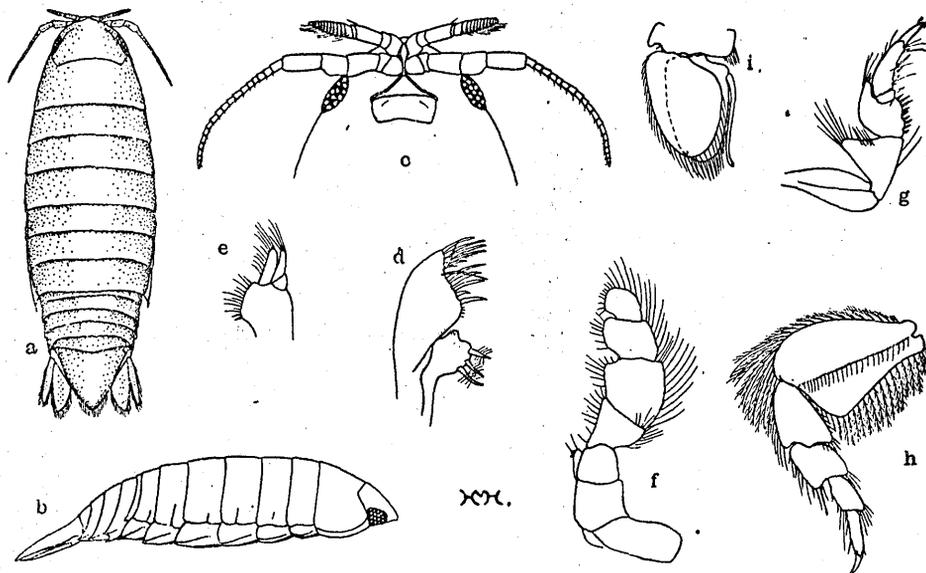


Fig. 5.

Cirolana woodjonesi, type male; a and b, dorsal and lateral views ($3\frac{1}{2}$ diams.); c, antennae, frontal lamina, clypeus and labrum (7 diams.); d, first maxilla (16 diams.); e, second maxilla (16 diams.); f, maxilliped (16 diams.); g and h, first and seventh peraeopods (8 diams.); i, second pleopod (8 diams.).

a small, median, subtriangular process, which does not separate the first pair of antennae. Eyes moderately large, with the inner margins straight; subquadrate in lateral view. First antennae short, reaching almost to middle of last peduncular article of second antennae; first article of peduncle much longer than second, and

third article as long as first two articles together; flagellum composed of thirteen articles, the second longer than the others, which are very short. Second antennae reaching to posterior margin of first peraeon segment; first article of peduncle twice as long as second; third as long as first two together, a little longer than the fourth and slightly shorter than the fifth article; flagellum composed of eighteen articles and a terminal style. Frontal lamina linear, at least four times longer than greatest width, widened at anterior third and slightly dilated at posterior end. Clypeus wider and shorter than labrum. Mandibles normal; first article of palp two-thirds as long as second, and about one-fourth longer than third article. Outer lobe of first maxillae capped with eleven spines (two of the outermost of which are denticulate) and two thinner spines; inner lobe with three stout, plumose spines. Maxillipeds rather slender, the basipodite less than one-third as long as the five-jointed palp. First peraeon segment embracing base of cephalon, subequal in length to cephalon, and much longer than any of the other segments, which are more or less subequal in length. Coxal plates each with a distinct, oblique furrow in addition to the usual submarginal furrow; first three pairs of plates subquadrate and obtusely rounded posteriorly; first and second pairs scarcely reaching to level of posterior margins of their segments and third pair extending very slightly beyond level of posterior margin of fourth segment; plates of fifth to seventh segments subacute posteriorly and reaching beyond level of hinder margins of their segments. All segments of pleon visible in dorsal view, the first partly concealed beneath last peraeon segment; second to fifth segments subequal in length, the lateral parts of the fifth covered by the postero-lateral portions of the preceding segment; telsonic segment distinctly wider than its medial length; lateral margins a little convex and converging to the roundly angular apex; postero-lateral margins with hairs and short spines. Uropods reaching slightly beyond level of apex of pleon; protopod with two or three spines at outer posterior angle and with inner process reaching to beyond middle of length of endopod; exopod lanceolate, shorter than and but half as wide as endopod, the margins furnished with plumose hairs and the apex with two spines; endopod subacute posteriorly, the margins provided with plumose hairs and a few spines. Peraeopods stout, all more or less expanded and flattened; outer distal part of merus of first three pairs forwardly produced; the propodus of the first pair bears three spines (the distal of which is serrate), the carpus one spine, and the merus ten or eleven spines, on the inner edge; propodus of second and third pairs with one spine, carpus with six, and merus with nine to twelve spines; ambulatory peraeopods armed with many spines and long plumose hairs; basos of seventh pair greatly expanded, two-thirds as wide as long, the median, inferior ridge set with shorter hairs than the lateral margins; merus as wide as long, a little longer than carpus and more than one-half as long as ischium. Outer ramus of first pair of pleopods a little shorter than, and nearly half as wide again as, inner branch; male appendage of second pair moderately stout, not much longer than rami and bent inwards at tip.

Colour during life—White.

Length, 14 mm.

♀. Form slightly wider than in male.

Length (largest specimen), 24 mm.

Hab.—South Australia: Gulf St. Vincent (type loc.) and south coast (S. Austr. Mus. Coll.). Tasmania: 100 fms. (C. Hedley); off Cape Portland, 5-10 fms., "fish baits on lines at night" (Dr. E. J. Paradice). Victoria: Port Phillip (Austr. Mus. Coll.). New South Wales: "From porpoise" (Austr. Mus. Coll.).

C. woodjonesi is common in the shallow waters around the South Australian coast. During life some specimens are diffused with rose red, but the usual

colour is white; examples have been taken from sharks and from a porpoise, and numbers have been secured on fish baits.

The antennae are a little variable in length and in the number of articles of which they are composed; the first pair may extend only to the end of the fourth peduncular article of the second antennae, and the latter may reach to the level of the posterior margin of the second peraeon segment. As many as twenty-eight articles are sometimes present in the flagellum of the second antennae. In some specimens the first pleon segment is entirely concealed in dorsal view, in others only a small postero-lateral portion on each side is visible. The relative width of the basos of the seventh peraeopods varies a little, but is always equal to more than half the length of the joint. As with other species of the genus, the number of spines margining the telson and uropods proves variable when a large series is examined.

I have referred to this species a small male dredged in 100 fathoms off Tasmania; in this example the male appendage of the second pleopods is apically rounded and is not inbent.

Cirolana pustulosa, n. sp.

Form rather narrowly suboval, about two and three-fourths times longer than greatest width. Surface very finely punctate. Cephalon scarcely twice as wide

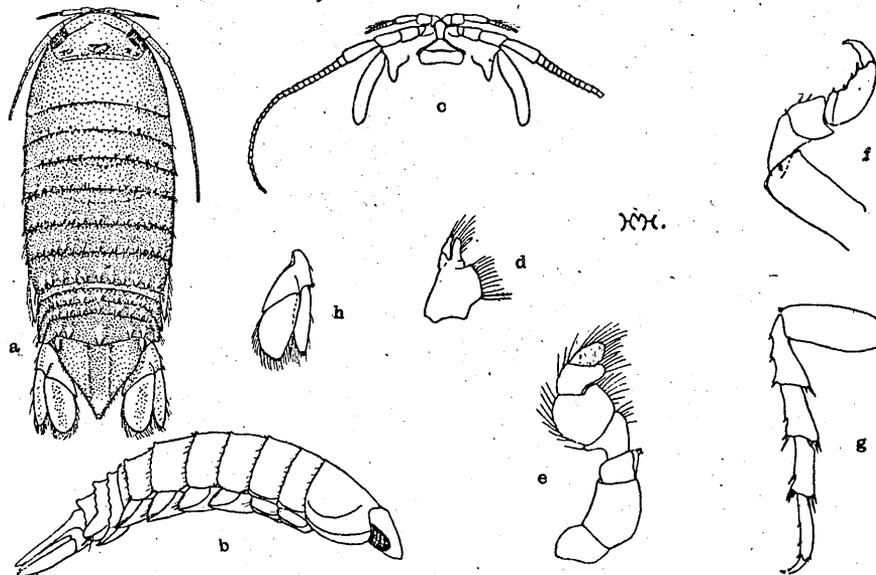


Fig. 6.

Cirolana pustulosa, type; a and b, dorsal and lateral views (8 diams.); c, antennae, frontal lamina, clypeus and labrum (10 diams.); d, second maxilla (29 diams.); e, maxilliped (29 diams.); f and g, first and seventh peraeopods (14½ diams.); h, uropod (7 diams.).

as medial length; anterior margin incrassate, somewhat conically rounded in outline and with a tiny, median, subtriangular process, which does not separate the first antennae; dorsum with a curved, medianly interrupted furrow, extending along inner margins of eyes and subparallel to antero-lateral margins, and with another furrow submarginal to posterior edge of cephalon; an irregular tubercle at middle of basal part and two smaller and less distinct tubercles near postero-lateral angles. Eyes moderately large, situate laterally. First antennae reaching

slightly beyond fourth article of peduncle of second antennae; first article stouter than second and subequal to it in length; third narrower than, and about three-fourths as long again as second article; flagellum composed of ten articles and a tiny terminal style; the first article is very short and the second is longer than any of the others. Second antennae reaching to level of posterior margin of fourth peraeon segment; first two articles of peduncle short, the first longer than the second; fourth article half as long again as third and about five-sixths as long as the fifth article; flagellum composed of thirty articles and a terminal style. Frontal lamina twice as long as greatest width, dilated anteriorly; margin of anterior part convex, and posterior margin concave. Clypeus scarcely as long as labrum. Outer lobe of first maxillae capped with strong spines, some of which are denticulate; inner lobe with three strong, plumose spines. Maxillipeds rather stout, the basipodite less than half as long as the five-jointed palp. First peraeon segment embracing base of cephalon and much longer than any of the others; second and seventh segments shorter than the third to sixth, which are subequal in length; posterior margins of all segments with sparse hairs; the last four have a submarginal row of conical, backwardly-directed tubercles, and on the third segment is a row of similar but very indistinct tubercles; on the first and second segments are faint and barely discernible indications of tubercles. Coxal plates each with a distinct, oblique furrow in addition to the submarginal furrow; plates of second and third segments obtusely rounded behind, not extending beyond posterior margins of their segments; remaining pairs subacute, reaching well beyond the level of the posterior margins of their segments, the last pair extending to beyond hinder margin of second pleon segment. Whole of first pleon segment, and anterior part of second segment, concealed beneath last peraeon segment; third and fourth segments subequal in length, much shorter than the fifth; postero-lateral angles of third segment acute, those of fourth rounded, lobular; lateral parts of fifth segment partly covered by postero-lateral portions of preceding segment; a submarginal row of nine subconical tubercles on third and fourth segments and with five tubercles (the median of which is largest) on fifth segment; telsonic segment wider than long; lateral margins sinuately converging to the narrowly rounded apex; dorsum with a prominent, elongate tubercle near each antero-lateral angle and with a longitudinal carina on each side of median line. Inner process of protopod of uropods not reaching to middle of length of endopod, which extends past level of apex of pleon, is rounded posteriorly, and has the outer margin almost straight; exopod not quite half as wide as and shorter than endopod, reaching to level of apex of pleon, and with the extreme apex emarginate, with a short spine set in the incision; apical and inner posterior margins of endo- and exopod, and apex of telson, with short spines intermixed with the fringe of hairs. Peraeopods rather slender; basos of seventh pair not greatly expanded; ischium, merus, carpus, and propodus with spines on distal margins and a few on inner margins; merus equal in length to carpus and about four-fifths as long as ischium.

Colour bleached.

Length, 7 mm.

Loc.—Queensland: Cooktown (A. G. Maitland). Type in Austr. Mus., Reg. No. P8202.

A single mutilated example, previously preserved in a dry state; the pleopods are destroyed. In some features this species resembles *C. cranchii*, but may be separated by the narrower frontal lamina and by the ornamentation of the dorsum. It is allied to *C. sculpta*, M. Edw., and to *C. willeyi*, *C. pleonastica*, and *C. sulcatauda* of Stebbing, but the sculpturing of the pleon is different.

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Cirolana cranchii, Leach, var. *AUSTRALIENSE*, NOV.

♂. Form suboval, more than three times longer than greatest width. Surface with fine punctures intermixed with a few larger punctures. Cephalon twice as wide as medial length; anterior margin rounded, with a small, median, subtriangular process, arching downwards and backwards, completely separating the first pair of antennae, and meeting the apex of the frontal lamina. Eyes moderately large, situate laterally. First antennae reaching slightly beyond end of peduncle of second antennae; first and second articles of peduncle subequal in length; third article more slender and more than one-third longer than either of first two articles; flagellum composed of fifteen articles and a small terminal style. Second antennae reaching to level of posterior margin of third peraeon segment; first and third articles of peduncle subequal in length, each longer than the second; fourth article twice as long as third and about four-fifths as long as fifth article; flagellum composed of thirty-four articles and a terminal style. Frontal lamina pentagonal, a little longer than greatest width. Clypeus wider

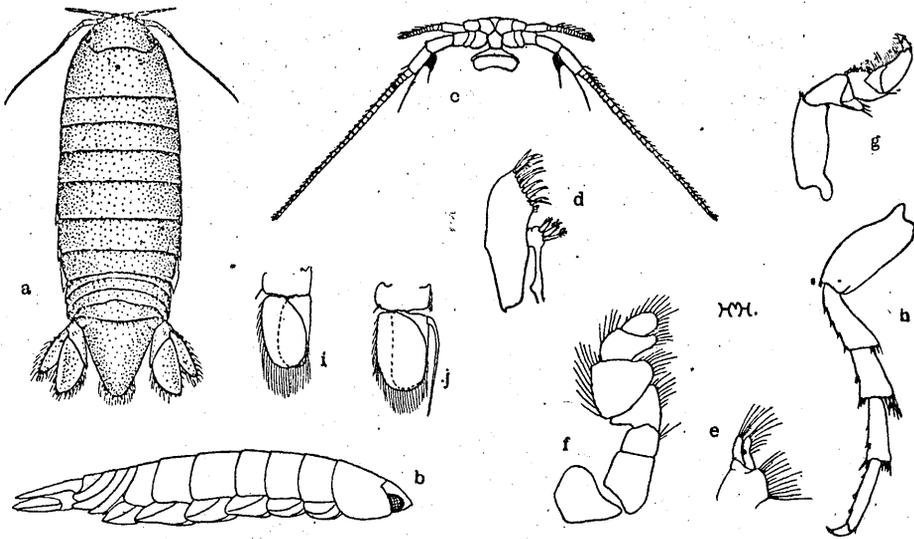


Fig. 7.

Cirolana cranchii, var. *australiense*, type male; a and b, dorsal and lateral views (4 diams.); c, antennae, frontal lamina, clypeus and labrum (9 diams.); d, first maxilla (9½ diams.); e, second maxilla (9½ diams.); f, maxilliped (9½ diams.); g and h, first and seventh peraeopods (8 diams.); i and j, first and second pleopods (5½ diams.).

and shorter than labrum. Mandible with tridentate cutting edge, movable lacinia and molar process well developed; first article of palp one-half as long as second. Outer lobe of first maxillae capped with eleven stout spines and one long seta (also some short setae near inner distal angle of lobe), the three or four innermost spines denticulate; inner lobe with three stout, plumose spines. Maxillipeds moderately stout, the basipodite not much more than one-third as long as the five-jointed palp. First peraeon segment embracing base of cephalon, much longer than any of the others. Coxal plates each with an oblique furrow in addition to the submarginal furrow; those of second and third segments obtusely rounded posteriorly, not reaching beyond hinder margins of their segments; remaining plates subacute posteriorly, extending beyond hinder margins of their segments, those of last segment reaching slightly beyond postero-lateral angle of first pleon segment. Pleon not abruptly much narrower than peraeon; first segment almost

wholly concealed beneath last peraeon segment, only a small postero-lateral portion being visible; anterior median part of second segment covered by last peraeon segment; third and fourth segments subequal in length; medial length of fifth segment equal to that of third and fourth together; lateral parts of fifth segment covered by postero-lateral parts of preceding segment; telsonic segment longer than wide; lateral margins almost straight, a little convex, converging to the rather narrowly rounded apex, which is furnished with eight short spines and short hairs. Inner process of protopod of uropods reaching to middle of length of endopod, which extends a little past level of apex of pleon and is twice as wide as exopod; apices of both exo- and endopod sub-bifid; outer margin of endopod with three, and inner with seven spines, and plumose hairs; outer margin of exopod with nine, and inner with three spines, and plumose hairs. Peraeopods rather slender; ischium of first pair with three or four setae on outer distal margin, the merus with six blunt spines on inner margin and with outer distal apex capped with several setae; merus, carpus, and propodus of first peraeopods with a dense fringe of hairs; ischium of second and third pairs with one spine and three setae on outer distal margin, merus with seven to nine spines on inner margin and with one spine and several setae on outer apex; carpus with several short spines at inner apex; last four pairs of peraeopods furnished with spines on inner and distal margins of ischium, merus, carpus, and propodus; basos of seventh pair more than twice as long as greatest width; ischium longer than carpus, which is longer than merus. Outer ramus of first pair of pleopods more than one and one-half times wider, and scarcely shorter, than inner ramus; male appendage of second pleopods more than one-fourth longer than inner ramus.

Colour—Whitish, with dorsum closely dotted with tiny black chromatophores. Length, 13 mm.

♀. The form is slightly wider than in the male.

Length, 12 mm.

Loc.—South Australia: Port Willunga, in rock pools and near shore (type loc.), and Gulf St. Vincent, dredged in 6-8 fms., etc. (H. M. Hale); Hallett's Cove, from a sponge (W. H. Baker). New South Wales: Near Tuggerah Lakes, in rock pools (A. A. Livingstone and H. O. Fletcher); off Bateman's Bay, 80 fms., in crevice of conglomerate (Capt. J. Fordar); east of Ulladulla, 74 fms., in conglomerate boulder (C. W. Mulvey); Port Jackson (F. A. McNeill); Port Stephens (Austr. Mus. Coll.). Victoria: Port Phillip (Gabriel). Type, male, and allotype, female, in S. Austr. Mus., Reg. No. C304-305.

This form is by no means rare in South Australia. A series of about 300 specimens was selected from a multitude recently obtained by lowering a piece of meat into the water near shore at Port Willunga, on a moonlight night. Immediately the meat was submerged swarms of *Cirolanac* crowded to it; two other species, *C. corpulenta* and *C. woodjonesi*, accompanied *C. cranchii*, var. *australiense*, but the last-named was in greatest number, so that a series was obtained in a few minutes. The following variation obtains in these specimens:—Some young examples are relatively wider in form, being not much more than two and one-half times longer than wide; in specimens 5 mm. or so in length most of the first pleon segment is concealed. The number of articles and the length of the flagellum is variable in both pairs of antennae; in some cases the flagellum of the second antennae reaches slightly beyond the posterior margin of the fourth peraeon segment; in an example 5 mm. in length the flagellum of the first antennae is composed of nine articles and that of the second of nineteen. The number of spines on the apical margin of the telson is not constant and varies from six to fourteen. The fringe of hair on the inner margin of the first peraeopods is not always developed. A young specimen from the marsupium of a female 8 mm. in length is approximately 2 mm. in length, and has the apices of the branches of

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the uropods scarcely sub-bifid; the telsonic segment is much as in the adult, but the apical spines are blunt.

In large specimens of *C. cranchii* the distal half of the lateral margins of the telson is a little concave,⁽⁵⁾ and the apical part is narrower than in the Australian examples. In other respects the latter agree closely with the descriptions of *C. cranchii*, but as the difference in the shape of the telson is apparently constant they are provisionally given a varietal name. I am indebted to Dr. K. H. Barnard for a small specimen of *C. cranchii* (*C. vicinia*, Barn.)⁽⁶⁾ from South Africa; in this the postero-lateral margins of the telson are not concave, but the apical part of the telson is very narrowly rounded.

CIROLANA LATA, Haswell.

Cirolana lata, Hasw., Proc. Linn. Soc. N.S. Wales, vi., 1881, p. 192, pl. iv., fig. 1, and Cat. Austr. Crust., 1882, p. 286.

♀. Form somewhat widely obovate, two and one-third times longer than greatest width. Surface punctate. Cephalon three times as wide as medial length; anterior margin rounded, medianly very slightly excavated, and with a

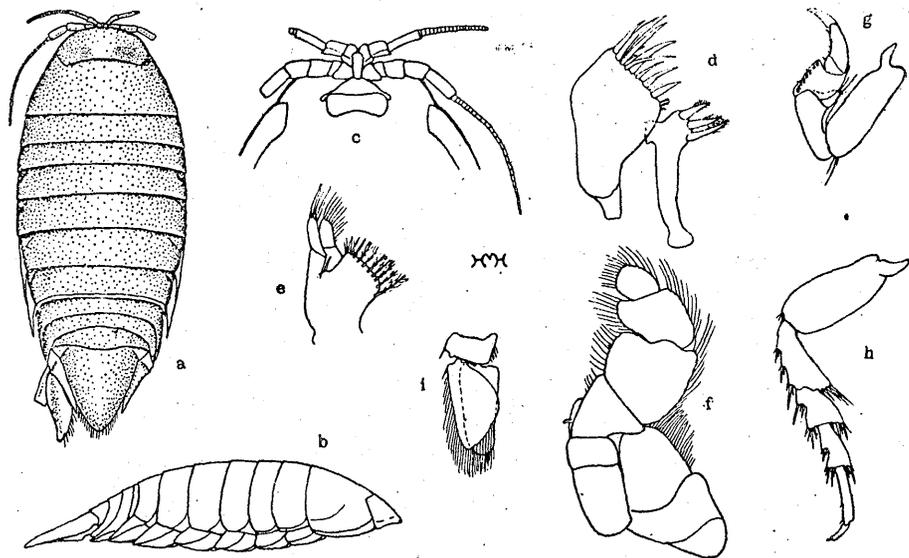


Fig. 8.

Cirolana lata, type female; a, dorsal view (3 diam.); b, lateral view (3 diam.); c, antennae, frontal lamina, clypeus and labrum (6 diam.); d and e, first and second maxillae (14½ diam.); f, maxilliped (14½ diam.); g and h, first and fifth pereopods (5½ diam.); i, first pleopod (5 diam.).

small, downbent, subtriangular median process, not visible in dorsal view and not separating bases of first antennae. No external trace of eye facets or pigment. Peduncle of first pair of antennae as long as first four articles of peduncle of second antennae; first article a little wider and shorter than second, which is wider than, and more than half as long as third; flagellum as long as peduncle, composed of twenty articles, the first very short. First article of peduncle of second antennae much longer than second, and shorter than third; fourth longer than third but only about two-thirds as long as fifth article; flagellum a little less

(5) Hansen, Journ. Linn. Soc., xxix., 1905, p. 351.

(6) Barn., Ann. S. Afr. Mus., x., 1914, p. 351a, pl. xxxv.

than half as long again as peduncle, reaching back well beyond hinder margin of first peraeon segment and composed of twenty-five articles. Frontal lamina more than twice as long as wide; lateral margins straight and slightly converging posteriorly; anterior margin convex and hinder margin concave; anterior end slightly projecting, visible in dorsal view. Medial length of clypeus subequal to that of labrum. Movable lacinia, molar part, and tridentate cutting edge of mandibles well developed. Outer lobe of first maxillae capped with ten strong, simple spines of varying lengths, and one thinner spine; one of the three outermost spines longer and much stouter than any of the others; inner lobe with three stout, plumose spines. Maxillipeds moderately wide, with basipodite less than one-third as long as palp. First peraeon segment embracing base of cephalon, twice as long as second segment, which is about as long as the seventh; fourth to sixth segments subequal in length, each a little longer than second; third segment slightly shorter than any of the others. Coxal plates each with a distinct furrow in addition to the submarginal furrow; first two pairs obtusely rounded posteriorly, not extending beyond hinder margins of their segments; those of fourth to seventh segments subacute posteriorly, successively extending further beyond hinder margins of their segments; the coxal plates of the sixth segment reach almost to the level of the hinder margin of the seventh segment, and the last pair reach to nearly the first fourth of the length of the pleon. First segment of pleon entirely concealed beneath last peraeon segment, and only a short portion of the second segment visible; postero-lateral angles of second segment subacute, a little backwardly produced; third, fourth, and fifth segments subequal in length; the postero-lateral angles of the third segment are greatly produced backwards and extend slightly beyond the produced and narrowly rounded postero-lateral angles of the fourth segment; lateral portions of fifth segment covered by postero-lateral parts of fourth segment; telsonic segment wider than medial length, which is equal to the second to fifth pleon segments and the last peraeon segment together; lateral margins convex, regularly converging to the acutely rounded apex. Protopod of uropods produced to almost two-thirds of length of endopod, which extends past apex of pleon; endopod narrowed on posterior fourth and narrowly subtruncate apically; armed with two short spines and some hairs, and with the inner margin convex, the outer margin sinuate. Peraeopods stout, the inner margin of the merus of first three pairs with a row of short stout spines; last four pairs armed with many strong spines on inner and apical margins of ischium, merus, and carpus. Outer ramus of first pair of pleopods wider and a little shorter than inner ramus.

Colour, after long preservation in alcohol—White.

Length, 16.5 mm.

Loc.—New South Wales: Off Broughton Islands, near Port Stephens.

The type (which, as the accompanying figure shows, has been damaged since Haswell described it) appears to be the only known example of this species. The uropods are now imperfect, but Haswell remarks that the exopod is "much narrower than . . . but of about equal length" to the endopod. Eyes are apparently absent. The exoskeleton is smoother and thinner for a small portion of the antero-lateral parts of the upper and underside of the cephalon, and by transmitted light a dark internal mass can be seen on each side of the basal part.

CIROLANA LATA, var. *INTEGRA*, Miers.

Cirrolana lata, var. *integra*, Miers, Zool. "Alert," 1884, p. 304.

Miers' description of this form is rather brief; the variety resembles *C. lata* in having the frontal lamina moderately broad, the form broadly ovoid, the first peraeon segment long, and the pleon short, but differs in having "the eyes black and subquadrate, the median rostral point prominent and prolonged between

the bases of the antennules to or nearly to the apex of the interannular plate," and the flagellum of the second antennae "13-15 jointed." Miers refers "three small specimens . . . with much hesitation to this species."

Hab.—North Queensland: Albany Island.

I have not seen this or the following species.

CIROLANA LAEVIS, Studer.

Cirolana laevis, Studer, Abh. Kon. Akad., Berlin, 1884, p. 21, pl. ii., fig. 8.

This species is also broadly suboval in form. The flagellum of the second antennae consists of fourteen articles and the eyes are elongate. The uropoda reach beyond the apex of the pleon; both rami are lanceolate and the exopod is narrower than the endopod. The shape of the frontal lamina is not mentioned, but the form of the antennae, as figured by Studer, separates *C. laevis* from *C. lata*. Without examining specimens it is difficult to determine the differences between this species and *C. lata*, var. *integra*.

Length, 10 mm.; width, 5 mm.

Hab.—"Östlich von Queensland aus 90 Faden Tiefe."

CIROLANA LINEATA, Potts.

Cirolana lineata, Potts, Carnegie Inst. of Wash., Papers from Dept. of Mar. Biol., viii., 1915, p. 89, pl. i., fig. 4, and text fig. 6.

♀. Oviparous. Body very convex. Form broadly ovate, about two and one-third times longer than greatest width. Surface with tiny and almost obsolete punctures. Cephalon about one and one-half times as wide as medial length; surface with some irregular foveae, and a tumidity on each side of anterior part;

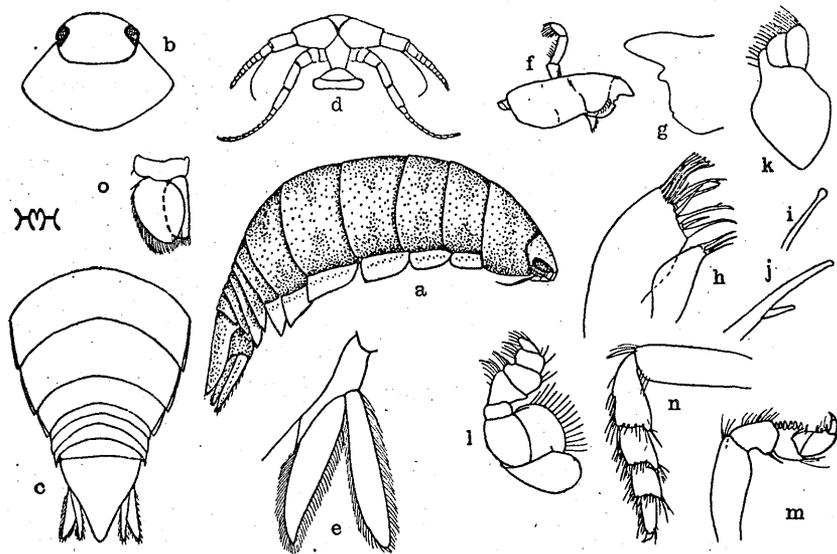


Fig. 9.

Cirolana lineata, female; a, lateral view (5 diams.); b, dorsal view of cephalon and first peraeon segment (5 diams.); c, dorsal view of pleon and hinder part of peraeon (5 diams.); d, antennae, frontal lamina, clypeus and labrum (10 diams.); e, uropod (12 diams.); f, mandible (16 diams.); g, cutting edge of mandible (32 diams.); h, first maxilla (32 diams.); i, tip of an outer, and j, tip of an inner, spine of outer lobe of first maxilla (188 diams.); k, second maxilla (32 diams.); l, maxilliped (16 diams.); m and n, first and seventh peraeopods (8 diams.); o, first pleopod (6 diams.).

anterior margin rounded, with a subtriangular, median process, scarcely visible in dorsal view but arching downwards and backwards, not completely separating the first pair of antennae and not quite meeting the apex of the frontal lamina. Eyes rather small, situate laterally. Antennae short. First pair reaching to hinder margin of cephalon and a little beyond end of peduncle of second antennae; peduncle two-jointed, the first article wider than, and one-half as long again as, second article; flagellum nearly as long as peduncle, composed of eleven articles, the first very short, and the second longer than any of the others. Second antennae not quite reaching to posterior margin of first peraeon segment; first three articles of peduncle short; fourth a little longer than fifth, which is slightly longer than the third; flagellum shorter than peduncle and not much longer than flagellum of first antennae, composed of ten articles and a tiny, terminal style. Frontal lamina large, pentagonal in shape, about one and one-half times longer than greatest width; with anterior apex acute, and lateral and postero-lateral angles obtuse. Clypeus and labrum rather short, subequal in length. Molar part of mandibles moderately well developed; first article of palp about four-fifths as long as second, and a little longer than third article. Outer lobe of first maxillae capped with thirteen spines of various lengths, many of them with a lateral branch and all with the apices blunt; inner lobe of one side with three, and of other with two, very acuminate simple spines. Basipodite of maxilliped less than twice as long as wide, almost as long as the first three articles of the five-jointed palp; inner plate subtriangular, with the apex narrowly rounded and reaching nearly to level of anterior margin of second article of palp, and with outer margin furnished with plumose hairs and inner margin with five spines. First peraeon segment embracing base of cephalon; a little longer than fourth to sixth segments; second and third segments about two-thirds as long as first; seventh segment much the shortest, less than half as long as the first. Coxal plates smooth, without oblique furrows; those of second and third segments rounded posteriorly, not extending to level of hinder margins of their segments; those of fourth segment subacute posteriorly, reaching to level of hinder margin of segment; remaining coxal plates with acute posterior angles, extending downwards and backwards beyond hinder margins of segments. Pleon rather short and scarcely more than one-half as wide as peraeon; first segment wholly concealed beneath last peraeon segment; second to fourth segments subequal in length, with posterior angles subacute; third segment the widest, its postero-lateral angles extending outwards and downwards beyond the level of the others; fifth segment a little longer than any of the others with sides, but not posterior angles, covered by lateral parts of fourth segment; telsonic segment scarcely wider than medial length, with sides a little sinuate and converging to the acutely rounded apex, which is armed with tiny spines; lateral parts downbent, forming a sheath into which the uropods fold. Uropods extending to apex of telson, with both rami narrow; inner process of protopod not reaching to middle of length of endopod; endopod very little wider than exopod with apex acute; apex of exopod narrowly rounded; margins of both endo- and exopod furnished with rather short hairs and short spines. First pair of peraeopods with a spine at outer distal angle of ischium, six strong, short spines on inner margin of merus, one on the carpus and three on the propodus; in the second and third pairs the distal margins of the ischium and merus are armed with some stout spines intermixed with stout setae, the merus has nine spines on the inner margin, the carpus two or three at inner distal angle, and the propodus has three smaller spines on inner margin; inner and distal margins of ischium, merus, carpus, and propodus of last four pairs armed with spines intermixed with strong setae; merus of seventh pair longer than carpus and more than half as long as ischium; basos not much expanded, more than three times longer than wide. Outer ramus of first pair of pleopods

longer than, and slightly more than twice as wide as, inner ramus.

Colour in alcohol.—Cephalon and telsonic segment densely mottled with dark purplish-brown. Peraeon segments and second to fifth pleon segments whitish, marked with dark mottled-brown along lateral margins and at middle of segments.

Length, 12 mm.

Loc.—Western Australia: Cottesloe (W. Austr. Mus. Coll). Queensland: Albany Passage (Austr. Mus. Coll.).

Hab.—Northern Queensland and Western Australia.

Only the female described above was collected from Cottesloe; a young example taken from the brood pouch is 2.35 mm. in length, and has the colouration much as in the adult, but differs in having the eyes relatively larger, the flagellum of the first antennae composed of six articles and that of the second of seven.

Four slightly smaller females in the Australian Museum Collection were taken in Albany Passage, and are labelled "Commensals of *Comatulae*." These are evidently some of the specimens referred to by Haswell,⁽⁷⁾ who, after describing *Synalpheus comatularum*, remarks: "Other commensals of these Comatulids were *Galathea deflexifrons*, and an undescribed species of Cymothoid, the latter usually ensconcing itself in the alimentary canal of its host, in which it remained buried with the exception of the anterior third of its body." These specimens (the colour of which is bleached) have the body even more convex transversely, and more arched longitudinally, than in the female from Cottesloe; also, in one or two specimens the lateral parts of the telson are not quite so much downbent (so that the telson in dorsal view appears less narrowed posteriorly), and the apex of the median process of the cephalon meets the apex of the frontal lamina, thus completely separating the first antennae.

Potts' specimens are much smaller than those now examined; he had both sexes, and gives the following measurements: male, length, 4.7 mm., and width, 1.5 mm.; female, length, 6 mm., and width, 2.5 mm. The male appendage of the second pair of pleopods is described as "slender, much longer than inner ramus of second uropod [pleopod], apex rounded." Potts remarks that the species "Occurs on crinoids, generally *Comanthus annulatum*, in Torres Straits. . . . While the isopod may make busy excursions on to the surface of *Comanthus*, it is often to be seen diving into the gut of the host, where it apparently spends a large part of its time. It does not feed, so far as I know, on the tissues of the crinoid itself, but only on the food it finds in the stomach."

The species is not typical of *Cirolana*, and, in view of the several new Eurydicid genera which have been erected in recent years, it is possible that a separate genus will be proposed to receive it. The mouth parts differ a little from those of *Cirolana*. The molar part of the mandibles is furnished with a row of setae, but the anterior margin of this process is only feebly serrate; the inner plate of the basipodite of the maxillipeds is different and the three spines on the inner lobe of the first maxillae are not plumose as in *Cirolana*, but are thin and simple, as in *Hansenolana*.⁽⁸⁾ In his description of the type species of the last-named genus⁽⁹⁾ Stebbing remarks that the narrow second joint of the peduncle of the first antennae "is followed by what appears to be an extremely short third peduncular joint." The condition, as shown in his figure, is similar to that obtaining in *C. lineata*, and in the new genus proposed below, in which this small article is treated as belonging to the flagellum; it certainly appears that in these species the normal first and second articles of the peduncle of this pair of antennae have been fused together to form a single article. A short article is present at the

(7) Hasw., Proc. Linn. Soc. N.S. Wales, vi., 1882, p. 762.

(8) Stebb., Herdman's Ceylon Pearl Fish. Suppl., xxiii., 1905, p. 15.

(9) Stebb., Willey's Zool. Res., 1902, p. 635.

base of the flagellum of the first antennae of some *Cirolanae* in which the three articles of the peduncle proper are quite distinct. Potts evidently treats the peduncle as three-jointed, for he says, "first joint . . . large, second a little smaller, and third much smaller."

CIROLANA SCHIOEDTEI, Miers.

Cirolana schioedtei, Miers, Zool. "Alert," 1884, p. 302, pl. xxxiii., fig. A; Nierstrasz, Zool. Meded., iv., 1918, p. 103, figs. —

♂. Form narrow, three and one-half times longer than greatest width, with sides subparallel. Surface with very small punctures. Cephalon more than twice as wide as medial length; anterior margin slightly concave, with a small median, downbent, subtriangular process, not meeting apex of frontal lamina and not completely separating first antennae. Eyes moderately large, elongate, situate on antero-lateral portions of head and with only a narrow part of each

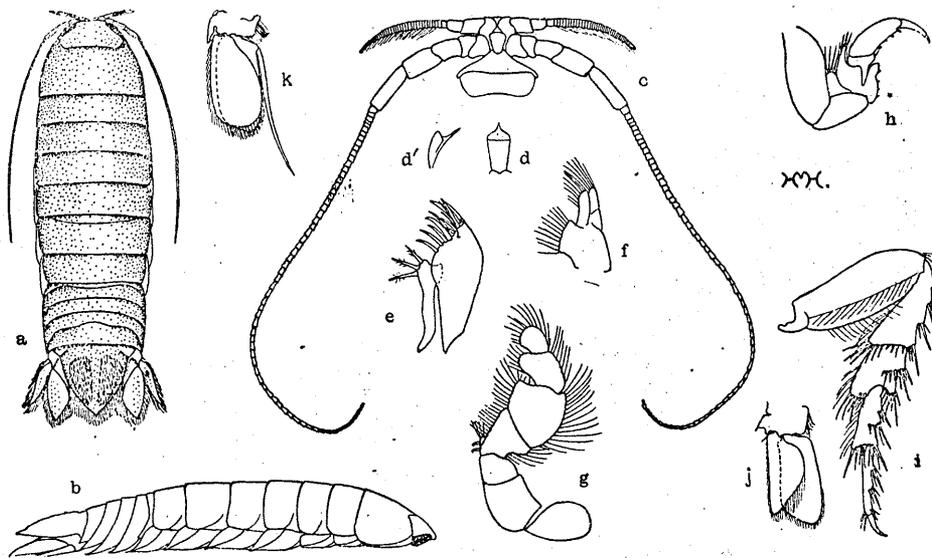


Fig. 10.

Cirolana schioedtei, male; a and b, dorsal and lateral views ($1\frac{1}{2}$ diams.); c, antennae, frontal lamina, clypeus and labrum (4 diams.); d, anterior, and d', lateral, views of frontal lamina (5 diams.); e and f, first and second maxillae ($7\frac{1}{2}$ diams.); g, maxilliped ($7\frac{1}{2}$ diams.); h and i, first and seventh pereopods (4 diams.); j and k, first and second pleopods (3 diams.).

visible in dorsal view. First antennae not quite reaching to end of peduncle of second antennae; articles of peduncle subequal in length; flagellum nearly twice as long as peduncle, composed of forty-four articles, the first longer than any of the others, which are extremely short. Second antennae reaching back distinctly beyond level of hinder margin of fifth pereopod segment; first two articles of peduncle short, the first a little longer than second; third not quite as long as first two together and almost as long as fourth article, which is a little shorter than the fifth; flagellum very long, composed of sixty-five articles and a terminal style. Frontal lamina more than twice as long as greatest width; postero-lateral margins converging, and antero-lateral margins sinuately converging to the acute apex; in lateral view the ventral profile is convex for the posterior two-thirds, then abruptly and obliquely truncated; from the truncated

surface arises the acuminate anterior part, the ventral surface of which is concave in lateral view. Clypeus wide, about as long as labrum, with apex emarginate. Mandibles normal; first article of palp slightly longer than third, and more than one-half as long as second article. Outer lobe of first maxillae capped with eleven strong simple spines and one thinner spine; inner lobe with three stout plumose spines. Maxillipeds moderately stout, the basipodite not much more than one-third as long as the five-jointed palp. First peraeon segment embracing base of cephalon, much longer than any of the others, which are subequal in length. Coxal plates each with a distinct, oblique furrow in addition to the usual submarginal furrow; those of second and third segments with obtuse posterior angles and not extending past level of hinder margins of their segments; remaining coxal plates with acute posterior angles, reaching well beyond hinder margins of their segments, the last pair extending to middle of length of postero-lateral margins of second pleon segment. Pleon not much narrower than peraeon; postero-lateral angles of first to fifth segments acute and not covered by preceding segments; all but a short posterior part of the fifth segment covered by last peraeon segment; first segment narrower and third wider than any of the others; fifth a little longer than second, third, or fourth; telsonic segment wider than medial length; lateral margins convexly converging to the acute apex; postero-lateral margins crenulate and furnished with a dense fringe of hairs; dorsum obscurely medianly carinate, for the greater part densely set with short hairs, leaving bare the basal area, a narrow median portion, and a narrow marginal part. Uropods reaching a little beyond level of apex of pleon; inner process of protopod extending to middle of length of endopod; exopod one-half as wide as, and shorter than, endopod, the outer margin sinuately curved and the inner margin slightly convex; both exo- and endopod with acute apices and with margins set with a dense fringe of hairs, intermixed with which are short spines. Peraeopods stout; outer distal part of ischium of first three pairs expanded, and outer distal part of merus produced to or a little beyond level of anterior margin of carpus, the outer margin and apex of produced part armed with spine-like setae; inner margin of merus in first pair with a few short spinules, and in second and third pairs with a series of spines; ischium, merus, carpus, and propodus of last four pairs armed with many strong spines; ischium folding back into a hollow in the outer posterior surface of basos, the anterior edge of the hollow, and also the margins of the basos, furnished with hairs; basos of seventh pair expanded, less than three times as long as greatest width; merus of this pair almost as long as carpus and more than one-half as long as ischium. Outer ramus of first pair of pleopods shorter than, and scarcely as wide as inner ramus; male appendage of second pair one-third as long again as outer ramus.

Length, 38 mm.

♀. The adult female is smaller in size and is relatively wider in form than the adult male, while the two patches of hair on the telson are less developed or absent.

The first segment of the pleon of an ovigerous female is almost wholly concealed beneath the last peraeon segment, and the postero-lateral angles are covered. The ova (in an early stage) are orange in colour, broadly cucumiform in shape, and about 2.4 mm. long by 1.65 mm. wide.

Length, 30 mm.

Colour in alcohol.—Pale brown or yellowish-white.

Loc.—Northern Territory (Prof. A. Watson). Western Australia: Broome (E. J. Stuart).

Hab.—Northern and North-west Australia.

A score of specimens of this large species are before me; as mentioned above, in this series the females have not the hair-tracts of the telson so well

developed as in the male, or the patches are absent altogether. This difference between the sexes may not always obtain, however, for Miers remarks that "There are in the British Museum Collection several specimens collected in Torres Straits. . . . All of them appear to be of the male sex. The terminal segment (only) is slightly pubescent above."

The flagellum of the second antennae is slightly variable in length and occasionally does not quite reach the level of the hinder margin of the fifth peraeon segment; the number of the articles of which it is composed vary, in the adult, between forty-nine and sixty-six. In the youngest example available (10 mm. in length) the second antennae reach to the middle of the length of the sixth peraeon segment, and the flagellum consists of forty-four articles and a terminal style; the seventh peraeopods, including the coxal plate, of this young example are not yet developed, but the first pleon segment is partly concealed beneath the last peraeon segment.

Cirolana vieta, n. sp.

♀. Form rather elongate, obscurely suboval, about two and three-fourths times longer than greatest width. Dorsum of cephalon, peraeon, and middle portions of first to fifth pleon segments not punctate but marked with numerous

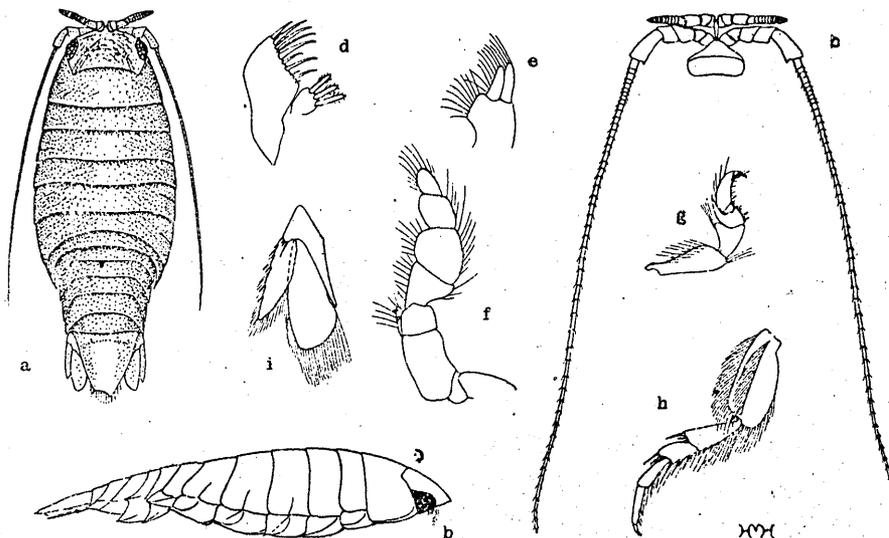


Fig. 11.

Cirolana vieta, type female; a and b, dorsal and lateral views (4 diams.); c, antennae, frontal lamina, clypeus and labrum (7 diams.); d and e, first and second maxillae (14½ diams.); f, maxilliped (14½ diams.); g and h, first and seventh peraeopods (5 diams.); i, uropod, ventral view (7 diams.).

transverse and oblique furrows, giving the surface a wrinkled appearance. Cephalon about one and three-fourths times wider than medial length; anterior margin distinctly bisinuate, with a small, median subtriangular process, partly separating basal articles of first antennae. Eyes moderately large, situate laterally. First antennae short, the tip of flagellum not reaching to end of peduncle of second antennae; peduncle not as long as first three articles of second antennae; first article a little shorter than second, extending in front at a right angle to rest of antenna; third article scarcely longer than second, with the posterior distal part produced and furnished with a short spine and two or three short setae;

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flagellum composed of fourteen articles. Second antennae with very long flagellum which reaches back to level of postero-lateral angles of fourth pleon segment; first two articles of peduncle short; third about one-half longer than second, one-third longer than fourth and two-thirds as long as fifth article; flagellum composed of forty-nine to fifty articles and a terminal style. Frontal lamina very elongate, almost linear, a little dilated anteriorly; anterior end not adpressed, directed forwards, and visible in dorsal view between the bases of the antennae. Clypeus as long as labrum; mid-line of frontal lamina and clypeus obscurely carinate. Mandibles normal, the first article of palp more than one-half as long as second and longer than third article. Outer lobe of first maxillae capped with twelve spines of varying size, three of the outermost being denticulate; inner lobe with three stout, plumose spines. Maxillipeds rather slender, the basipodite one-half as long as the first four articles of the five-jointed palp. First peraeon segment embracing base of cephalon, longer than any of the others; second, sixth, and seventh segments shorter than third, fourth, or fifth segments, which are subequal in length; seventh segment much the shortest. Coxal plates each with a subobliquely curved furrow in addition to the submarginal furrow and various oblique wrinkles; plates of second to fifth segments subrectangular, not or scarcely passing hinder margins of their segments; those of sixth segment subrectangular, extending beyond posterior margin of their segment, and those of seventh segment subtriangular, posteriorly subacute, and reaching to level of hinder margin of first pleon segment; the coxal plates of the second segment are rounded posteriorly and the posterior angles of those of the third to sixth segments are produced into a small, acute point. Pleon much narrower than peraeon; all segments visible, the first shorter than the second to fifth, which are subequal in length; the posterior margins of the first two segments are tri-sinuate, the concave dorsal portion of these margins meeting the concave infero-lateral margins at an acute angle; lateral parts of fifth segment covered by postero-lateral parts of fourth segment; telsonic segment at least as long as basal width, the lateral margins slightly sinuate, and converging to the apex, which is asymmetric and abnormal. Uropods not reaching to end of pleon; protopod with two or three marginal spines on inferior side near articulation of exopod, and with inner process on one side reaching to two-thirds of length, and on other side not reaching to half of length of endopod; exopod lanceolate, more than three-fourths as long, and but half as wide, as endopod, the margins furnished with short spines and plumose hairs; outer margin of endopod almost straight, posterior margin obliquely rounded; margins with plumose hairs. Peraeopods moderately stout; outer distal part of merus of first pair produced to level of inner apex of carpus, the apex of produced part with a strong, short spine and some setae; basos of seventh pair considerably expanded, two and one-fourth times longer than greatest width; merus four-fifths as long as carpus and more than half as long as ischium. Outer ramus of first pair of pleopods shorter than and nearly twice as wide as inner ramus.

Colour completely bleached after long preservation in alcohol.

Length, 13 mm.

Loc.—South Australia: Encounter Bay (Dr. Robt. Pulleine). Type, female, in S. Austr. Mus., Reg. No. C278.

Only a single, slightly abnormal specimen was taken. As in *C. corpulenta* the first antennae approach the condition found in *Eurydice*, but other structural details of *C. vieta* are typical of the genus *Cirolana*. The very long flagellum of the second antennae and the wrinkled appearance of the dorsal surface separate this from all other Australian species.

Cirolana concinna, n. sp.

♀. Form widely suboval, two and one-third times longer than greatest width. Surface with transverse series of punctures submarginal to posterior edges of cephalon, and of peraeon and pleon segments; remainder of dorsum sparsely punctate. Cephalon about twice as wide as medial length; anterior margin bisinuate and with a small, median, subtriangular process, not separating bases of first antennae. Eyes moderately large, situate laterally. First antennae long, reaching back nearly to hinder margin of third peraeon segment; peduncle extending to about one-half of length of fourth article of second antennae; first article short, about two-thirds as long as second; third scarcely longer than first article; flagellum three times as long as peduncle, composed of eighteen articles and a terminal style. Second antennae long, extending back to posterior margin of sixth peraeon segment; first two articles of peduncle short, the second shorter than the first; third article as long as first two together and a little shorter than

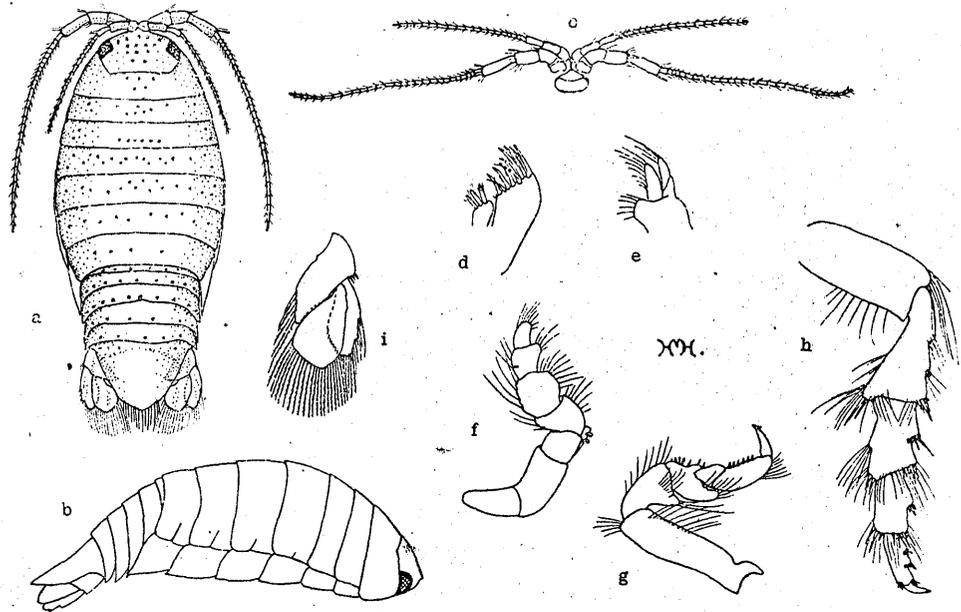


Fig. 12.

Cirolana concinna, type female; a and b, dorsal and lateral views ($6\frac{1}{2}$ diams.); c antennae, frontal lamina, clypeus and labrum ($6\frac{1}{2}$ diams.); d and e, first and second maxillae (29 diams.); f, maxilliped (29 diams.); g and h, first and seventh peraeopods ($14\frac{1}{2}$ diams.); i, uropod ($14\frac{1}{2}$ diams.).

fourth, which is more than one-half as long as fifth article; flagellum two and one-half times longer than peduncle, composed of twenty-seven articles and a terminal style. Frontal lamina linear, slightly dilated anteriorly and posteriorly. Clypeus scarcely as long as labrum, projecting outwards and forwards. Outer lobe of first maxillae capped with thirteen spines of various sizes, many of them being denticulate; inner lobe with three stout, plumose spines. Maxillipeds moderately slender, the basipodite less than half as long as the five-jointed palp. First peraeon segment embracing cephalon to level of middle of eyes; not very long, its medial length greater than that of second, third, or seventh segments, but less than that of fourth, fifth, or sixth segments, which are subequal in length. Coxal plates with sparse punctures but without oblique furrows; first two pairs

subrectangular, not extending past the hinder margins of their segments; last four pairs with subacute or acute posterior angles, extending beyond the posterior margins of their segments, the last pair reaching almost to postero-lateral angles of third pleon segment. Greater part of first segment of pleon concealed beneath last peraeon segment, leaving visible only a short portion; postero-lateral angles of second to fifth segments acute and free, those of the fifth segment not covered by lateral parts of preceding segment; telsonic segment about one-half as wide again as medial length; lateral margins slightly sinuate, converging to the widely rounded and slightly crenulate posterior margin, which is furnished with long plumose hairs; this crenulate hinder portion of the edge forms a very obtuse angle with the lateral margin on each side. Uropods extending to level of apex of pleon; protopod with three setae on outer margin and with inner process very broad, extending to beyond middle of length of endopod, and with plumose hairs on posterior part of inner margin; exopod shorter than, and about two-thirds as wide as, endopod, the outer margin with two nicks, from each of which emanates a short spine; apex of endopod broadly, obliquely, and roundly truncate; postero-lateral and apical margins of both exo- and endopod furnished with long plumose hairs, intermixed with which are a few short inconspicuous spines. Peraeopods moderately slender, furnished with many long hairs and spines; outer distal part of merus of first pair a little forwardly produced; basos of seventh pair expanded, about two and one-half times longer than greatest width; the inner and apical margins of the ischium, merus, carpus, and propodus of the seventh peraeopods are set with clusters of strong spines, some of which are acute and others bluntly rounded apically; merus longer than carpus and about two-thirds as long as ischium. Outer ramus of first pair of pleopods longer and wider than inner branch.

Colour in alcohol.—White, marked with sparse black chromatophores arranged in transverse series, as shown in the accompanying figure.

Length, 8 mm.

Loc.—Western Australia: Cottesloe (type loc., W. Austr. Mus. Coll.). New South Wales: Broughton Islands, off Port Stephens (Austr. Mus. Coll.). Type, female, in W. Austr. Mus., Reg. No. 10789.

The number of articles in the flagella of the antennae is somewhat variable, and in immature specimens the first segment of the pleon is not at all concealed. According to Boone's figure of *C. hermitensis*, the first peraeon segment of that species is not much longer medianly than the other segments, as in *C. concinna*; the last-named species differs, however, in having very different antennae and in not having the frontal lamina "conspicuous with the anterior margin triangulate."

Neocirolana, n. gen.

Cephalon partly immersed in first peraeon segment. Eyes set widely apart. First antennae short, with the peduncle composed of two articles. Peduncle of second antennae consisting of five articles. Mandibles considerably narrowed towards the cutting edge, which is short and more or less distinctly tri- or quadri-dentate; palp three-jointed, the second article not very long; movable lacinia and molar part well developed, the first with stout and rather short spines and the last with triangular processes on anterior margin. Apex of outer lobe of first maxillae capped with many spines and that of inner lobe with three plumose spines. Maxillipeds with five-jointed palp; basipodite wide and not very elongate, the inner plate with two coupling spines. Frontal lamina distinct. Dactyli of all peraeopods bi-ungulate, there being a small claw on inner margin of dactylus near the base of the larger terminal claw. Pleon short, the lateral parts of fifth segment concealed by postero-lateral portions of preceding segment. Male

appendage of second pleopods attached at base of inner ramus. Inner process of uropods well produced.

This genus is close to *Cirolana*, but differs in the narrower cutting part of the mandibles, in the bi-ungulate dactyli of the legs, etc.

Hansenolana⁽¹⁰⁾ and *Conilorpheus*⁽¹¹⁾ of Stebbing differ in having the male appendage attached far from the base of the inner ramus of the second pleopods. *Pontogelos* of Stebbing⁽¹²⁾ has the second joint of the mandibular palp very long, and the flagellum of the first antennae of "extraordinary length." *Pontogeloides* of Barnard⁽¹³⁾ has but two articles in the palp of the mandibles, and *Gnatholana* of the same author⁽¹⁴⁾ has no distinct frontal lamina.

The peraeopods of the type species of *Conilorpheus* (*C. herdmani*) are also apparently bi-ungulate, having "on the inner margin a small tooth or spine at the base of the short curved nail."

***Neocirolana obesa*, n. sp.**

♂. Form oval, two and one-half times longer than greatest width. Surface with sparse and not very distinct punctures. Cephalon twice as wide as medial length; anterior margin somewhat conically rounded in outline and with a small, median, subtriangular process, not visible in dorsal view, arching downwards and backwards and meeting frontal lamina, thus completely separating the first pair of antennae. Eyes not very large, situate postero-laterally and widely separated.

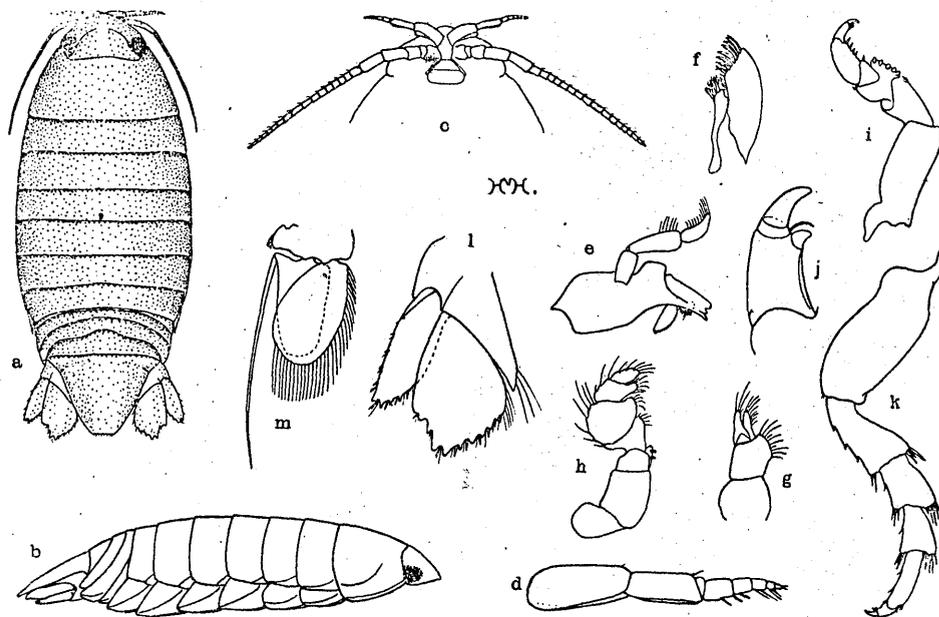


Fig. 13.

Neocirolana obesa, type male; a and b, dorsal and lateral views (6½ diams.); c, antennae, frontal lamina, clypeus and labrum (8 diams.); d, first antenna (30 diams.); e, mandible (30 diams.); f and g, first and second maxillae (30 diams.); h, maxilliped (30 diams.); i and k, first and seventh peraeopods (15 diams.); j, dactylus of first peraeopod (75 diams.); l, uropod (15 diams.); m, second pleopod (15 diams.).

(10) Stebb., Willey's Zool. Res., 1902, p. 634.

(11) Stebb., Herdman's Ceylon Pearl Fish., Suppl. Rep., xxiii., 1905, p. 13.

(12) Stebb., Trans. Linn. Soc., xiv., 1910, p. 97.

(13) Barn., Ann. S. Afr. Mus., x., 1914, p. 325a.

(14) Barn., loc. cit., xvii., 1920, p. 352.

First antennae reaching almost to end of peduncle of second antennae; first article of two-jointed peduncle wider, and distinctly longer, than second; flagellum short, not as long as first article of peduncle, and composed of five articles and a terminal style; the first article is very short. Second antennae reaching well beyond hinder margin of first peraeon segment; second article of peduncle shorter than either first or third; fourth article almost as long as fifth and nearly as long as first three articles together; flagellum composed of sixteen articles and a terminal style. Frontal lamina nearly twice as long as wide, subpentagonal in shape. Clypeus shorter than labrum. Palp of mandibles stout, the first article almost as long as third, and more than half as long as second. Outer lobe of first maxillae capped with ten spines (all but two of which are denticulate) and one thinner spine, and with one simple, and several plumose, setae on distal part of interior margin; inner lobe with three plumose setae. Maxillipeds moderately wide, the basipodite about one-fourth longer than wide, and more than half as long as the five-jointed palp. First peraeon segment embracing base of cephalon, much longer than any of the others; second to sixth segments subequal in length, each longer than the seventh. Coxal plates each with a well-marked oblique furrow in addition to the submarginal furrow; plates of second and third segments obtusely rounded behind, not extending beyond posterior margins of their respective segments. Whole of first pleon segment, and greater part of second, concealed beneath last peraeon segment; second segment wider, and fifth longer, than first, third, or fourth segments; telsonic segment wider than long, with the lateral margins slightly convex and converging to the truncate apex, which is crenulate and furnished with tiny spines. Inner process of protopod of uropods large, extending beyond middle of length of endopod; margins of rami with but sparse hairs; exopod barely half as wide as, and shorter than, endopod, with a row of small spines along outer margin (which is almost straight), with the apex sub-bifid, and with three serrations in the inner margin, each incision set with a spine; endopod with outer margin slightly and evenly convex for anterior two-thirds, thence incised, the incision further divided into two or three smaller serrations; intero-posterior margin serrate and apex sub-bifid; a spine emanates from most of the smaller marginal incisions. Peraeopods rather slender, the dactylus of each bi-ungulate; ischium of first pair with one blunt spine on inner margin near distal end, and merus with five blunt spines on inner margin; carpus with one, and propodus with four, acute spines on inner margin; ischium of second and third pairs with one or two strong, acute spines on outer apex and three blunt spines near distal end of inner margin; merus with two acute spines at outer apex and six blunt spines on inner margin, carpus with one or two, and propodus with three, spines on inner margin; last four pairs of peraeopods with many spines on distal margins of ischium, merus, carpus, and propodus, and a few on inner margins of these joints; basos of seventh pair more than twice as long as wide; merus longer than carpus and shorter than ischium. Outer branch of first pair of pleopods slightly longer than, and less than twice as wide as, inner ramus; male appendage of second pair long, acute, twice as long as the inner ramus.

Colour in alcohol.—Yellowish-white.

Length, 9 mm.

♀. Oviparous. Form wider than in male, two and one-fourth times longer than greatest width. Head shorter, less conically rounded in front, more than twice as wide as medial length. Flagellum of first antennae composed of seven articles and a terminal style, that of second of twenty articles and a terminal style. Apex of telson rounded and scarcely subtruncate.

Length, 8.7 mm.

Loc.—New South Wales: Port Stephens and ? Port Jackson (Austr. Mus. Coll.). Type, male, and allotype, female, in Austr. Mus., Reg. Nos. P8203 and P8204.

Two separate series were taken from Port Stephens; the type specimens were secured in Nelson's Bay, in Port Stephens, in company with Sphaeromids, and with the others was a specimen of *Cirolana cranchii*, var. *australiense*. The tube of a *Spirorbis* is firmly attached to the left uropod of one of the examples thought to have been obtained at Port Jackson.

In a young example removed from the marsupium of the allotype, the apex of the telson is obtusely angular, while the rami of the uropods are not conspicuously serrate as in the adult, and are apically subtruncate and not sub-bifid; the second antennal flagellum of this specimen consists of but nine articles and a terminal style.

The length of the antennae, and the number of articles in their flagella, varies somewhat in the adult; the second antennae may reach only to level of posterior margin of the first peraeon segment, or extend to slightly beyond hinder margin of second segment. In a male 8 mm. in length the flagellum of the first antennae is seven-jointed, and that of the second is twenty-jointed. In a few examples only a small postero-lateral portion of the second pleon segment is visible, and in one male there are but two spines on the apex of the inner lobe of the first maxilla of one side.

This species resembles the much smaller *Cirolana excisa*, Rich.,⁽¹⁵⁾ but differs in having the flagellum of the second antennae shorter and composed of fewer articles, the first peraeon segment longer, and the telson more narrowed posteriorly. In *C. excisa* the peduncle of the first antennae is three-jointed.

EXCIROLANA, Richardson.

Excirrolana, Rich., Proc. U.S. Nat. Mus., xliii., 1913, p. 201.

The following characters are given in Richardson's diagnosis of this distinct genus. The middle of the front of the cephalon is produced in a prominent and anteriorly dilated process, which separates the antennae. The sides of the fifth pleon segment are not covered by the lateral parts of the fourth segment. The uropods and apical part of the telson are provided with long plumose hairs, but the outer margin of the exopod of the former is always naked. The pleopods have both rami long and slender. Mouth parts as in *Cirolana*.

EXCIROLANA ORIENTALIS, Dana.

Cirolana orientalis, Dana, U.S. Expl. Exped., Crust., xiv., 1853, p. 773, pl. li., fig. 7; Hansen, K.D. Vid. Selsk. Skr. (6), iii., 1890, p. 353, pl. iv., fig. 4; Stebb., Willey's Zool. Res., 1902, p. 633; Rich., Wash. Bur. of Fish., Doc. No. 736, 1910, p. 4.

Excirrolana orientalis, Rich., Proc. U.S. Nat. Mus., xliii., 1913, p. 201.

♀. Form oval, two and one-half times longer than greatest width. Surface finely and rather sparsely punctate. Cephalon much wider than medial length including frontal process, which is apically truncate. Eyes dorso-lateral, widely separated. First antennae reaching to hinder margin of first peraeon segment; third article of peduncle shorter than first or second, which are subequal in length; flagellum composed of sixteen articles, the first very short. Second antennae reaching almost to hind margin of fourth peraeon segment; last article of peduncle about one-third longer than penultimate; flagellum composed of twenty-two articles. Frontal lamina large, in form of an inverted triangle, with apex beneath extreme anterior apex of clypeus. Outer lobe of first maxillae capped with ten

(15) Rich., Wash. Bur. of Fish., Doc. No. 736, 1910, p. 6, fig. 4.

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spines, most of which are denticulate; inner lobe with three plumose spines. Basipodite of maxillipeds as long as first three articles of palp together. First, fifth, and sixth pereon segments subequal in length, a little longer than any of the other segments, which are subequal in length. Coxal plates each with a well-marked oblique furrow; plates of second and third segments subquadrate, not reaching beyond posterior angles of their segments; remaining plates subtriangular, reaching beyond hinder angles of their respective segments, those of seventh segment extending to middle of length of lateral margin of fourth pleon segment. Greater part of first pleon segment concealed beneath last pereon segment; second segment a little longer than third, which is slightly longer than fourth; fifth distinctly longer than fourth segment; telsonic segment subtriangular, with sides rounded; dorsum with a pair of large foveae near base; apex with two short spines. Uropods reaching beyond apex of pleon, protopod with a spine at middle of outer margin and two marginal spines on ventral side near outer posterior angle; inner process reaching to about level of middle of length of endopod, with plumose hairs on inner margin; endopod shorter than, and more than half as wide again as, exopod, with outer edge emarginate; intero-posterior margins of endopod and inner margin of exopod provided with a row of short,

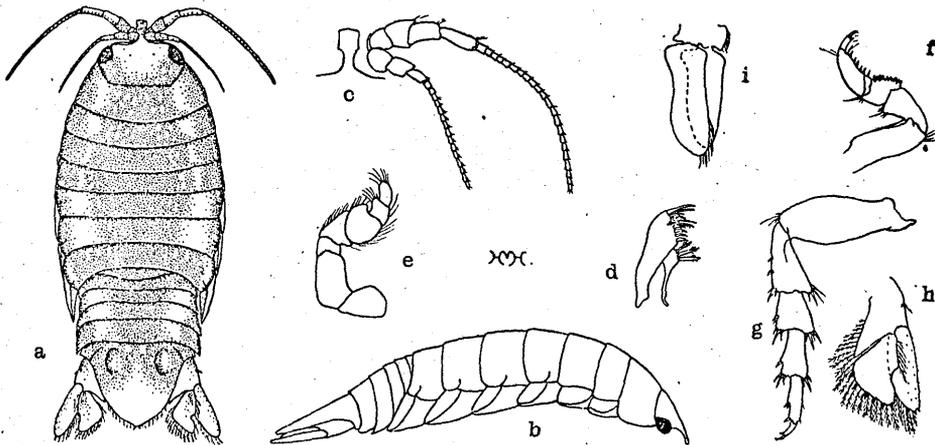


Fig. 14.

Exciorolana orientalis, female; a and b, dorsal and lateral views (5 diams.); c, dorsal view of frontal process of cephalon and antennae (9½ diams.); d, first maxilla (14 diams.); e, maxilliped (14 diams.); f and g, first and seventh pereopods (9½ diams.); h, uropod (9½ diams.); i, second pleopod (9½ diams.).

stout spines in addition to the plumose hairs; exopod suboval, narrowly truncate apically, dotted with tiny spinules towards and on outer margin. Dactyli of pereopods bi-ungulate; first pereopods with six blunt and three acute spines on inner margin of merus, one acute spine on inner margin of carpus and five on that of propodus; basos of seventh pereopods not greatly expanded; ischium three-fourths as long again as merus, which is subequal in length to carpus.

Colour in alcohol.—Dorsum yellowish, with a broad median brown marking and a narrower lateral brown stripe; anterior part of head and posterior part of telson yellowish.

Length, 11 mm.

Loc.—Queensland: Bowen, Port Denison (E. H. Rainford).

Hab.—Nicobar Islands, Malay Archipelago, New Guinea, Isle of Pines, and North-eastern Australia.

The female described above, and three immature examples, were taken with a hand-net from a patch of weed in 3 feet of water at low tide. Richardson says that the species is "Very ravenous, attacking small fishes, first devouring eyes, then gills, then working into body cavity—all of this is done inside of ten minutes."

The salient features of *E. orientalis* are the two conspicuous pits on the dorsum of the telson, and the emargination of the outer edge of the endopod of the uropods.

Phoratopodidae, n. fam.

Both pairs of antennae with the peduncle large and expanded, and with the flagellum short; first antennae not shorter than second. Mandibles with the distal part conspicuous, the cutting edges moderately wide, trifid, or quadridentate, meeting behind the large labrum; movable lacinia large, attaining greater development in mandible of left side than in that of right; molar process tiny. Outer lobe of first maxillae wide, capped with many spines; inner lobe with four plumose spines. Second maxillae of moderate size, the three plates very setose. Maxillipeds with the palp free, five-jointed, broad and setose; basipodite not elongate, the inner plate with two coupling spines. Peraeon semicylindrical in form. Coxal plates well defined on second to seventh segments, the first five pairs very large and the last abruptly smaller. First pair of peraeopods subchelate, and second and third pairs imperfectly subchelate; fourth, fifth, and sixth pairs with merus, carpus, and propodus greatly expanded and flattened; seventh peraeopods much less expanded; dactylus rudimentary or absent in fourth to seventh peraeopods. Pleon composed of six distinct segments. Pleopods well developed. Uropoda large, lateral, forming a caudal fan with the telsonic segment.

This family approaches the Eurydicidae in the form of the mouth parts, but the molar process is small. In other respects it is totally dissimilar, the great development of the coxal plates of the second to sixth peraeon segments, and the curious modification of the posterior peraeopods being very distinctive. The first pair of peraeopods are subchelate, in the genotype of the Eurydicid genus *Hansenolana*, but there the other peraeopods are normal.

Phoratopus, n. gen.

The only genus of the family is represented by a single species.

Phoratopus remex, n. sp.

♀. Form suboval, with sides of peraeon subparallel, more than twice as long as wide. Surface almost smooth. Cephalon immersed in first peraeon segment, rather more than half as wide again as medianly long; anterior margin sinuate, with a median subtriangular process separating the bases of the first articles of the first antennae. Eyes apparently absent. First antennae not reaching to hinder margin of first peraeon segment, slightly longer than second pair; peduncle four-jointed, the margins of the articles furnished with long plumose hairs; first article greatly expanded, not much longer than wide, and about one-third longer and slightly wider than second; third article as long, but only half as wide, as second; fourth short, almost as wide, but only about one-fourth as long, as third article; flagellum composed of six articles and a small, rounded, terminal style, immersed in the sixth article, which is abruptly smaller than the others. Peduncle of second antennae five-jointed; first article short and inconspicuous; second greatly expanded, almost as long as wide, with plumose hairs on anterior margin; third article about three-fourths as wide as, and slightly longer than, second, with long hairs on distal half of anterior margin and near posterior distal angle; fourth article as wide, and half as long, as third, with long

plumose hairs on posterior margin and distal part of anterior margin; fifth article nearly as long, but only half as wide, as second, with long plumose hairs on posterior margin and distal part of anterior margin; flagellum consisting of five articles and a very short, apically truncate, terminal style; a tuft of long hairs emanates from the antero-distal margin of each article and from apex of style. Clypeus rather short, strongly keeled. Labrum large and conspicuous, less than twice as wide as long. Mandibles with cutting edge tridentate or quadridentate; palp stout, the first article shorter than the third, which is a little more than half as long as second article; movable lacinia of left mandible highly chitinized and hard, with anterior margin tridentate (obscurely quadridentate); that of right mandible much thinner and less chitinized, with anterior margin feebly and

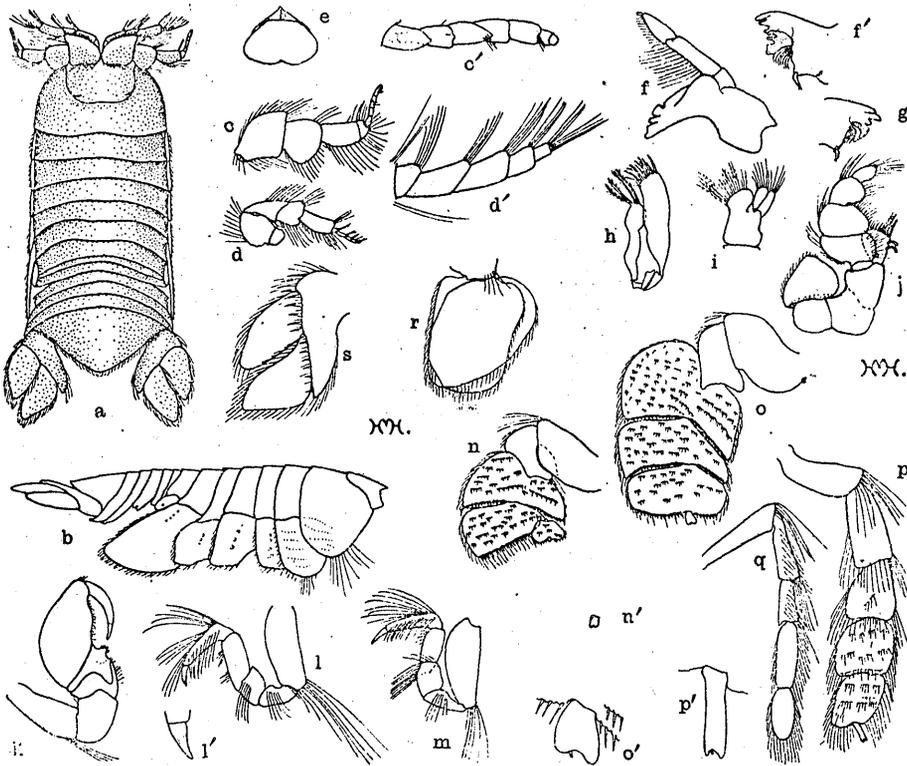


Fig. 15.

Phoratopus remex, type female; a and b, dorsal and lateral views (2 diams.); c and d, first and second antennae (4 diams.); c¹ and d¹, flagellum of first and second antennae (15 diams.); e, clypeus and labrum (4½ diams.); f, left mandible (6 diams.); f¹, ventral view of anterior part of left mandible (6 diams.); g, ventral view of anterior part of right mandible (6 diams.); h and i, first and second maxillae (8 diams.); j, maxilliped (8 diams.); k to q, first to seventh pereopods (4 diams.); l¹, claw of second pereopod (32 diams.); n¹, o¹, and p¹, dactylus of fourth, fifth and sixth pereopods respectively (15 diams.); r, second pleopod (4 diams.); s, uropod (4 diams.).

irregularly serrate, both laciniae with strong spines; molar process rudimentary, apically bidentate. Outer lobe of first maxillae capped with eleven simple spines and one thinner spine; inner lobe with four long plumose spines. Maxillipeds with basipodite stout, the inner plate bearing two coupling hooks and having the truncate apex furnished with nine spines and some plumose hairs; first article of palp very short, second and third subequal in length, each much wider than

long; fourth shorter and narrower than third, and fifth shorter and narrower than fourth. First peraeon segment longer than any of the others, which are more or less subequal in length. Coxal plates without submarginal or oblique furrows, smooth excepting for a few shallow grooves and pits, the first five pairs greatly enlarged; plates of second to fourth segments not or scarcely passing beyond posterior angles of their segments and those of fifth segment reaching beyond level of hinder margin of their segment; plates of sixth segment larger than any of the others, reaching back to level of posterior angles of fourth pleon segment; plates of seventh segment small and comparatively inconspicuous. First pleon segment slightly shorter and narrower than second, which is subequal in length to third to fifth segments; lateral parts of fourth and fifth segments produced, the sides of the fifth not covered by preceding segment; lateral parts of third segment broken; telsonic segment subtriangular, twice as wide as medianly long, the lateral margins furnished with short hairs. Protodop of uropods large, the outer margin with a few strong spines and long hairs, the outer posterior margin with some rather slender setae and spines dorsally and with stronger spines and setae ventrally; inner process well produced, reaching beyond level of apex of pleon, the distal part of the inner margin with long plumose hairs; rami of uropods broad, subequal in length, subacutely rounded apically, the inner side of endopod very obliquely truncate. First pair of peraeopods subchelate, the dactylus provided with a curved claw and folding back on to the bristle-set inner edge of the enlarged, suboval propodus; posterior distal angle of basos with a tuft of long hairs. Dactylus of second and third peraeopods much shorter than in first, but with distinct claw; joints of these peraeopods furnished with various tufts of hairs and propodus with conspicuous, hair-like sensory organs, each of which narrows abruptly towards its apex, which is rounded. Last four pairs of peraeopods more or less expanded and flattened. Merus, carpus, and propodus of fourth pair greatly expanded, each about twice as wide as long, with the margins provided with plumose hairs and some spines and with dorsum furnished with numerous groups of small adpressed spines; posterior margin of merus fitting over anterior margin of carpus, the dorso-posterior margin set with a row of short stout spines; propodus articulating near inner posterior angle of carpus, abruptly smaller than carpus; dactylus very small, obcordate, without claw. Merus, carpus, and propodus of fifth peraeopods of same character as in fourth pair, but the propodus is almost as large as the carpus; dactylus rudimentary, somewhat obcordate, with a minute claw. Sixth peraeopods much less expanded than fourth or fifth, but with longer marginal hairs and with the spines on the dorsum of merus, carpus, and propodus longer, sparser, and more slender; dactylus tiny, elongate, parallel-sided, the apex incised, and bearing a minute claw. Seventh peraeopods slender, much less expanded than sixth, with long marginal hairs; propodus oval and dactylus completely aborted. Pleopods with both rami membranaceous, the outer a little wider than inner.

Colour completely bleached.

Length, 20.5 mm.

Loc.—South Australia: Encounter Bay (Dr. R. H. Pulleine). Type in S. Austr. Mus., Reg. No. C302.

Only a single, non-ovigerous female was secured by Dr. Pulleine in 1886, in company with *Cirolana vieta*. The specimen is somewhat damaged, and after long preservation in methylated spirit has become soft and brittle.

Family CORALLANIDAE.

The distal half of the mandibles is narrow, directed inwards and hidden under the lips; the movable lacinia is small or vanishing and the molar process is often rudimentary, but may be well developed. The outer lobe of the first

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maxillae tapers towards the apex, which is armed with tiny spines, or with a few large spines, and, sometimes, a few small inconspicuous spines also. The apex of the second maxillae is not furnished with spines, but sometimes a few setae are present.

KEY TO AUSTRALIAN GENERA.

- a. Outer lobe of first maxillae ending in two spines (or unciform teeth).
 Molar process of mandibles wanting *Alcirona*
- aa. Apex of outer lobe of first maxillae without large spines, or with only one large spine. Molar process of mandibles developed.
- b. Outer lobe of first maxillae ending in a sharp, curved unguis, at base of which are a few small hooked spines. Peduncles of first pair of antennae two-jointed *Argathona*
- bb. Outer lobe of first maxillae furnished with tiny hooked spines at distal end, but without large claw. Peduncle of first pair of antennae three-jointed *Smicrostoma*

ALCIRONA, Hansen.

Alcirona, Hansen, K.D. Vid. Selsk. Skr. (6), v., 1893, pp. 285, 313, and 391; Stebb., Hist. Crust., 1893, p. 346; Rich., Bull. U.S. Nat. Mus., No. liv., 1905, p. 157.

ALCIRONA MULTIDIGITATA, Miers.

Cirolana multidigitata, Miers, Journ. Linn. Soc., Zool., xiii., 1878, p. 511, pl. xxiv., figs. 6-11.

Alcirona multidigitata, Stebb., Willey's Zool. Res., 1902, p. 637.

Stebbing (*ut supra*) says that the species "named *Aega multidigita* by Dana, and that named *Cirolana multidigitata* by Miers," should apparently be referred to *Alcirona*. I have seen no specimens of the species.

Hab.—Philippine Islands and Western Australia (*fide* Miers).

ARGATHONA, Stebbing.

Argathona, Stebb., Herdman's Ceylon Pearl Fish., Suppl. Rep., xxiii., 1905, p. 17, and Trans. Linn. Soc., xiv., 1910, p. 99, and Rec. Ind. Mus., vi., 1911, p. 179.

Brotherus, Budde-Lund, Voeltzkow's Reise in Ostafrika, ii., 1908, p. 306.

Stebbing erects a family for the reception of this genus and cites the following distinguishing characters:—"Mandibles with cutting edge bidentate or simple; molar represented by a feeble blade, not serrate. First maxillae with inner plate broadly truncate, outer strongly produced, ending in an unguis with a small curved spine at its base. Second maxillae very short, ending in a broadly rounded single lobe. Maxillipeds six-jointed, second joint not elongate, fourth and fifth joints fused together, seventh well developed, blunt. Male appendix of second pleopods affixed at the base of the ramus."

In 1910 Stebbing somewhat expands the limitations of the family to include a second species (*A. reidi*) in which the palp of the maxilliped is composed of five distinct articles. In the same year Richardson,⁽¹⁶⁾ in dealing with some Isopods from the Philippine Islands, describes three new species of *Argathona*. Under one of these (*A. setosa*) she remarks:—"I have placed this species in Stebbing's genus *Argathona*, notwithstanding the slight difference in the form of the second maxilla, which, instead of ending in a curved, sharp unguis, seems to end bluntly. There is also an additional article to the maxillipeds, but this may have been overlooked in Stebbing's specimen." A year later Stebbing notes that *Brotherus*, of Budde-Lund, "is not distinguishable from *Argathona* . . . unless the fusion of the fourth and fifth joints of the maxillipeds of *Argathona normani* suffices to distinguish that type species generically from *Brotherus longi-*

(16) Rich., Wash. Bur. of Fish., Doc. No. 736, 1910, pp. 9-11.

cornis . . . and *Argathona reidi* . . . in which there is no such fusion." Budde-Lund places *Brotherus* in the family Alcironidae (Corallanidae).

The genera placed in the family Corallanidae differ considerably in the form of the mouth parts; in fact, similar relative differences to those separating the Argathonidae from the Corallanidae have been regarded as of only generic importance in the last-named family. Thus, it will be convenient to include *Argathona* in the Corallanidae, unless some of the genera at present placed in this family are to be accommodated with new families.

Argathona differs from *Lanocira* of Hansen in having one or more small hooked spines at the base of the terminal unguis of the first maxillae, and in having the apical article of the second maxillae broadly rounded instead of sublunar or elongate. Apparently all the species have the first and second articles of the peduncle of the first antennae fused together, as in *Exocorallana*, *Alcirona*, etc. The genus has not been hitherto noted in Australian waters.

KEY TO AUSTRALIAN SPECIES.

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| a. Second antennae reaching back beyond hinder margins of penultimate peraeon segment. Articles of peduncle of first antennae subequal in length | <i>similis</i> |
| aa. Second antennae reaching back scarcely beyond middle of length of peraeon. First article of peduncle of first antennae much longer than second | <i>confine</i> |

ARGATHONA SIMILIS, Richardson.

Argathona similis, Rich., Wash. Bur. of Fish., Doc. No. 736, 1910, p. 11, fig. 10.

♀. Form suboval, about two and one-half times longer than greatest width. Dorsal surface distinctly punctate and with a few short setae near lateral margins of peraeon. Cephalon two and one-half times wider than medial length; anterior margin rounded, slightly conical, with a small, median, subtriangular process, downbent, but not separating the first pair of antennae. Eyes large, the interocular space about equal to the length of an eye. First antennae extending to beyond end of fourth peduncular article of second antennae; peduncle two-jointed, the first article scarcely longer than the second; flagellum composed of twenty articles and a terminal style, the first article being very short and the second longer than any of the others. Second antennae with long flagellum, which extends beyond level of apices of coxal plates of seventh peraeon segment; first three peduncular articles short, the second the shortest; fourth about three-fourths as long as fifth article; flagellum composed of fifty articles and a terminal style. Frontal lamina not very elongate, twice as long as greatest width, a little dilated anteriorly and with anterior margin subangularly rounded. Clypeus broadly \wedge -shaped. Mandibles elongate; molar process feeble, transparent; first article of palp more than half as long as second, and longer than third article. Outer lobe of first maxillae terminating in a strong claw, at the inner side of the base of which is a small hooked spine; inner lobe apically subtruncate. Second maxillae short, ending in a broadly rounded lobe. Basipodite of maxillipeds as wide as long, a little shorter than first three articles of palp together; the division between the second and third articles of the five-jointed palp is very indistinct. First peraeon segment embracing base of cephalon; first, third, and fourth segments subequal in length, longer than second, fifth, and six segments, which are subequal in length; seventh segment a little shorter than sixth. All coxal plates prominent in dorsal view, each with a very distinct, obliquely-curved furrow in addition to the usual submarginal furrow; plates of second and third segments roundly subrectangular, not extending past level of posterior margins of segments; remaining plates subacute posteriorly, reaching beyond hinder margins of

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their segments. First pleon segment short, concealed beneath last peraeon segment; fifth longer than second, third, or fourth segments, which are subequal in length; postero-lateral angles of first three segments subacute, those of fourth concavely truncate; fifth segment narrower than, and with the rounded postero-lateral angles not wholly covered by, fourth segment; telsonic segment more than one-third wider than medial length, with lateral margins sinuately converging to the subacutely rounded apex; dorsal surface punctate, with indications of short stout hairs, and with an obsolete, longitudinal, median carina; basal part rather prominently tumid, the tumidity divided into three parts by a longitudinal furrow on each side of the mid-line; posterior half of lateral margins furnished with hairs, and apex with six short, stout spines also. Uropods extending beyond level of apex of pleon; inner process of protopod reaching to middle of length of endopod, which is rounded posteriorly, almost straight on outer edge, and is about same length but twice as wide as exopod; margins of both branches furnished with hairs, intermixed with which are short spines. Peraeopods moder-

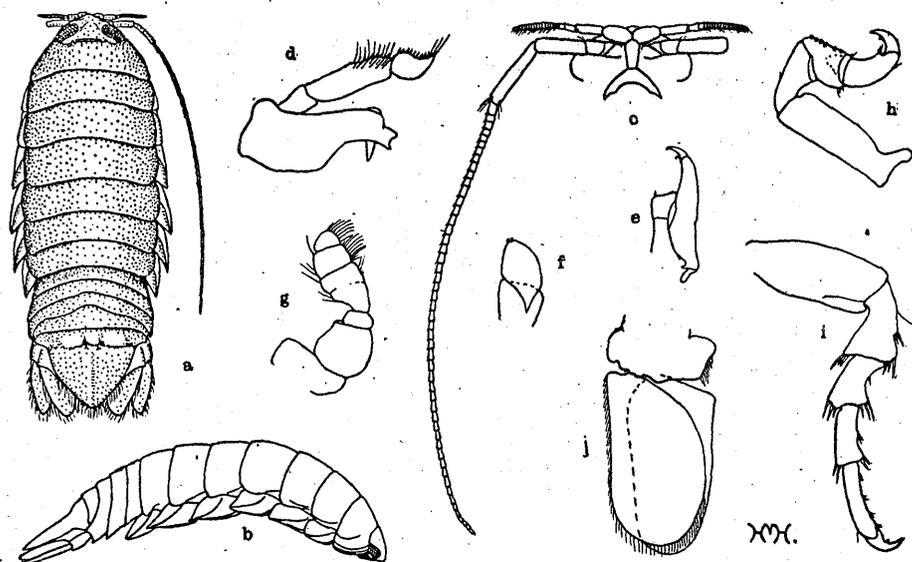


Fig. 16.

Argathona similis, female; a and b, dorsal and lateral views (2½ diams.); c, antennae, frontal lamina and clypeus (4 diams.); d, mandible (14 diams.); e and f, first and second maxillae (14 diams.); g, maxilliped (14 diams.); h and i, first and fourth peraeopods (7 diams.); j, first pleopod (7 diams.).

ately stout; dactyli bi-ungulate, the inner claw minute; merus of first pair with six short, stout spines on inner margin and three slender spines at outer distal angle, and carpus with one minute spine on inner edge; ambulatory peraeopods with strong spines on distal and inner margins of third to sixth joints; ischium, merus, and carpus of seventh peraeopods subequal in length. Rami of first pair of pleopods wide, the inner ramus slightly longer and narrower than outer branch.

Colour in alcohol.—Dark brown.

Length, 21 mm.

Loc.—South Australia: Glenelg (W. H. Baker). Western Australia: Garden Island (W. Austr. Mus. Coll.).

Hab.—Celebes (Richardson) and Australia.

The example described above was taken in June, 1907, from amongst weeds attached to a pile at Glenelg. It is somewhat mutilated, and the clothing of the telson is abraded; the telsonic segment is relatively wider than in the single male examined by Richardson.

Another female, 18.5 mm. in length (taken in Western Australian waters), is narrower in form, being three times longer than greatest width. The telsonic segment is in close agreement with that of the type, being narrower than in the larger female; excepting on the obsolete median carina, the telson is clothed with short adpressed hairs. The hinder margins of the second to fifth pleon segments, and of the posterior peraeon segments, are sparsely furnished with hairs. The second antennal flagella reach to level of apices of coxal plates of sixth peraeon segment, and each is composed of forty articles in addition to the tiny terminal style. The mouth parts are as in the larger example, excepting that no trace of suture is discernible between the second and third articles of the palp of the maxilliped, which thus consists of but six distinct articles. The six spines on the inner edge of the first peraeopods are exactly similar, two near the distal end being separated from four on the posterior half. The colour is dark purplish-brown, with the telson, uropods, and peraeopods pale brown.

Argathona confine, n. sp.

♀. Ovigerous. Form narrowly suboval, three and one-third times longer than greatest width. Dorsal surface punctate. Cephalon two and one-half times as wide as medial length, dorsally clothed with short upright hairs; anterior margin with a median, subtriangular process, partly separating the first pair of antennae, and almost meeting frontal lamina. Eyes set well apart. First antennae reaching to end of fourth peduncular article of second antennae; peduncle two-jointed, the first article nearly twice as long as second; flagellum about same length as peduncle, composed of ten articles and a terminal style; the first article is very short but is wider than any of the others, being almost as wide as the last peduncular article; second article longest. Second antennae reaching to middle of length of fourth peraeon segment; first three peduncular articles short, subequal in length, and together equal in length to fourth article, which is six-sevenths as long as fifth article; flagellum composed of twenty-eight articles and a terminal style. Frontal lamina pentagonal, the posterior margin somewhat incised. Clypeus broadly Δ -shaped. Mandibles elongate; molar process represented by a transparent feeble blade; first article of palp subequal in length to third, and scarcely more than one-half as long as second article. Outer lobe of first maxillae terminating in a strong claw, at the inner side of base of which are three hooked spines, one being almost half as long as the claw; inner lobe apically truncate. Second maxillae shorter than first pair, with apex simple. Palp of maxillipeds five-jointed on one side, abnormal and but three-jointed on the other. Dorsum of peraeon and of visible segments of pleon clothed with upstanding hairs, which are denser on hinder margins of segments, on whole of first peraeon segment and on telson. First peraeon segment not embracing base of cephalon; first, third, fourth, fifth, and sixth segments subequal in length, each longer than the second, which is a little longer than seventh segment. Coxal plates each with a distinct oblique or curved furrow in addition to the submarginal furrow; plates of second and third segments subrectangular, rounded behind, not extending beyond level of hinder margins of segments; remaining plates subacute posteriorly, reaching beyond hinder margins of their segments, the last pair extending to hinder margin of second pleon segment. First pleon segment smooth, almost wholly concealed beneath last peraeon segment; fifth segment longer but narrower than fourth, the postero-lateral parts of which partly cover lateral portions of fifth segment; telsonic segment more than one-third wider than medial length, with lateral

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margins sinuately converging to the narrowly rounded apex. Uropods reaching to slightly beyond apex of pleon; protopod with two spines near outer posterior angle and with inner process extending to about middle of length of endopod; exopod suboval in shape, shorter than and scarcely more than half as wide as endopod, which is also suboval in shape, obscurely, obliquely truncate posteriorly; margins of both branches furnished with plumose hairs and short spines. Peraeopods moderately stout, with dactyli bi-ungulate, there being a tiny claw at the base of the larger one; ischium of first peraeopods with two stout, short spines near the distal end of inner margin, merus with seven short spines on inner margin and one (more slender) at outer apex, carpus with one, and propodus with four, sharp spines on inner margin; ambulatory legs with strong spines on inner and distal margins of third to sixth joints; some of the spines on the distal margin of carpus are branched, the remainder are simple; basos of seventh pair not greatly expanded; merus as long as carpus and two-thirds as long as ischium. Outer ramus of first pair of pleopods a little wider and shorter than inner branch.

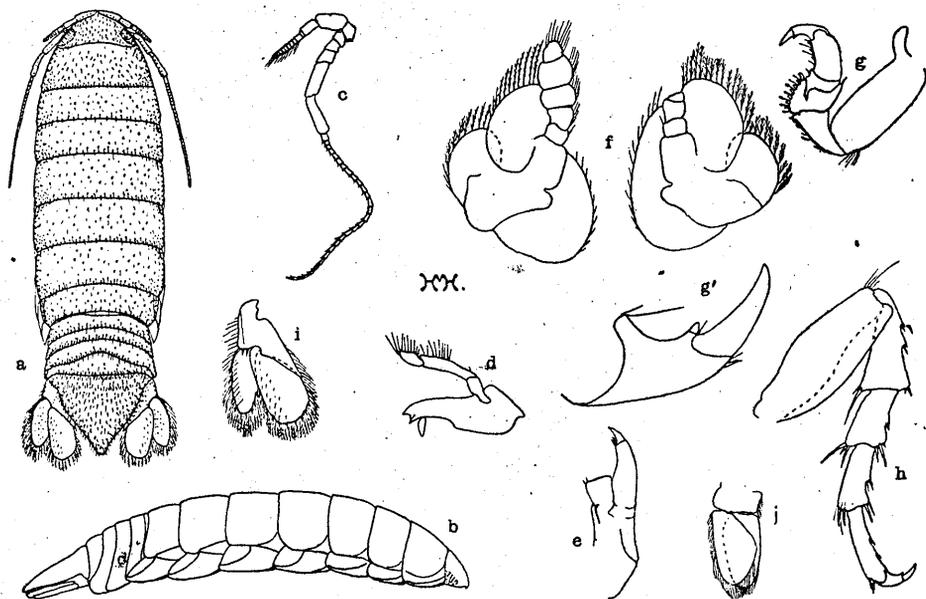


Fig. 17.

Argathona confine, type female; a and b, dorsal and lateral views (5 diams.); c, frontal lamina and antennae (7 diams.); d, mandible (14 diams.); e, first maxilla (29 diams.); f, maxillipeds (29 diams.); g and h, first and seventh peraeopods (14 diams.); g', dactylus of first peraeopod (73 diams.); i, uropod (7 diams.); j, first pleopod (7 diams.).

Colour in alcohol.—Pale yellow.

Length, 11.5 mm.

Loc.—Queensland: Albany Passage (Austr. Mus. Col.). Type, female, in Austr. Mus., Reg. No. 8205.

A single female, with the exoskeleton in a rather soft state, is before me; this specimen was taken in a *Comatula* in company with *Cirolana lineata*.

A. confine differs from *A. similis* in the smaller size, narrower form, less elongate frontal lamina, shorter second antennae, in the shape of the branches of the uropods, in not having the coxal plates so completely visible in dorsal view, etc. In some respects it is very close to the genotype (*A. normani*), but differs

in the much more elongate form, in the absence of tubercles on the peraeon and pleon, in having seven instead of only four spines on the inner edge of the merus of the first peraeopods, in the five-jointed palp of the maxillipeds, and in having the uropods of slightly different shape, with the inner process of the protopod less produced; as shown in Stebbing's figure, this process reaches to two-thirds of the length of the endopod in *A. normani*. When more specimens are available it is possible, however, that these differences may prove to be sexual. Stebbing examined apparently two males of *A. normani*, for at the end of his description he gives measurements of two examples.

The small Corallanid doubtfully referred to *Alcirona multidigitata* by Miers (*Cirolana multidigitata*, Miers) was also taken near Albany Island.⁽¹⁷⁾

Smicrostoma, n. gen.

Peduncle of first pair of antennae composed of three articles, that of second pair of five. Molar process of mandibles well developed. Outer plate of first maxillae slender, curved, and tapering, the inner side furnished with minute hooks at distal end; second maxillae elongate, much stouter than first pair, the apical article conical, closely beset with tiny downbent spinules. Maxillipeds rather elongate, with five-jointed palp, the third article of which is about as long as wide; inner plate of basipodite very elongate, as long as the palp and not furnished with hooks. Clypeus short and wide, Δ -shaped. Labrum small.

Type, *S. saxicola*, n. sp.

The very long inner plate of the basipodite of the maxillipeds distinguishes this from all other genera of the family. In some respects *Smicrostoma* approaches *Tridentella*, Richardson,⁽¹⁸⁾ (species of which are known from North America and Japan), but the maxillae and maxillipeds are totally dissimilar.

Smicrostoma saxicola, n. sp.

♂. Form broadly oval, about two and one-third times longer than greatest width. Surface faintly punctate and granulate. Cephalon more than twice as wide as medial length, anteriorly produced forwards over and beyond the insertion of the antennae; antero-lateral margins slightly concave, converging to the rather narrowly rounded apex, which is slightly upturned; dorsal surface with a pair of prominent, well separated tubercles on basal part; on underside of cephalon a subtriangular process from anterior part is directed backwards between the basal joints of the first antennae and meets the anterior margin of the frontal lamina. Eyes moderately large, well separated, situate at the antero-lateral portions of head. Peduncle of first pair of antennae extending to end of fourth article of peduncle of second pair; first two articles of equal length, together a little longer than third article; flagellum short, as long as last two articles of peduncle together, reaching beyond end of peduncle of second antennae and composed of nine articles. First three articles of peduncle of second antennae together equal in length to fourth, which is slightly shorter than fifth; second article much shorter than first or third; flagellum longer than peduncle, extending to a little beyond hinder margin of second peraeon segment; composed of eighteen articles and a terminal style. Frontal lamina pentagonal, longer than greatest width, the postero-lateral margins longer than any of the others. Clypeus Δ -shaped. Labrum projecting outwards and slightly backwards. Palp of mandibles stout, the first article one-half as long as the second. First peraeon segment not quite twice as long as second to sixth segments, and twice as long as the seventh. Coxal plates each with an oblique furrow in addition to the submarginal furrow;

(17) Miers, Zool. "Alert," 1884, p. 301.

(18) Rich., Bull. U.S. Nat. Mus., liv., 1905, p. 161.

plates of second and third segments subrectangular, with obtusely rounded posterior angles, not extending past hinder margins of segments; last four pairs of coxal plates successively increasing in length backwards, and with posterior angles successively more subacute; the last pair reach past posterior angles of second pleon segment. Pleon ornamented with small and obscure tubercles, which are most distinct on telsonic segment; greater part of first segment concealed beneath last peraeon segment, leaving exposed part of middle of hinder margin and a small postero-lateral portion on each side; second, third, fourth, and fifth segments subequal in length, the fourth wider than any of the others, and laterally covering sides of fifth segment; telsonic segment broad, nearly half as wide again as medial length; lateral margins roundly converging to apex, which is slightly subtruncate and crenulate; with a low, median, longitudinal carina, on each side of which is a broader and much more prominent carina. Uropods reaching to end of pleon; protopod produced to beyond first third of length of endopod, which is longer than, and more than twice as wide as, exopod; endopod widest at posterior

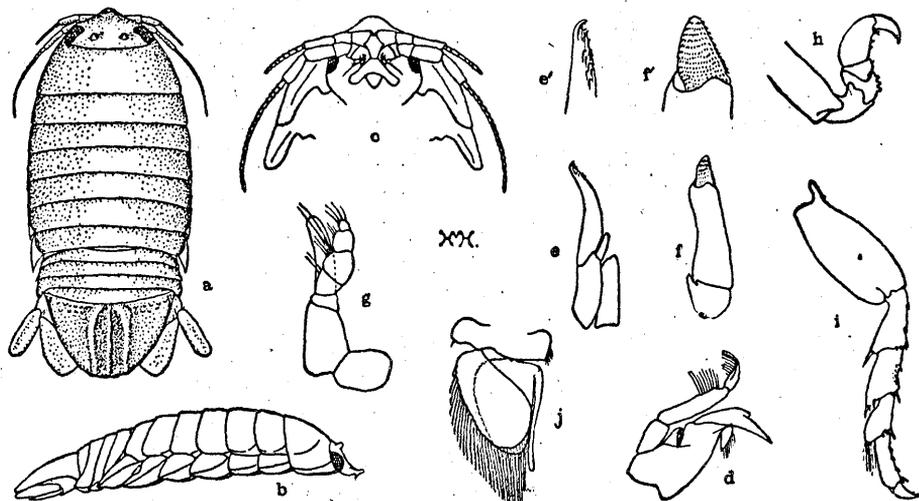


Fig. 18.

Smicrostoma saxicola, type male; a and b, dorsal and lateral views (7 diam.); c, antennae, frontal lamina, clypeus and labrum (9 diam.); d, mandible (29 diam.); e and f, first and second maxillae (29 diam.); e¹ and f¹, apices of maxillae (73 diam.); g, maxilliped (29 diam.); h and i, first and seventh peraeopods (14½ diam.); j, second pleopod (14½ diam.).

fourth, posteriorly subacute, and with margins crenulate; exopod elongate sub-oval, with posterior and postero-lateral margins crenulate. Peraeopods stout, none of them greatly expanded. Pleopods wide, the male appendage of second pair one-fifth longer than inner ramus.

Colour in alcohol.—Yellow, in parts faintly mottled with brown.

Length, 7.25 mm.

♀. Cephalon not forwardly produced, with antero-lateral margins convex; middle of anterior margin with a small subtriangular process, bent downwards and backwards to meet anterior margin of frontal lamina; surface without two prominent tubercles (although there are three small and very obscure elevations in line at the posterior part of cephalon). Flagellum of second antennae composed of nineteen articles, extending to middle of length of fourth peraeon segment. Almost whole of first segment of pleon concealed beneath last peraeon segment, only a very tiny postero-lateral portion being visible.

Length, 7.25 mm.

Loc.—New South Wales: East of Ulladulla, lat. 35° 20' S., long. 150° 47' E., 75 fms. (type loc., C. W. Mulvey); off Bateman's Bay, lat. 30° 47' 30" S., long. 150° 34' E., 80 fms. (Capt. J. Fordar). Type, male, and allotype, female, in Austr. Mus., Reg. Nos. P8206 and P8207.

Several specimens were secured by Mr. Mulvey; they were found "burrowing in a conglomerate boulder taken by the trawler 'Goonambee,'" and from the same boulder Sphaeromids, *Cirolana cranchii*, var. *australiense*, and an Amphipod were collected. Capt. Fordar obtained two small specimens; they were taken in a "crevice of a piece of conglomerate" brought up in a trawl.

In one adult male the exopod of the uropods, although perfect in form, is scarcely more than one-half as long as the endopod. Younger examples than those described, 5 mm. or so in length, are relatively narrower in form, and a lesser portion of the first pleon segment is concealed.

The sexes may be distinguished at a glance, the cephalon of the male, with the two large interocular tubercles and produced anterior portion, presenting a very different appearance to that of the female.

Family AEGIDAE.

The Aegidae, in common with the other families herein considered, have the peduncle of both pairs of antennae distinct from the flagellum. The first maxillae are slender and styliform, and the apex of each is furnished with short spines. The second maxillae are broad, with two unequal apical lobes, armed with hooked spines. The palp of the maxillipeds embraces the cone formed by the anterior parts of the mouth organs, and in the male and non-ovigerous females is furnished with outwardly curved spines.

The oral parts together form a sucking tube; according to Hansen the modified maxillipeds are probably utilised to pull apart the skin of a fish, the mandibles are adapted to enable the Aegids to tear out a piece of flesh, and the style-like first maxillae are used to deepen and lacerate the wound so caused.

KEY TO AUSTRALIAN GENERA.

- | | |
|---|----------|
| a. Peraeon and pleon compact, not relaxed. Anterior margin of cephalon with a small, median process, separating more or less the basal articles of the first antennae. Flagellum of first antennae usually composed of numerous articles. Frontal lamina moderately large. Maxillipeds with five-jointed palp | Aega |
| aa. Peraeon more depressed and pleon relaxed. Anterior margin of cephalon overhanging the basal articles of the first antennae, the flagellum of which is composed of only four to six articles. Frontal lamina small. Maxillipeds with two-jointed palp | Rocinela |

AEGA, Leach.

Aega, Leach, Trans. Linn. Soc., xi., 1815, p. 369; Sch. and Mein., Naturh. Tidsskr., (3) xii., 1879, p. 334; Sars, Crust. of Norway, ii., 1899, p. 58; Barn., Ann. S. Afr. Mus., x., 1914, p. 361 (syn.).

Owing to the curve of the maxilliped in males and non-ovigerous females, it is not always possible to show all five segments of the palp in illustrations. In ovigerous females the maxilliped as a whole is lamellar; the palp has no hooks and the coxo-, basi-, and epipodite are greatly expanded. The anterior marsupial plates of females in this condition overlap the greater part of the oral organs, and it is said that they are then unable to feed and have never been found attached to a fish.

Ingested food solidifies in specimens preserved in alcohol and, removed in this condition, provides a cast of the inside of the capacious stomach (fig. 19). In Europe these dark-brown or black masses were at one time regarded by superstitious fishermen and others as "lucky stones" or "Peter's stones"; the stomach contents of *A. psora* are said to have been used in the preparation of a salve, hence the popular name "Salve-bug" was formerly applied to this species; further, medical men prescribed the substance as an antidote to sea-sickness and other ills.

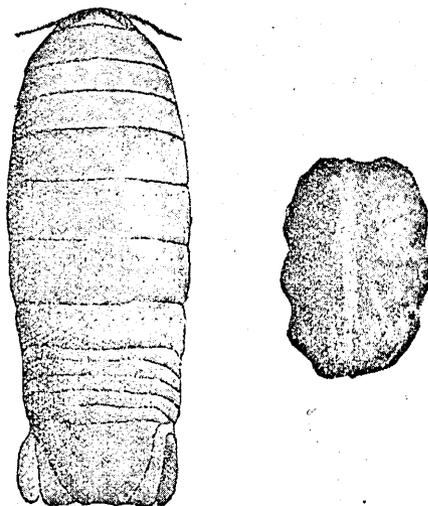


Fig. 19.

Acga serripes, and food mass removed from stomach ($1\frac{1}{2}$ diams.).

KEY TO AUSTRALIAN SPECIES.

- | | |
|--|--------------------|
| a. Eyes of moderate size, distinctly separated one from the other. | |
| b. Form slender, much more than three times longer than greatest width. Telsonic segment terminating in an acute projection .. | <i>angustata</i> |
| bb. Form stouter, less than three times longer than greatest width. Telsonic segment obtusely rounded or truncate apically. | |
| c. Inferior margin of basos of last four pairs of pereopods produced into a thin carina, excised to form three or four prominent dentations | <i>serripes</i> |
| cc. Inferior margin of basos of pereopods not so produced .. | <i>australis</i> |
| aa. Eyes very large, confluent, and occupying the greater part of dorsal surface of cephalon. | |
| d. Whole dorsal surface of cephalon, excepting a small V-shaped piece at middle of anterior margin, occupied by eyes | <i>vigilans</i> |
| dd. Dorsal surface of cephalon with a subtriangular portion at base, as well as a smaller V-shaped piece at middle of anterior margin, not occupied by eyes. | |
| e. Endopod of uropoda narrow, with outer margin prominently excised near the apex, which is rounded | <i>antillensis</i> |
| ee. Endopod of uropoda wide, with outer margin not excised and apex subtruncate. | |
| f. First five pleon segments, and at least last peraeon segment, with a row of tubercles along hinder margins | <i>nodosa</i> |
| ff. Dorsal segments of peraeon and pleon without tubercles. | |
| g. Shape of apex of telson unknown | <i>cyclops</i> |
| gg. Apex of telson subtruncate | <i>meinerti</i> |
| ggg. Apex of telson acute | <i>spongicola</i> |

It will be noticed that all of our species excepting those under section *ff* are readily separated; this last part of the key is very unsatisfactory. I have seen

no specimens of *A. meinerti* and *A. spongicola*, and the telson of the type of *A. cyclops* is abnormal. It is assumed that in *A. spongicola* a small piece at the front of the cephalon is unoccupied by the eyes, although this condition is not shown in Thomson's figure of the species. If the eyes extend along the whole anterior margin of the cephalon, then this character distinguishes *A. spongicola* from all other Australian species.

AEGA ANGUSTATA, Whitelegge.

Aega angustata, Whitel., Mem. Austr. Mus., iv., 1901, p. 232, fig. 21a-21f.

♀. Form narrow, elongate, three and three-fourths times longer than wide. Surface rather finely punctate. Cephalon a little more than twice as broad as long; anterior margin with a prominent acute triangular process, the apex of which is slightly bent downwards, between the bases of the antennae, to meet the anterior margin of the frontal lamina. Eyes oblong, composite, extending along lateral margins of cephalon, and well separated one from the other, the narrowest interocular space being equal to the greatest diameter of an eye. Antennae short. First pair reaching beyond fourth peduncular article of second antennae; first

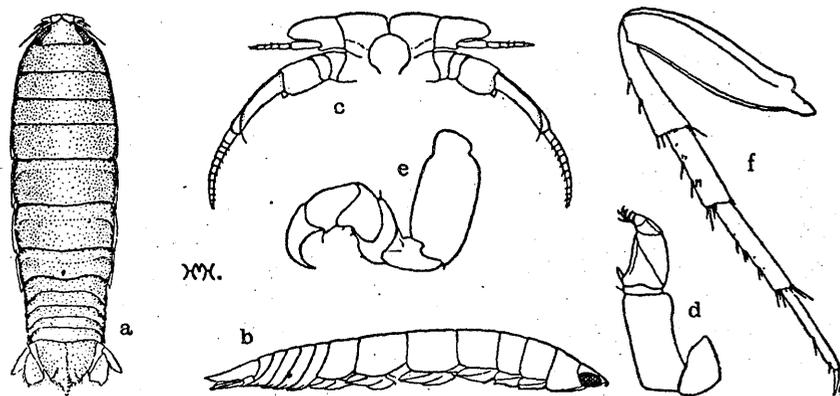


Fig. 20.

Aega angustata, female; a and b, dorsal and lateral views (2 diams.); c, frontal lamina and antennae (8 diams.); d, maxilliped (18 diams.); e and f, first and seventh pereopods (9 diams.).

two articles of peduncle subequal in length, flattened, and considerably expanded; the anterior distal part of the second article is produced into a prominent lobe, extending as far as, and overhanging, the narrow third article, which is but half as long as the second; flagellum a little longer than last peduncular joint, composed of five articles. Second antennae reaching to about middle of length of lateral margins of first pereon segment; peduncle compressed and dilated; fourth article almost as long as second and third together, on upper side with an acute lobe produced slightly outwards and backwards; fifth article a little curved, as long as first four articles together; flagellum equal in length to fifth peduncular article and composed of eleven articles. Frontal lamina subcircular, with surface concave. Medial length of first pereon segment about equal to that of cephalon, the antero-lateral angles a little forwardly produced; first, second, third, and seventh segments shorter than the others. Coxal plates each with two oblique furrows; plates of second and third segments with posterior margins rounded, not extending beyond hinder margins of their segments, and with the lower, or submarginal, furrow terminating behind in a small projection; remaining coxal plates subacute posteriorly, extending beyond hinder margins of their segments.

Lateral portions of first to fourth pleon segments not separated from dorsal part, each with two furrows and with posterior angles subacute; telsonic segment slightly wider than long, its medial length equal to that of rest of pleon segments together; with punctures obsolete and much less distinct than on remainder of upper surface of peraeon and pleon; with an obsolete median carina, disappearing anteriorly, and a still less distinct lateral carina on each side of posterior fourth; lateral margins convexly converging and with three dentations on each side in front of the acutely produced apex, on each lateral margin of which are two tiny teeth. Uropods extending to level of second lateral dentation of telson; protopod produced nearly to apex of endopod, which is truncated posteriorly, with the hinder and postero-lateral margins serrate; exopod scarcely as long, and but half as wide, as endopod, subacute apically and with outer margin serrulate and set with spinules. First pair of peraeopods without spines but with several setae; ischium of second and third pairs armed with two, and merus with four, short spines on inner side; propodus of third pair with a subacute claw-like process emanating from inferior part of distal end, and extending nearly to apex of dactylus; last four pairs of peraeopods slender, with ischium, merus, carpus, and propodus armed with slender spines on inner and distal margins.

Colour in alcohol.—Light brown.

Length, 24 mm.

♂. The single type specimen, 15 mm. in length, proves to be a male. This example, which is fully described and figured by Whitelegge (*ut supra*) differs but slightly from the female described above. A male, 21 mm. in length, has six articles in the flagellum of the first antennae.

Loc.—New South Wales: Wata Mooli, 54-59 fms. (type); Eden, "on saw-fish" (J. A. Boyd); off Botany (Prof. J. D. Ogilby).

Hab.—New South Wales.

The salient characters of this well-defined species are the expanded antennal peduncles and the serrated and apically acute telsonic segment and the widely separated eyes. A process of the propodus of the third pair, or both second and third pairs, of peraeopods is found in several other species of the genus, but apparently in none of them is it quite as prominent as in *A. angustata*; in the female described above the process lends the third pair of peraeopods somewhat the appearance of chelate limbs.

AEGA SERRIPES, Milne Edwards.

Aega serripes, M. Edw., *Hist. Nat. Crust.*, iii., 1840, p. 241; Sch. and Mein., *Naturh. Tidsskr.*, (3) xii., 1879, p. 355, pl. viii., figs. 1-4.

♂. Form elongate, about two and three-fourths longer than wide; sides subparallel. Surface punctate. Cephalon more than twice as wide as medial length; punctures between eyes a little larger than those behind eyes; anterior margin bisinuate, with a small median triangular process, which does not completely separate the first pair of antennae, and is not bent downwards to meet the frontal lamina. Eyes large, oblong, extending from lateral angles of cephalon, along anterior margin, but distinctly separated one from the other. First antennae reaching a little beyond fourth peduncular article of second antennae; with the first article of peduncle one-half as long again as second, and the third article about same length as, but much narrower than second; flagellum composed of nine articles. Second antennae reaching almost to posterior angle of first peraeon segment; first two articles short, subequal in length; third a little longer than second; fourth almost as long as first three together and slightly longer than the fifth; flagellum composed of twenty-one articles. Frontal lamina short, wider than long, medianly sulcate; with the anterior margin convex and the posterior margin slightly concave. First peraeon segment a little longer, and seventh

shorter, than any of the others. Coxal plates each with two not very oblique furrows and with the posterior angle in all but the last pair obtuse; plates of second and third segments rhomboidal, not longer than lateral margins of segments; those of fourth to seventh increasing in length backwards, the fourth pair extending slightly beyond the posterior angles of their segment, and the last pair reaching about to middle of length of lateral margins of first pleon segment. Lateral portions of first to fourth pleon segments not separated from dorsal part, each with two furrows; telsonic segment more than one-third wider than long; with an obsolete median sulcus and a slight depression near each basal angle; lateral margins a little convex, converging to the widely truncate, crenulate, and very slightly emarginate apex. Branches of uropods of equal length, extending to apex of pleon; protopod produced almost to apex of endopod, which is crenulately truncate posteriorly; exopod rounded, narrower than endopod, with outer and posterior margin crenulate. Outer surfaces of first three pairs of peraeopods deeply and coarsely punctate; outer inferior margin of basos of third pair with a thin carina; merus of first pair armed with three short spines, of second and third pairs with six to seven spines; outer surface of fourth to seventh peraeopods with shallower and smaller punctures and outer inferior

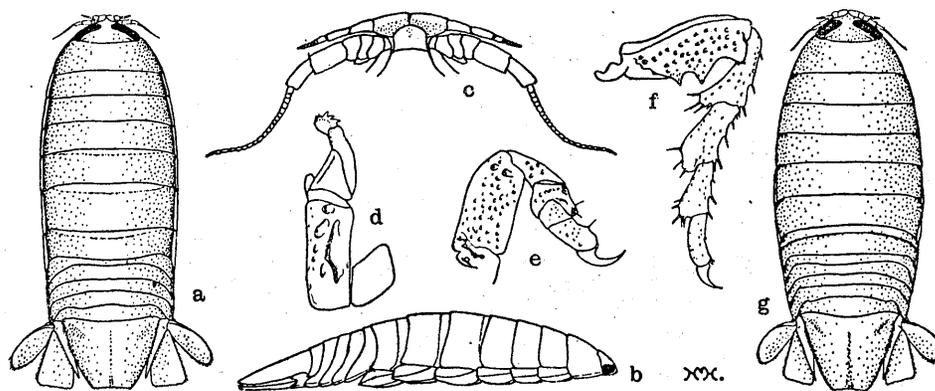


Fig. 21.

Aega serripes, male; a and b, dorsal and lateral views ($1\frac{1}{2}$ diams.); c, frontal lamina and antennae (6 diams.); d, maxilliped (9 diams.); e and f, first and seventh peraeopods ($4\frac{1}{2}$ diams.). Female; g, dorsal view ($1\frac{1}{2}$ diams.).

margin of basos of these limbs produced into a thin carina, excised to form three prominent triangular lobes; sometimes one or two additional small teeth are present at the proximal end of carina; ischium, merus, and carpus armed with movable spines.

Length, 35 mm.

♀. Differs from the male in having the form relatively wider and of a more oval shape.

Length, 50 mm.

Colour during life.—The dorsum is brown, marked with longitudinal whitish streaks. The peduncles of the antennae are marked with dark brown, a brown bar connects the eyes, and there is a short dark-brown streak at the antero-lateral angles of the first peraeon segment.

Loc.—South Australia: Encounter Bay (Dr. R. H. Pulleine); Victor Harbour, from a skate (W. H. Baker); Port Willunga (S. Howe). New South Wales: Maroubra (Austr. Mus. Coll.). Victoria: Off Flinders Island, dredged in 10 fms. (Dr. W. E. J. Paradise).

Hab.—Southern and eastern Australia and Japan.

In some examples the carina of one or more of the last four pairs of peraeopods is divided into four large teeth, as in the Japanese specimen figured by Schioedte and Meinert. The number of articles in the flagellum of the second antennae is variable; the total length and number of articles in the second antennal flagellum of five females are as follow: 50 mm., 22; 43 mm., 18; 35 mm., 20; 23 mm., 13; 15.5 mm., 15.

The dark-brown bar which connects the eyes in living examples lends a somewhat deceptive appearance, and the eyes at first glance appear to be confluent. In one small example the interocular space is very narrow, being equal to the length of about three eye facets only. The species may be instantly recognized by the character of the posterior peraeopods, and the shape of the telson and uropods.

AEGA AUSTRALIS, Whitelegge.

Aega australis, Whitel., Mem. Austr. Mus., iv., 1901, p. 229, fig. 20a-20f.

♀. Ovigerous. Form oval, two and one-third times as long as greatest width. Surface shallowly punctate. Cephalon twice as wide as medial length, with a median triangular process which is not bent downwards to meet the frontal

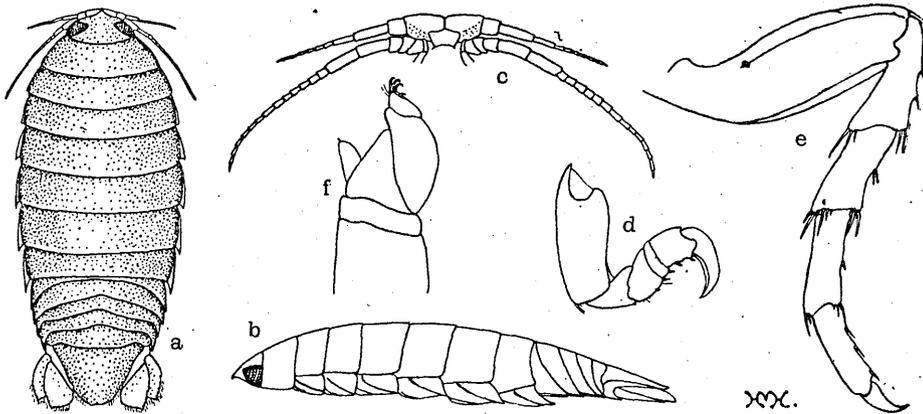


Fig. 22.

Aega australis, paratype ovigerous female; a and b, dorsal and lateral views (4 diams.); c, frontal lamina and antennae (8 diams.); d and e, first and seventh peraeopods (18 diams.). Type male; f, palp of maxilliped (45 diams.).

lamina. Eyes rather small, subtriangular, composite, well separated, the narrowest interocular space being equal to the greatest diameter of an eye. First antennae reaching well beyond end of peduncle of second antennae, with the first two articles flattened and somewhat expanded anteriorly; first article wider than, and rather more than twice as long as, second; third twice as long, and one-half as wide, as second; flagellum shorter than peduncle, composed of eight articles, the first of which is twice as long as any of the others. Second antennae reaching to beyond middle of length of third peraeon segment; first peduncular article longer than second or third; fourth and fifth articles subequal in length, each a little shorter than first three together; flagellum distinctly longer than peduncle, composed of fourteen articles. Frontal lamina short, nearly twice as wide as medial length; anterior margin bisinuate, medianly a little forwardly produced; antero-lateral angles acutely rounded and lateral margins converging posteriorly. First to sixth peraeon segments subequal in length, the second and third a little shorter than the others, which are about as long as cephalon; seventh segment

the shortest. Coxal plates visible in dorsal view, each with two oblique furrows; those of second to fourth segments subrectangular, with posterior angles rounded, not extending beyond hinder margins of segments; remaining coxal plates reaching past hinder margins of their segments and with the posterior angles acute. First segment of pleon very short medianly, the second to fifth subequal in length; posterior angles of first to fourth segments acutely produced backwards; telsonic segment half as wide again as medial length, with lateral margins convexly converging to the obscurely subtruncate extremity; postero-lateral and apical margins crenulate, a slightly larger incision preceding the smaller crenulations on each side. Uropods reaching beyond apex of telsonic segment; protopod produced to about three-fourths of length of endopod, which is longer and much wider than the exopod and is subtruncate posteriorly; apical margins and posterior part of outer margins of both endo- and exopod crenulate and set with tiny spines. Merus and carpus of first three pairs of peraeopods armed with a short stout spine at inner distal angle, and with a few inconspicuous spinules on inner surface; propodus of these limbs with two spines on inner side; ischium of second and third peraeopods with a spine at outer distal angle; ischium, merus, carpus, and propodus of fourth to seventh peraeopods armed with spines on distal margins and a few on inner sides.

Colour in alcohol.—Yellowish, uniformly dotted with brown chromatophores. Length, 11 mm.

♂. The type example is a male; in this specimen the form is slightly more slender than in the ovigerous female, the flagellum of the first antennae is composed of ten articles and that of the second of fourteen articles, and the coxal plates are not visible from above.

Length, 12 mm.

Loc.—New South Wales: Coogee Bay, 49-50 fms. (type), and off Wollongong, 55-56 fms. (Austr. Mus. Coll.).

Hab.—New South Wales.

A non-ovigerous female 9.5 mm. in length, together with the type male, paratype ovigerous female, and two smaller paratypes, comprising Whitelegge's original series, are the only specimens of this species before me; the two examples last mentioned are each 9 mm. in length, and have eight to ten articles in the flagellum of the first pair of antennae, and fourteen in that of the second pair. The apex of the telsonic segment is very slightly subtruncate in the ovigerous female, but in the other specimens it is obtusely rounded, as shown in Whitelegge's figure; in a young example from the brood pouch the flagellum of the first antennae consists of seven articles, that of the second of ten articles.

AEGA VIGILANS, Haswell.

Rocinela vigilans, Hasw., Proc. Linn. Soc. N.S. Wales, v., 1881, p. 472, pl. xvi., fig. 2, and Cat. Austr. Crust., 1882, p. 285; Miers, Zool. "Alert," 1884, p. 304; Rich., Proc. Amer. Philos. Soc., xxxvii., 1898, pp. 9, 10.

Aega dubia, Rich., Wash. Bur. Fish., Doc. No. 736, 1910, p. 12, fig. 12.

♀. Ovigerous. Form oblong-oval, about two and three-fourths times longer than wide. Surface punctate, the punctures sparse on anterior portions of second to seventh peraeon segments. Cephalon more than twice as wide as medial length; anterior margin rounded, medianly produced downwards in a small triangular process, the apex of which almost meets the anterior end of the frontal lamina. Eyes very large, confluent, occupying the whole dorsal surface of cephalon excepting a small V-shaped piece at middle of anterior margin, and extending on to underside of cephalon. Antennae slender; first pair reaching to about sixth flagellal article of second antennae, which are long and extend to posterior angle of fourth peraeon segment. The first antennae have the second peduncular article a little longer and narrower than the first, and the third as long

as the first and second together; the flagellum is composed of fifteen articles. The first and third articles of the peduncle of the second antennae are subequal in length and the third is a little shorter; the fourth is nearly half as long again as the third and about three-fourths as long as the fifth; flagellum composed of thirty-one articles. Frontal lamina narrow, considerably curved fore and aft, and widened anteriorly; surface at widest part concave. First, fifth, and sixth peraeon segments a little longer than the others. Coxal plates of second and third segments obtusely rounded posteriorly, not extending beyond posterior margins of segments, and with two oblique furrows; coxal plates of fourth to seventh segments each with two oblique furrows, the posterior of which extends from the margin adjoining the lateral edge of the peraeon segment to the posterior angle; plates of fourth segment angularly rounded posteriorly, reaching a little beyond level of hinder margin of segment; remaining pairs more acute, and extending distinctly beyond posterior angles of segments. Lateral parts of first to fourth pleon segments not separated from dorsal portion; each with two furrows; telsonic segment a little wider than medianly long, punctate, and with a median longitudinal line of punctures lying in a slight sulcus; lateral margins convex,

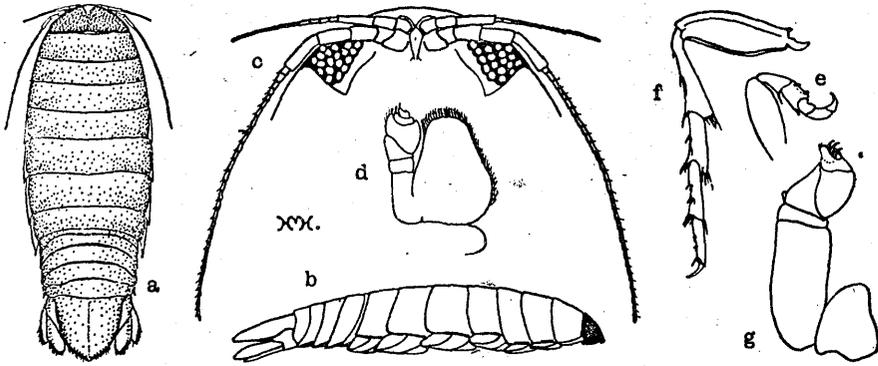


Fig. 23.

Aega vigilans, ovigerous female; a and b, dorsal and lateral views ($4\frac{1}{2}$ diams.); c, frontal lamina and antennae (11 diams.); d, maxilliped (18 diams.); e and f, first and seventh peraeopods (5 diams.). Non-ovigerous female; g, maxilliped (18 diams.).

roundly converging to the apex, which has a small triangular median projection, on each side of which are four to five smaller denticulations. Branches of uropoda obliquely truncate posteriorly, with outer and posterior margins ciliate, crenulate, and furnished with short spines; protopod produced to the first of the lateral denticulations of telson; endopod wider and longer than exopod, extending to apex of pleon. Ischium of first pair of peraeopods with a long spine at apex; merus with two short spines; ischium of second and third peraeopods with one long, and one or two short, spines; merus with three or four, and carpus with one or two short spines.

Length, 20 mm.

♀. Non-ovigerous. Differs in having the form narrower, three to three and one-half times longer than wide, and the cephalon scarcely more than twice as wide as long.

Length, 26 mm.

Loc.—Queensland: Holborn Island, near Port Denison, 20 fms. (type). Western Australia: Trawled between Fremantle and Geraldton (W. Austr. Mus.).

Hab.—Australia and Philippine Islands.

The mouth parts of Haswell's type, which is a female without ova, are missing, but a comparison of this specimen with Miss Richardson's excellent description and figure shows that *A. dubia*, from the Philippine Islands, is undoubtedly the same species. I have not seen a male, but Richardson says that this sex "differs in its smaller size . . . and in the different length of the segments of the thorax"; according to the figure, the male is of somewhat the same shape as the ovigerous female described above. This author describes the colour as "yellow, with numerous black and brown arborescent spots close together and covering the entire surface of the body except the posterior half of the terminal segment of the abdomen and the uropoda."

Richardson further remarks that *A. dubia* "is very close to *Rocinela vigilans*, Haswell, but differs in having a small V-shaped space on the dorsal surface of the head in front of the eyes, and in having the posterior extremity of the abdominal segments and the uropods denticulate, which are described by Haswell as 'smooth, entire.'" The posterior margin of the telsonic segment is certainly not so strongly denticulate in the type as in other examples, but nevertheless the denticulations of this segment, and of the branches of the uropoda, are quite distinct; a small V-shaped portion of the anterior surface of the cephalon is unoccupied by the eyes, which thus do not cover "all the upper surface of the head," as stated by Haswell.

There is very little doubt that the Indian specimen from "Mutwal Island," deemed by Stebbing⁽¹⁹⁾ to be "the female or a younger form" of *A. ommatophylax*, Stebb., is a young example of *A. vigilans*. Stebbing's remarkable species differs from *A. vigilans* in that the head, at least in the male, has a prominent frontal process, while a pair of large cylindrical processes emanating from the anterior margin of the first free peraeon segment overhang the eyes; also the sides of the peraeon are subparallel and the form is distinctly stouter than in the male of the last-named species.

AEGA ANTILLENENSIS, Schioedte and Meinert.

Aega antillensis, Sch. and Mein., Naturh. Tidsskr., (3) xii., 1879, p. 361, pl. viii., figs. 10-13; Rich., Proc. U.S. Nat. Mus., xxiii., 1901, p. 521; and Bull. U.S. Nat. Mus., liv., 1905, p. 170, fig. 149; Thielemann, München Abh. Akad. Wiss., ii., Suppl. 3, 1911, p. 26, pl. i., figs. 1, 2.

Aega excisa, Rich., Wash. Bur. of Fish., Doc. No. 736, 1910, p. 11, fig. 11.

♂. Form elongate-ovate, three times longer than wide. Surface punctate. Cephalon about three times as wide as medial length; punctures behind eyes small; anterior margin slightly bisinuate, with a small, median, triangular process partly separating the first antennae, but not bent downwards to meet frontal lamina. Eyes very large, confluent, occupying greater part of dorsal surface of head but leaving a small V-shaped piece at middle of anterior margin and a larger triangular portion at base of cephalon; not extending on to underside. First antennae reaching to middle of fifth peduncular article of second antennae; with the first article of peduncle less than half as long again and a little wider than second; third article about as long as first but much narrower; flagellum composed of ten articles, the first of which is very short and the second longer than any of the others. Second antennae reaching to hinder margin of first peraeon segment; first two articles subequal in length; third nearly twice as long as second; fourth twice as long as third and as long as fifth; flagellum imperfect. Frontal lamina in form of an oval disc, with surface concave and finely punctate. First peraeon segment longer, and seventh shorter, than any of the others. Coxal plates rather narrow, each with two oblique furrows, the upper of which extends diagonally across to the posterior angle in the plates of the fourth to seventh

(19) Stebb., Herdman's Ceylon Pearl Fish., Suppl. Rep., xxiii., 1905, p. 23, pl. v.a.

segments; plates of second and third segments scarcely longer than their segments, with the posterior angles rounded, the others with the posterior angle subacute or acute and produced beyond posterior angles of segments. Lateral portions of first to fourth pleon segments not separated from dorsal part, each with two furrows and acute posterior angles; telsonic segment as wide as medial length, with a very obscure median carina; lateral margins slightly sinuate, converging to the acute apex, which is a little upturned; postero-lateral margins crenulate, the crenulations set with tiny spines. Branches of uropoda subequal in length, reaching to apex of pleon and with the margins crenulate and set with tiny spines and short hairs; endopod with a conspicuous notch at about two-thirds of the length of outer margin; protopod produced nearly to level of marginal notch of endopod; exopod narrow, at greatest width scarcely wider than endopod, with apex subacutely rounded. Outer surface of peraeopods faintly punctate; propodus of first three pairs produced on inner side at distal end; the merus of the first pair has four short stout spines on inner side and two or three slender setae at outer distal apex, while the ischium bears two spines at the outer apex; the merus of the second and third pairs has seven to eight spines on the inner side

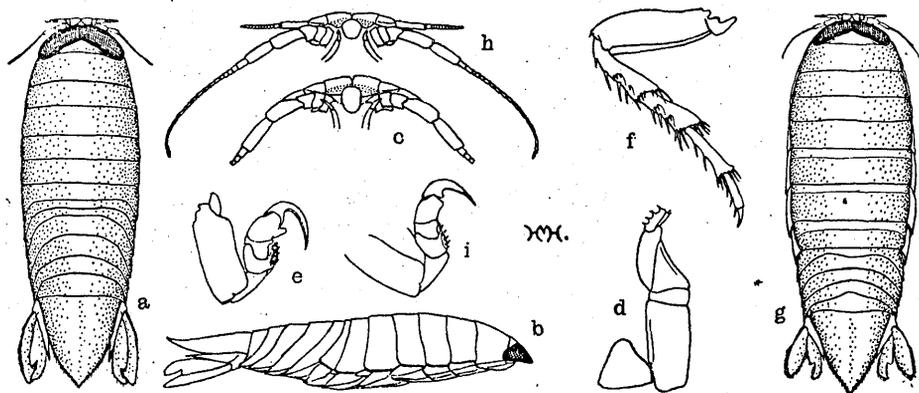


Fig. 24.

Aega antilensis, male; a and b, dorsal and lateral views (nat. size); c, frontal lamina (3 diam.); d, maxilliped (4½ diam.); e and f, first and seventh peraeopods (2¾ diam.); Female; g, dorsal view (nat. size); h, frontal lamina and antennae (3 diam.); i, first peraeopod (2¾ diam.).

and two on the outer distal apex; ischium of second pair with one spine at inner and two at outer apex, that of third peraeopods with two at inner and two at outer apex; ischium, merus, carpus, and propodus of fourth to seventh peraeopods with many spines on inner and apical margins.

Length, 48 mm.

♀. Head relatively smaller than in male. First antennae reaching almost to end of fifth peduncular article of second antennae; with flagellum composed of twelve articles. Second antennae reaching to posterior margin of first peraeon segment, with flagellum composed of nineteen articles. Frontal lamina somewhat obovate in shape, as wide as long. Uropods not reaching to termination of telson, but extending to level of six-sevenths of length of telson. Dorsum of telsonic segment concave in lateral view, but apex scarcely upturned. First three pairs of peraeopods less robust than in male with the propodus slightly produced distally; the merus of the first pair has five spines on the inner margin, and one strong spine and one seta at outer apex, while the outer apex of the ischium bears two setae and one tiny spine; the merus of the second pair has seven spines on the inner side and one strong spine at outer distal apex, while that of the third

peraeopods has seven spines on the inner margin and two at the outer apex; ischium of both second and third peraeopods with two spines at inner apex and two at outer apex; basos of ambulatory legs more slender than in male.

Colour in alcohol.—Yellowish-brown.

Length, 47 mm.

Loc.—South Sea Islands (Austr. Mus. Coll.). New South Wales: "Dredged off coast" (Melbourne Ward). Tasmania: 100 fms. (C. Hedley). South Australia: Fowler's Bay, from basking shark (*Cetorhinus maximus*) (C. A. Tait).

Hab.—West Indies, Philippine Islands, Japan, and Australia.

A female, 30 mm. in length, dredged off Tasmania, has the distal part of the propodus more produced than in the female described above. The flagellum of the first antennae is composed of nine articles, that of the second of seventeen. The frontal lamina is much as in the male here figured. The merus of the first pair of peraeopods bears only two spines on the inner margin and one at outer apex, while the ischium has two spines at the outer apex; the merus of the second pair has five spines on the inner margin and one at the outer apex, that of the third pair six spines on the inner margin and two at the outer apex; the ischium in the second and third pairs is armed with one spine at the inner and two at the outer edge.

In a young female, 19 mm. in length, the flagellum of the first antennae consists of eight articles and that of the second of fifteen. The merus of the first pair of peraeopods has two spines on the inner margin and the ischium bears one spine at the outer apex; the merus of the second pair has four spines on the inner margin and two at the outer apex, while that of the third pair has six spines on the inner margin and two at the outer apex; the ischium in the second and third pairs of peraeopods bears two spines on the outer apex.

In these two females the apex of the telson is not at all upturned. The only other specimens before me are those described in detail above, a male in a dry state, and a gorged female. The latter example was taken from a basking shark, over 25 feet in length; a cast of this large fish is preserved in the South Australian Museum.

Mrs. H. Richardson Serle informs me that the single type specimen of *A. excisa* differs from *A. antillensis* in the following slight characters: "The number and arrangement of the spines on the prehensile legs, the narrower and longer uropods, which extend beyond the tip of the terminal abdominal segment, the slightly longer second antennae, and the less acutely pointed terminal abdominal segment." The tip of the abdomen is broken in the type of *A. excisa*. The other differentiating characters are variable in the Australian specimens, thus connecting the two species.

AEGA NODOSA, Schioedte and Meinert.

Aega nodosa, Sch. and Mein., Naturh. Tidsskr., (3), xii., 1879, p. 367, pl. ix., figs. 1-3.

♀. Oviparous. Form oval, two and one-half times longer than wide. Surface with large shallow punctures. Cephalon more than two and one-half times wider than medial length; anterior margin bisinuate, with a small, median, triangular process, directed downwards and backwards and almost meeting anterior margin of frontal lamina. Eyes large, oblong, meeting for a short distance on mid-line of head, leaving unoccupied a large triangular basal part of dorsal surface of cephalon, and a small V-shaped piece at anterior margin; extending on to under surface. First antennae reaching to just beyond end of peduncle of second antennae; with first two articles subequal in length and third not as long as first two together; flagellum stout, densely fringed with hair on distal two-thirds; composed of sixteen articles, including a short basal jointlet and a tiny terminal style. Second antennae reaching slightly beyond hinder margin of

second pereaeon segment; first three articles of peduncle short, the third longer than the first or second; fourth article as long as first two together and about four-fifths as long as fifth; flagellum composed of sixteen articles. Frontal lamina narrow, anteriorly terminating in a little spherical knob. First to sixth pereaeon segments not differing markedly in length; seventh much shorter, with a series of low tubercles along posterior margin. Coxal plates successively increasing in length backwards, the last reaching almost to posterior angle of third pleon segment; those of second and third segments obtusely rounded posteriorly, not backwardly produced; those of fourth and fifth segments acutely rounded posteriorly, extending a little beyond the hinder margins of their segments; posterior angles of last two pairs more acute, and produced well beyond hinder margins of their segments; oblique furrows of each coxal plate shallow. First segment of pleon concealed; second to fifth segments with a row of low tubercles along posterior margins, and with lateral parts not separated from dorsal portion; posterior angles of second to fourth segments acute; telsonic segment large, about as long as wide and longer than rest of pleon; subtriangular in shape, with the convex lateral margins evenly converging to the acute apex; with a shallow fovea on each side of basal part of dorsal surface; postero-lateral margins serrulate,

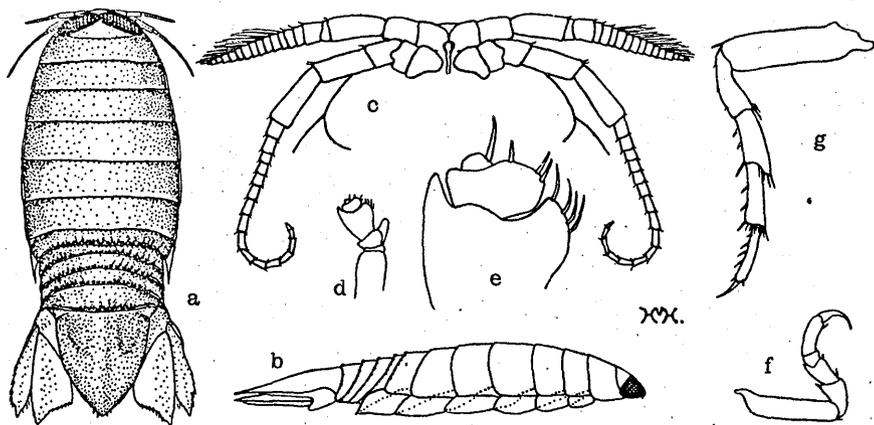


Fig. 25.

Aega nodosa, ovigerous female; a and b, dorsal and lateral views ($3\frac{1}{2}$ diams.); c, frontal lamina and antennae (10 diams.); d, palp of maxilliped (18 diams.); e, terminal articles of palp of maxilliped (90 diams.); f and g, first and seventh pereaeopods (7 diams.)

armed with two short stout spines on each side of apex. Uropoda large; propod produced to beyond middle of length of endopod, which is longer and much wider than exopod, and reaches beyond apex of pleon; hinder margin of endopod subtruncate, a little oblique, the outer posterior angle acutely produced; apex of exopod acute; hinder margin of endopod, and posterior portions of lateral margins of exopod, serrulate and set with short, stout spines. First three pairs of pereaeopods rather slender, armed with a few small, sharp spines; ischium, merus, carpus, and propodus of last four pairs armed with acute spines on inner and apical margins.

Colour in alcohol.—Yellow.

Length, 15 mm.

Loc.—South Australia (? dredged, Sir Joseph Verco).

Hab.—Tasmania (Bass Strait; type) and South Australia.

The large telsonic segment and uropods, and the dorsal tubercles, are salient features of the species. The tubercles on the pleon and hinder part of the peraeon of the female described above are not as conspicuous as in the type, a "*Mas adolescens*," 16 mm. in length, described and figured by Schioedte and Meinert; the authors of the species state that in their specimen the hinder margin of the sixth, as well as of the seventh, peraeon segment is ornamented with small tubercles, and that four larger nodes are conspicuous, one at the middle of the posterior margin of the sixth peraeon segment, one on each side of the seventh segment, and one at the middle of the hinder margin of the fourth pleon segment. The difference in the sculpture is possibly sexual. In the type the flagellum of the first antennae is composed of fourteen articles, that of the second antennae of sixteen to seventeen articles.

AEGA CYCLOPS, Haswell.

Aega cyclops, Hasw., Proc. Linn. Soc. N.S. Wales, vi., 1881, p. 192, and Cat. Austr. Crust., 1882, p. 285.

♂. Form oval, nearly two and one-half times longer than wide. Surface with moderately large, shallow, and rather sparse punctures. Cephalon a little more than twice as wide as medial length; anterior margin rounded, with a small, median, narrowly-triangular process, directed downwards and backwards, and almost touching the anterior margin of the frontal lamina. Eyes very large, confluent, occupying greater part of dorsal surface of cephalon, leaving a tiny V-shaped piece at middle of anterior margin, and a triangular portion at base of cephalon; extending on to under surface. First antennae reaching slightly beyond end of peduncle of second antennae; with first article of peduncle slightly wider than, but equal in length to second; third article more slender, distinctly longer than first two together; flagellum composed of eight to nine articles, the first of which is much the longest. Second antennae extending beyond posterior angle of second peraeon segment; first three peduncular articles subequal in length; fourth one-third longer than third and more than two-thirds as long as fifth; flagellum of right side composed of fourteen articles, that of the left side imperfect. Frontal lamina small, convex, somewhat lozenge-shaped in outline. First to sixth peraeon segments subequal in length, the seventh a little shorter. Coxal plates successively increasing in width backwards, the seventh pair being more than twice as wide as first; each with two furrows, the posterior (or upper) of which, on the plates of fourth to seventh segments, extends from the upper margin to the posterior angle; first four pairs of plates with obtuse posterior angles, not or but slightly reaching past hinder margins of their segments; last two pairs with posterior angles acute, extending beyond hinder margins of their segments. Lateral portions of second to fourth pleon segments carinate, not separated from dorsal portions; first segment almost concealed beneath last peraeon segment, telsonic segment abnormal, irregularly subtriangular in shape. Branches of uropoda of equal length on right side, the exopod of left side abnormal; protopod produced beyond middle of length of endopod, which is wide, obliquely truncate posteriorly, with the outer apical angle produced into a spine, above which (on outer margin) are three smaller spines and some fine serrations; posterior margin of endopod with four serrations; exopod narrowly ovate, a little more than one-half as wide as endopod; apex produced into an acute process, above which, on the outer margin, are five spiny serrations. Ischium, merus, carpus, and propodus of last four pairs of peraeopods set with numerous spines.

Colour in dry state.—Whitish, with scattered brown dots on peraeon; near posterior margins of segments these spots are arranged in lines.

Length, 11 mm.

Loc.—New South Wales: Port Jackson.

The only specimen of this species before me is the type, here figured and described; it is a dried and, unfortunately, somewhat abnormal example, the telsonic segment and left uropod having been damaged, evidently during life, for the uneven edge of the telson is ciliate. Haswell describes the telsonic segment as "subtriangular, the apex rounded," but the normal shape of the apical margin is a matter for conjecture.

A. cyclops is rather close to the previous species, *A. nodosa*, but differs in having the antennae a little different, and the eyes considerably larger, leaving unoccupied a much smaller triangular space at the base of the head; in *A. nodosa* the eyes are in contact for a length of four facets, but in the present species five facets of each eye are contiguous.

AEGA MEINERTI, Miers.

Aega meinerti, Miers, Zool. "Alert," 1884, p. 305.

Miers' diagnosis of *A. meinerti* is as follows:—" . . . very nearly allied to *Aega cyclops*, Haswell, . . . but seems to be sufficiently distinguished by having the body very coarsely punctulated, the epimera of the fourth to seventh segments only subacute and (the last excepted) scarcely prolonged beyond the posterior margin of the segments; and particularly by the form of the terminal

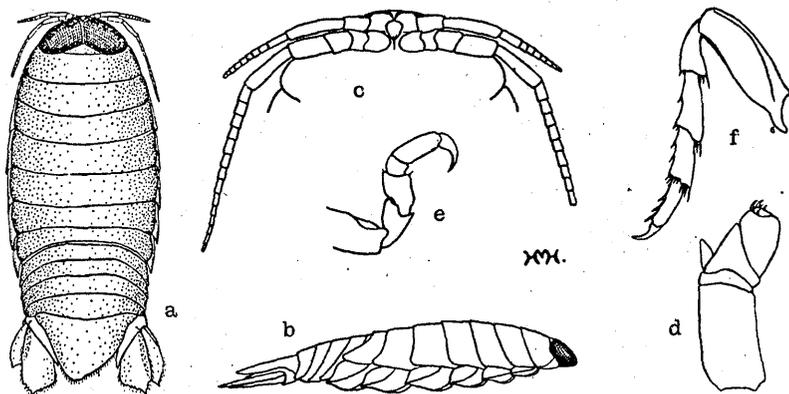


Fig. 26.

Aega cyclops, type male; a and b, dorsal and lateral views ($4\frac{1}{2}$ diams.); c, frontal lamina and antennae (11 diams.); d, maxilliped (35 diams.); e and f, first and seventh pereopods (13 diams.).

postabdominal segment, which is truncated, not rounded, at its distal extremity; the outer ramus of the uropoda is ovate but not acute, the inner squarely truncated at its distal extremity; the distal process of the peduncle extends considerably beyond the middle of the inner ramus. This species, of which a single male is in the collection from King George's Sound . . . I propose to designate *Aega meinerti*. In the confluent eyes and the form of the terminal segment it somewhat resembles . . . *Aega crenulata*, Lutken, but the posterior prehensile limbs are without the cultriform process characteristic of that species. "

Hab.—Western Australia.

In view of the fact that the telson of the type of *A. cyclops* is abnormal, there is no character mentioned in Miers' description that satisfactorily distinguishes *A. meinerti* from Haswell's species.

ÆGA SPONGICOLA, Thomson.

Rocinela spongicola, Thoms., Proc. Roy. Soc. Tas., 1893, p. 57, pl. iii., figs. 3-8; Rich., Proc. Amer. Philos. Soc., xxxvii., 1898, pp. 9, 10.

Aega spongicola, Stebb., Herdman's Ceylon Pearl Fish., Suppl. Rep., xxiii., 1905, p. 24.

As remarked by Stebbing (*ut supra*), a reference to Thomson's rather poor figure shows that this species is undoubtedly an *Aega*. As the name implies, the two type specimens were found in a sponge. Judging from the figures the species is extremely close to *A. nodosa*, but apparently lacks dorsal tubercles.

Length, 15 mm.

Hab.—Tasmania.

The status of *A. meinerti* and of *A. spongicola* is unsatisfactory; it seems possible that *A. meinerti* is identical with *A. cyclops*, and that *A. spongicola* is synonymous with *A. nodosa*, but an examination of the types of the two species is necessary to settle the question.

ROCINELA, Leach.

Rocinela, Leach, Dist. Sci. Nat., xii., 1818, p. 348; Sch. and Mein., Naturh. Tidsskr., (3) xii., 1879, p. 380; Rich., Proc. Amer. Philos. Soc., xxxvii., 1898, p. 8; Sars, Crust. of Norway, ii., 1899, p. 65; Stebb., Herdman's Ceylon Pearl Fish., Suppl. Rep., xxiii., 1905, p. 23 (syn.).

Acherusia, Lucas, Explor. Algérie, Crust., 1849, p. 78.

Twenty-seven species, including a new form described below, have apparently to be referred to this genus; this number does not include the Indian Cymothoid named *Rocinella latis*, by Southwell,⁽²⁰⁾ nor the two Australian forms *Rocinela vigilans*, Hasw., and *R. spongicola*, Thoms., both of which are referred to *Aega*.

Only two representatives of the genus are known from our waters, and both belong to the group of species which have the eyes distinctly separated and the flagellum of the second antennae composed of fourteen to sixteen articles.

KEY TO AUSTRALIAN SPECIES.

- a. Anterior margin of cephalon rounded. Lateral parts of second to fourth pleon segments not prominently produced *orientalis*
- aa. Anterior margin of cephalon truncate. Lateral parts of second to fourth pleon segments prominently produced *sila*

ROCINELA ORIENTALIS, Schioedte and Meinert.

Rocinela orientalis, Sch. and Mein., *loc. cit.*, p. 395, pl. xiii., figs. 1, 2; Miers, Zool. "Alert," 1884, p. 304; Rich., *loc. cit.*, p. 11; Stebb., *loc. cit.*, p. 24; Rich., Wash. Bur. of Fish., Doc. 736, 1910, p. 17; Barnard, Ann. S. Afr. Mus., x., 1914, p. 369, pl. xxxviii.

♀. Form oval, about two and one-half times longer than wide. Dorsal surface with shallow but distinct punctures. Cephalon less than twice as wide as long; dorsal surface with a shallow, ovate fovea; anterior part of head extending forward in front of eyes and overhanging the bases of the antennae; anterior margin rather obscurely trilobate. Eyes large, well separated, the interocular width being less than the length of an eye. First antennae reaching to about first third of length of fifth peduncular article of second antennae; first article of peduncle shorter than second, which is shorter than the third article; flagellum composed of five articles and a short, obliquely truncate, terminal style. Second antennae reaching to posterior margin of second peraeon segment; first peduncular article twice as long as second, and third slightly longer than first two together; fourth nearly as long as second and third together, with a seta at posterior side of distal end; fifth about one-seventh longer than fourth article; flagellum composed of thirteen articles and a narrow terminal style. Frontal lamina tiny, longer than wide. First to sixth peraeon segments not differing markedly in length; seventh shorter than the others; middle portion of anterior margin of

(20) Southwell, Rec. Ind. Mus., xi., 1915, p. 321, pl. xxviii., figs. 12-15.

first segment concave, lateral portions each excavate to receive bases of eyes. Coxal plates successively increasing in length backwards, none of them greatly produced, those of the seventh segment not reaching to level of postero-lateral angles of second pleon segment. Pleon segments with lateral parts not prominent and projecting; first segment almost entirely concealed beneath last peraeon segment, only a short portion of the posterior margin being visible on each side; fifth segment narrower and a little longer than any of the others, with postero-lateral angles almost covered by lateral parts of fourth segment; telsonic segment subtriangular, about one-fourth wider than medianly long; lateral margins slightly convex, converging to the rather angularly rounded apex; dorsum with a shallow, longitudinal, median furrow. Uropoda scarcely reaching to level of apex of pleon; protopod with a spine and some setae at outer posterior angle and with inner process reaching to beyond middle of length of endopod; exopod scarcely narrower but distinctly shorter than endopod, with the apex narrowly rounded; outer margins crenulate and furnished with small spines; apex of endopod rounded, outer and apical margins provided with small spines; margins of both rami, and inner margin of process of protopod with plumose hairs. Inner edge of propodus of first pair of peraeopods with three spines; ischium of seventh pair

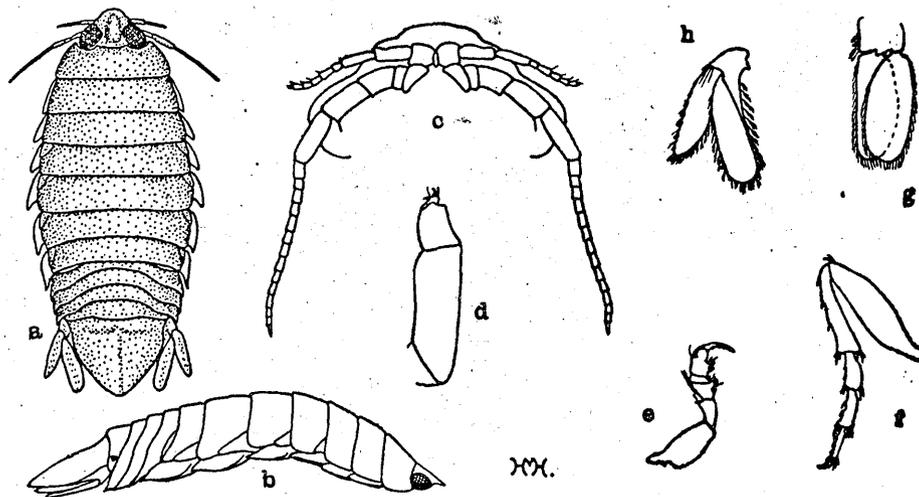


Fig. 27.

Rocinela orientalis, female; a and b, dorsal and lateral views (3 diams.); c, antennae and frontal lamina (9 diams.); d, maxilliped (28 diams.); e and f, first and seventh peraeopods (6 diams.); g, first pleopod (6 diams.); h, uropod (5 diams.).

more than twice as long as merus, which is subequal in length to the carpus and to the propodus. Outer ramus of first pair of pleopods slightly longer and wider than inner branch.

Colour in alcohol.—Brownish-yellow, marked with tiny brown chromatophores.

Length, 16 mm.

Loc.—Queensland: Port Molle (C. Hedley and A. R. McCulloch).

Hab.—India, Philippine Islands, South Africa (*vide* Barnard), and Northern Australia.

A second female, also 16 mm. in length, is very similar to the specimen described and figured above, but has the apex of the telson rather more rounded. The margins of the uropods are furnished with tiny spines as in the examples

figured by Stebbing, but the inner process of the protopod is relatively less produced in both specimens before me. Stebbing's illustration of a specimen 11.3 mm. in length (dorsal view) differs from that of Schioedte and Meinert in having the cephalon extending less forwards in front of the eyes, in not having the anterior margin of the first peraeon segment biexcavate and in having the whole of the posterior part of the first pleon segment visible, while the cephalon is not shown to be "supra leviter excavata." The examples from Port Molle agree with the type as regards these characters, but differ in the shorter inner process of the base of the uropods and in having the margin of the cephalon in front of the eyes somewhat trilobate.

Rocinela sila, n. sp.

♀. Form suboval, about two and one-half times longer than wide. Dorsal surface finely and shallowly punctate. Cephalon one-third wider than medianly long; dorsum with a subquadrate, shallow fovea, at the middle of posterior part of which is a low tumidity; anterior part of cephalon extending forwards in front of eyes, overhanging bases of antennae and with apex slightly upturned; antero-

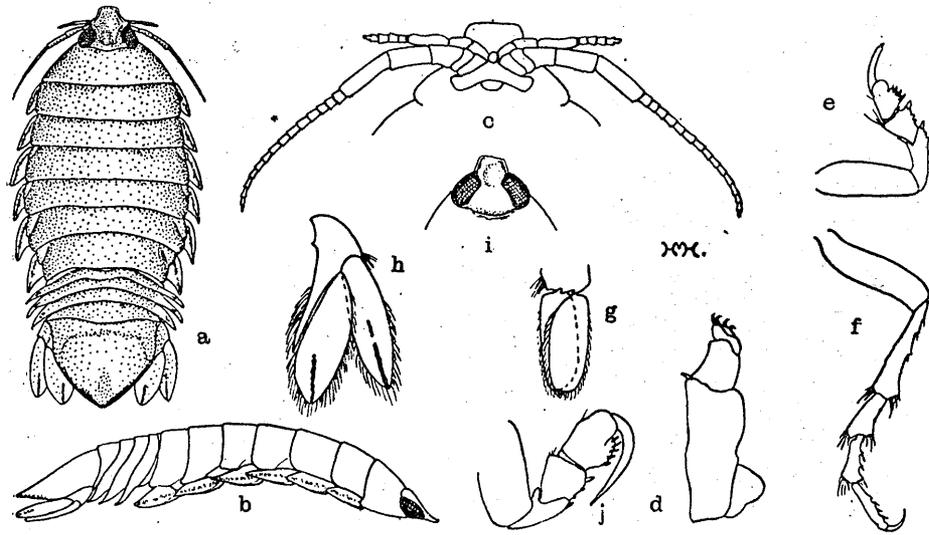


Fig. 28.

Rocinela sila, type female; a and b, dorsal and lateral views (2½ diams.); c, antennae, frontal lamina, clypeus and labrum (7 diams.); d, maxilliped (18 diams.); e and f, first and seventh peraeopods (5 diams.); g, first pleopod (5 diams.); h, uropod (5 diams.). Paratype female; i, cephalon (3½ diams.); j, first peraeopod (19 diams.).

lateral margins sinuate and incrassate, each almost as long as an eye; anterior margin truncate, a little incrassate. Eyes moderately large, well separated, the interocular width equal to the length of an eye. First antennae reaching to about first third of length of fifth peduncular article of second antennae; first and second articles of peduncle subequal in length, about two-thirds as long as third article; flagellum composed of four articles (not counting a very small and inconspicuous basal article) and a blunt terminal style which is united with the fourth article. Second antennae reaching very slightly beyond hinder margin of second peraeon segment; first article of peduncle more than twice as long as second, and third a little longer than first two together; fourth slightly longer

than third and two-thirds as long as the fifth article; flagellum composed of fourteen articles and a narrow terminal style. Frontal lamina tiny, suboval in shape. Peraeon segments more or less subequal in length; anterior margin of first segment sinuate, with lateral portions slightly excavate. Coxal plates prominent in dorsal view, successively increasing in length backwards and with posterior angles subacute; plates of second segment reaching to level of posterior margins of segment; those of third segment extending slightly, and those of remaining segments more distinctly, beyond hinder margins of their segment. Greater part of first segment of pleon concealed beneath last peraeon segment, only a small part of the middle of the posterior margin and a short postero-lateral portion on each side being visible; lateral portions of second to fourth segments much produced, with the posterior angles acute and obscurely sub-bifid; width of second and third segments equal to that of last peraeon segment including the coxal plates; fifth longer than the others with the postero-lateral angles acute and partially covered by preceding segment; telsonic segment subtriangular, more than one-third wider than medianly long; antero-lateral margins sinuate and postero-lateral margins almost straight, converging to the angularly rounded apex, which is furnished with tiny spines and hairs. Uropoda not quite reaching to level of apex of pleon; protopod with a spine and three setae at outer posterior angle and with inner process reaching to about three-fourths of length of endopod; exopod scarcely shorter, but narrower than endopod, with apex subacute and with outer margin furnished with small spines; endopod with apex subacutely rounded and with outer and intero-posterior margins provided with tiny spines; margins of both branches and hinder half of inner margin of process of protopod with plumose hairs. Inner edge of propodus of first peraeopods with four spines; merus, carpus, and propodus of seventh peraeopods subequal in length; ischium about as long as merus and carpus together. Outer ramus of first pair of pleopods slightly wider than, and subequal in length to inner branch.

Colour in alcohol.—Yellow, closely dotted with brown chromatophores; lateral margins of first peraeon segment and of anterior parts of cephalon, and mid-line of each coxal plate, with a black stripe; telson with a suboval marking on middle of posterior fourth, and with postero-lateral margins black; each ramus of uropods with a median black streak on posterior half; projecting portions of pleon segments each with a small blackish marking.

Length, 20 mm.

Loc.—South Australia: Port Adelaide (type loc., W. H. Baker). Victoria: Port Phillip (Austr. Mus. Coll.). Type, female, in S. Austr. Mus., Reg. No. C281.

Only two specimens are before me. The Victorian example, which was collected many years ago, is mutilated; it is 23.5 mm. in length, and differs from the type in the following particulars: "the colour markings are more pronounced, the median black streak on the branches of the uropods extending for the whole length of each ramus, while the black line margining the postero-lateral parts of the telson is continued upwards as an inverted U-shaped marking. The eyes are a little larger, and less widely separated, and the propodus of the first peraeopods has five spines on the inner margin (fig. 28, *i* and *j*).

This species may be readily separated from *R. orientalis* by the characters given in the above key. In some respects it greatly resembles *R. japonica*, Rich.,⁽²¹⁾ but differs in having the branches of the uropoda of different shape and not equal in width, in not having the lateral margins of the cephalon produced into a lobe in front of the eye on each side, and in having the telson relatively narrower.

(21) Rich., Proc. Amer. Philos. Soc., xxxvii., 1898, p. 15, figs. 7-9.