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Parapherusa crassipes (*Haswell*), *an Amphipod of Australasian Seas.*

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[Plates VIII.–X.]

IN 1879 Haswell described a new genus and species of Amphipod from Clark Island, Port Jackson, New South Wales, giving it the name of *Harmonia crassipes*, the name being misprinted *Harmomia* on the original page (p. 330), but correctly spelt in the explanation of the plates (p. 349). In 1880, in his 'Preliminary Report on the Australian Amphipoda,' he used the name *Chloris* in referring to this genus. It was included in the 'Catalogue of the Australian Crustacea' published in 1882 under the name *Harmonia crassipes*. In 1883 I recorded the species from Lyttelton, New Zealand, and added a description of the female, which had not been described by Haswell. In establishing the genus Haswell stated that it had affinities with *Eurystheus*

and *Amathia*, being "distinguished from the former by the form of the telson and the stoutness of the peræopoda, and from the latter mainly by the large size of the second gnathopoda." Before recognizing that the species I had found at Lyttelton was the same as Haswell's, I had begun to describe it as a new species of *Eurystheus*. In 1885 Haswell stated that the relations of the species were not correctly expressed by the position in which it was placed in the 'Catalogue of Australian Crustacea,' and that it belonged to the Corophiidæ. He gave a new definition of the genus, still retaining the erroneous statement that the maxillipeds had "a squamiform plate on the basos only," and describing the terminal uropoda as "biramous, the outer ramus with slightly hooked spines and straight hairs, the inner with straight hairs only."

In 1893 Della Valle gave the species as doubtfully belonging to the genus *Protomedeia*. In 'Das Tierreich, Amphipoda' (1906, p. 383), Stebbing renamed the genus *Parapherusa*, as the names *Harmonia* and *Chloris* were both preoccupied, and placed it in the family Gammaridæ between the genera *Paramicruropus* and *Amathillopsis*, and he retained it under the Gammaridæ in 1910.

As there has thus been some difference of opinion as to the systematic position of this Amphipod, and as there are several points in its structure that have not yet been fully described, the following account may be acceptable:—

In most respects (*i. e.*, in the mouth-parts, gnathopods, and peræopods) the species shows well the general characters of the Gammaridæ, the form of the palp of the mandible being like that of many Gammaridæ, and showing that it cannot come near to *Eurystheus*, as was originally supposed. In the first antenna the secondary appendage is long, being nearly half as long as the primary flagellum, and both the first and the second antennæ are fringed on the underside with long slender setæ, giving an appearance not unlike that found in some species of *Eurystheus*. The greatly broadened peræopods again are paralleled by some species of *Eurystheus*, and so is the long spine arising from the peduncle between the rami of the first uropod. On the other hand, the telson, though single and somewhat thick and apparently partially rolled up, being convex above, shows neither hooks nor the special character of that of *Eurystheus* and allied genera. The outer ramus of the third uropod bears, *in the male*, a peculiar stout seta or spinule dentate towards the end, some of the other setæ are slightly curved towards the end and finely serrate, but they seem quite distinct from the definite hooked setæ found in *Jassa* (formerly known as *Podocerus*)

and in some genera of the Corophiidæ. Moreover, the character described above is found only in the male; the female differs in that both rami of the uropod are more slender and bear simple setæ of the ordinary type.

It appears, therefore, that the characters which were thought to show resemblance to *Eurystheus* and the Corophiidæ are superficial only, and the position in which Stebbing has placed the species is probably the correct one, though the difficulty of arranging the genera of the family Gammaridæ according to their affinities is, in the present state of our knowledge, very great.

Genus PARAPHERUSA, Stebbing, 1906.

Harmonia, Haswell, 1879, } preoccupied.
Chloris, Haswell, 1880, }

As there is only one species at present known in this genus, the characters of the genus must be looked upon as provisional only. They are described by Stebbing as follows:—

"Side-plates shallow. Antenna 1 the shorter, accessory flagellum well developed. Mouth-parts normal. Mandible: second joint of palp as long as third, but stouter. Maxilla 1: inner plate with about ten long setæ, outer with eleven spines; second joint of palp with seven or eight spine-teeth. Maxilla 2, inner plate fringed on inner margin. Maxillipeds: inner and outer plates well armed. Gnathopods 1 and 2 subchelate, second much the larger in ♂, but not in ♀. Peræopods 3–5 very stout. Uropod 3 very short, rami equal, shorter than peduncle. Telson simple."

Parapherusa crassipes (Haswell).
(Pls. VIII.–X. figs. 1–24.)

Harmonia crassipes, Haswell, 1879, Proc. Linn. Soc. N.S.W. vol. iv. pp. 330, 349, pl. xix. fig. 3; Haswell, 1882, Cat. Australian Crustacea, p. 251; Haswell, 1885, Proc. Linn. Soc. N.S.W. vol. x. p. 106, pl. xvi. fig. 9; Chilton, 1883, Trans. N.Z. Inst. vol. xv. p. 82, pl. ii. fig. 5; Della Valle, 1883, Fauna und Flora des Golfes von Neapel, vol. xx. p. 442.

Parapherusa crassipes, Stebbing, 1906, Das Tierreich, vol. xxi., Amphipoda, p. 383; Stebbing, 1910, Australian Museum, Memoir 4, p. 641; Chilton, 1909, Subantarctic Islands of New Zealand, p. 630.

Chloris, Haswell, 1880, Ann. & Mag. Nat. Hist. ser. 5, vol. v. p. 33.

Specific diagnosis.—Pleon-segments 5 and 6 very short. Eyes narrow, reniform. Antenna 1 about half the length of body and as long as antenna 2; flagellum longer than peduncle, accessory flagellum well developed. Antenna 2

with flagellum subequal to peduncle. Gnathopod 1, in female, with carpus and propod subequal in length, propod oval, palm convex and occupying about half the hind margin; in the mature male the propod widens at the base and has a very short, projecting, serrate hind margin, the palm slightly concave. Gnathopod 2 in female like gnathopod 1, but larger, and with carpus shorter and triangular; in the male, carpus very short, cup-shaped; propod very large, oblong, palm only slightly oblique, well defined, undulating, with flat-topped teeth. Peræopoda 3, 4, 5 very stout, subequal in length. Uropod 1 with long curved spine arising from end of peduncle and lying between the rami; uropod 3 in the female with both rami slender, about as long as the peduncle; in the male both rami much shorter than peduncle, the outer bearing a peculiar spinule serrate towards the end.

Colour brown.

Length 4 mm.

Port Jackson, New South Wales; Griffith's Point, Victoria; New Zealand, Antipodes Island.

The specific diagnosis given above has been modified from that given by Stebbing. It may be supplemented by the following fuller description :—

First antennæ (Pl. VIII. fig. 1) subequal to or slightly shorter than the lower, second joint of peduncle equal in length to the first, but more slender; the third about half the length of the second; flagellum nearly twice as long as the peduncle, of twenty to thirty joints; accessory flagellum long, more than one-third the length of the primary, and consisting of about nine to twelve joints; the joints of the peduncle and the more proximal portions of the flagellum bear small tufts of long setæ, considerably longer than the width of the joints from which they arise; towards the end of the flagellum these setæ become progressively fewer in number and shorter.

Second antennæ (fig. 1): gland-cone very short, last two joints of peduncle subequal, both with numerous tufts of long setæ projecting towards the underside of the appendage; the flagellum is slightly longer than the peduncle and contains about fifteen to twenty joints, the more proximal ones bearing long setæ similar to those on the peduncle.

Upper lip (fig. 2) with distal border regularly convex and fringed with the usual closely-set setæ; attached to this lip is a triangular structure, the *epistome*, which has the extremity rounded.

The *mandible* (figs. 3, 4, 5) is of normal form, with cutting-edge, spine-row, and molar tubercle all well developed;

in the palp the first segment is short, less than half the length of the second, the second and third are subequal, but the third is more slender; the second bears on the inner convex side about a dozen long setæ; on the third there is a regular double row of setæ on the distal half of the inner margin, with longer setæ near the base of the joint and two or three very long ones at its extremity. The right and left mandibles differ in the structure of the inner cutting-edge; in the left this is formed of four or five large teeth, similar to those of the outer cutting-edge, while in the right mandible it is somewhat different in shape and terminates in about six short small teeth. The spine-row contains about ten serrated spines.

The *lower lip* (fig. 6): inner lobes large and broad, almost as broad as the outer lobes; the mandibular processes are short and broad.

First maxillæ (figs. 7, 8): the inner lobe triangular, about half as long as the outer lobe, and bearing on its inner convex margin about a dozen long, slender, plumose setæ; the outer lobe with about ten or eleven spines, most of which are finely denticulate towards the ends; the palp reaching slightly beyond the outer lobe, its first joint very short; the second ends in about six short spines, and bears an oblique row of setæ on the surface near the extremity. In one maxilla the spines at the end of the palp are shorter than in the maxilla of the other side.

Second maxillæ (Pl. IX. fig. 9): both lobes short and broad, broadly rounded at the ends, and bearing at the extremity and on the distal portion of the inner margin the usual long setæ; on the inner lobe there is also an oblique row of setæ arising from the surface.

Maxillipeds (figs. 10, 11): outer and inner lobes well developed; inner lobe truncate at the extremity, with two stout, rather blunt teeth at the inner corner, and a number of simple setæ at the extremity and on the distal portion of the inner margin; the outer lobe has its inner margin bordered with about ten stout broad spines, becoming progressively larger towards the distal end; its extremity and part of its outer curved margin bear long setæ; other long setæ arise from the surface of the joint external to the stout spines; the carpal joint of the palp reaches far beyond the outer lobe and is much longer than the propod; the propod is held more or less vertically or at right angles to the plane of the base, and bears a row of five or six long setæ near its outer and upper margin, and near the inner or lower margin a rounded lobe fringed with many long setæ; other long setæ

arise at the base of this finger; the terminal joint or finger is long, curved, ending acutely, and has its inner margin finely denticulate (see fig. 11).

The *first gnathopod* in the female (fig. 12) has the side-plate almost square, the lower margin slightly convex, with a few minute setæ; the basal joint is long, about three times as long as broad; the ischium has a tuft of setæ at the postero-distal angle; the merus is almost quadrangular and bears two small tufts of setæ on the posterior margin near the distal end and a row of stouter setæ parallel to the distal margin; the carpus is slightly shorter than the propod and almost oblong, narrowing abruptly at its junction with the merus; its anterior margin is very slightly convex and bears only two or three small setæ, and there is another small tuft on the surface near the postero-distal angle; the propod is oval in outline, somewhat narrowed at the base; anterior margin regularly convex, with five or six short transverse rows of setæ, the posterior margin bearing three similar rows, and there are also three or four rows on the surface of the joint; the palm is regularly convex, not well defined, but bearing one or two stout spines and small tufts of more slender setæ near the point against which the end of the finger impinges, the rest of the palm towards the base of the finger bearing a few short setæ; the finger is strongly curved, tapering gradually to an acute point, and when closed fits closely against the palm.

In the young males the first gnathopod has the same character as that just described for the female. In the older males (fig. 13), however, the shape of the propod becomes considerably different. It is widest at the base, the palm is much longer, straight or slightly concave, and the hind margin proper becomes very short, and in place of bearing the typical transverse rows of setæ is irregularly serrate; the anterior margin and surface of the propod bear tufts of setæ similarly placed to those described in the female; the finger is more strongly curved, so that when closed there is a space between it and the palm. In the oldest males that I have been able to examine there is practically no trace left on the short hind margin of the transverse rows of setæ. In other specimens, however, presumably not so mature, this posterior margin is longer and still bears some of the setæ, though these appear to be becoming shorter and modified into the serrate surface found in the old specimens. In the female and in young males the hind margin occupies nearly one-half of the posterior margin of the propod, while in the fully developed male it forms only about a fourth of that

margin and protrudes considerably, so that the propod is then broadest at the base instead of being narrowest at the base as in the female and young male. Practically all the transition-stages between these two extremes can be found.

The *second gnathopod* in the female (fig. 14) has the same general shape as the first gnathopod, but is larger, and differs in having the carpus shorter and triangular, being only about half as long as the propod; the propod is oval, widest about the middle, narrowing a little towards the distal end. The arrangement of setæ on all the joints is practically the same as that on the first gnathopod, and can be readily understood from the figure without further description.

In the male the second gnathopod (Pl. X. fig. 15) is very large and strong, the basal joint is rather short and is broad; on the outer side the margin forms a thin flange and is produced at the distal end into a small rounded lobe, so that a groove is formed on the anterior surface of the basal joint, into which the distal portion of the limb fits when reflexed; the ischium is short and has its outer margin also produced into a small lobe; the merus is short and produced at its antero-distal angle into a subacute point; the carpus is short, triangular, and cup-shaped, being hollowed at the end to receive the greatly enlarged propod; the propod is oblong-oval, widening slightly distally; the palm is slightly oblique, well defined by a sharp tooth, and has a large flat-topped tooth near the base of the finger and a wide lobe at the centre of the palm, with a deep rounded depression at each side; the finger is particularly large and strong.

In the fully developed second gnathopod of the male the setæ are very few, sometimes there are two or three small tufts along the hind margin of the propod and a very small tuft at the distal end of the anterior margin at the base of the finger, and a few very short setæ on the palm. In still older specimens even these few setæ are hardly distinguishable, while, on the other hand, in younger males the setæ may be longer and more abundant and are present on the anterior margin as well as on the hind margin, so that the whole appendage approaches more nearly to the form found in the female.

The *first* and *second peræopods* (fig. 16) are moderately broad, especially the basal joint; the side-plates are rectangular in both. There are no signs of glands in any of the joints similar to those in *Jassa*, the Corophiidæ, etc., and these peræopoda do not call for detailed description.

The *third*, *fourth*, and *fifth peræopods* (fig. 17) are all stout, particularly the fourth and fifth; they increase some-

what in length posteriorly, but not greatly so, the fourth and fifth being almost subequal and not very much longer than the third. The basal joint in all is oblong, not much expanded, and is narrowed a little distally ; its posterior border is obscurely serrate ; all the succeeding joints are stout ; the merus is only slightly produced at the postero-distal angle ; the propod is much longer than the carpus ; the finger is short and stout, with a small secondary nail. The arrangement of the setæ on the joint can be readily seen from fig. 17.

The *first uropod* (figs. 18, 19) has the peduncle oblong, rather shorter than the rami ; it bears a small spinule at the distal end of the upper margin, and from the lower part of its extremity a long curved acute spine, fully half as long as the inner ramus, projects between the two rami, recalling a similar spine found in some species of *Eurystheus*, *Corophium*, etc. ; the outer ramus is slightly shorter than the inner, both bear two or three short spinules on the upper margin and longer ones at the extremity.

The *second uropod* (fig. 20) has the peduncle subequal to the inner ramus, the outer ramus being rather shorter ; there is no curved spine at the extremity of the peduncle, but otherwise the uropod shows similar structure to that of the first.

The *third uropod*, in the male (figs. 21, 22), has the peduncle stout and nearly twice as long as either of the rami : these are short and broad, being less than twice as long as broad ; the outer one bears at the extremity a peculiar stout seta with fine serrations towards the end (see fig. 22)—in addition to this there are five or six short setæ which are slightly curved at the end and some of which are finely serrate ; the inner ramus bears at the extremity three or four setæ of the usual kind slightly longer than those on the outer ramus and one or two smaller ones placed more proximally. In the female (fig. 23) both rami are more slender and slightly longer, being about as long as the peduncle ; they bear only simple setæ.

The telson (fig. 24) is slightly convex above, so that it appears fairly thick in side-view : it is broadest at the base, where the breadth is about two-thirds the length, and narrows slightly distally ; the posterior border is convex and bears two small spines at each corner, and two or three smaller spines are present on each lateral margin. There is no sign on the telson of hooked spines.

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EXPLANATION OF THE PLATES.

All the figures refer to *Parapherusa crassipes*.

Plate VIII.

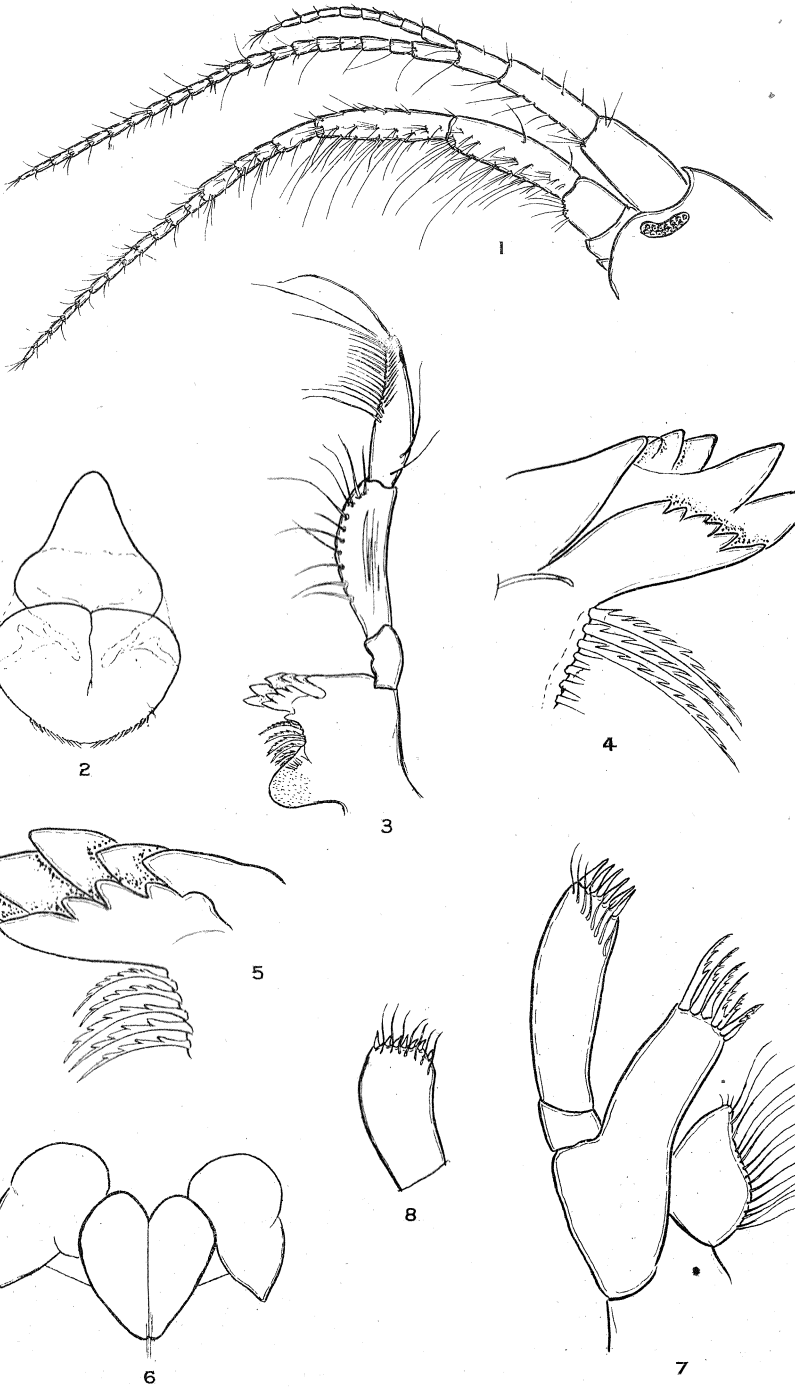
Fig. 1. Upper and lower antennæ and anterior portion of head.
Fig. 2. Upper lip, with epistome.
Fig. 3. Left mandible.
Fig. 4. Cutting-edge of right mandible.
Fig. 5. Cutting-edge of left mandible.
Fig. 6. Lower lip.
Fig. 7. First maxilla.
Fig. 8. End of palp of first maxilla of opposite side.

Plate IX.

Fig. 9. Second maxilla.
Fig. 10. Maxilliped.
Fig. 11. End of palp of maxilliped (more highly magnified).
Fig. 12. First gnathopod of female.
Fig. 13. First gnathopod of male.
Fig. 14. Second gnathopod of female.

Plate X.

Fig. 15. Second gnathopod of male.
Fig. 16. First peræopod.
Fig. 17. Fifth peræopod.
Fig. 18. Side-view of urus, with uropoda and telson.
Fig. 19. First uropod.
Fig. 20. Second uropod.
Fig. 21. Third uropod of male.
Fig. 22. Distal portion of the same, more highly magnified.
Fig. 23. Third uropod of female.
Fig. 24. Telson.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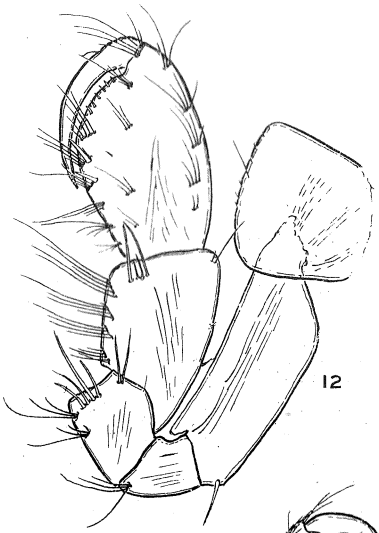
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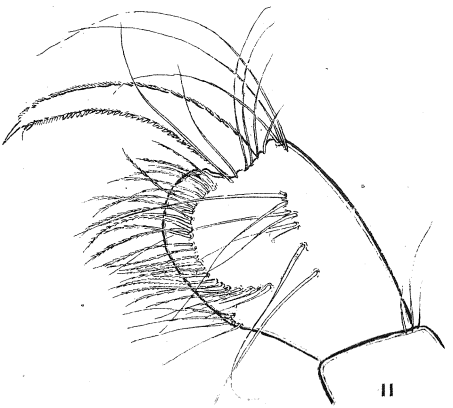
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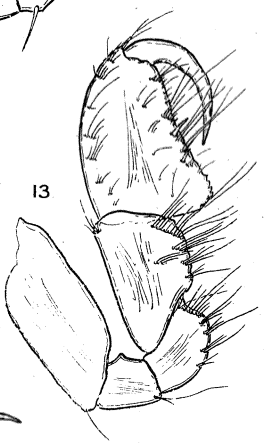
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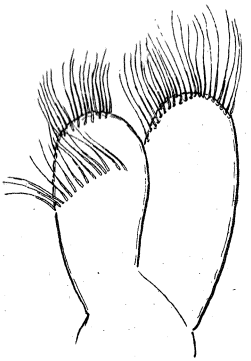
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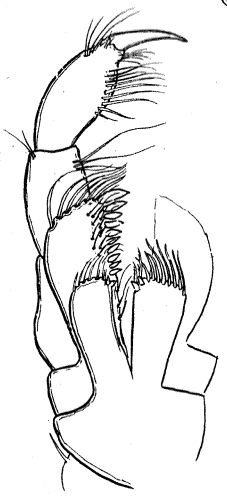
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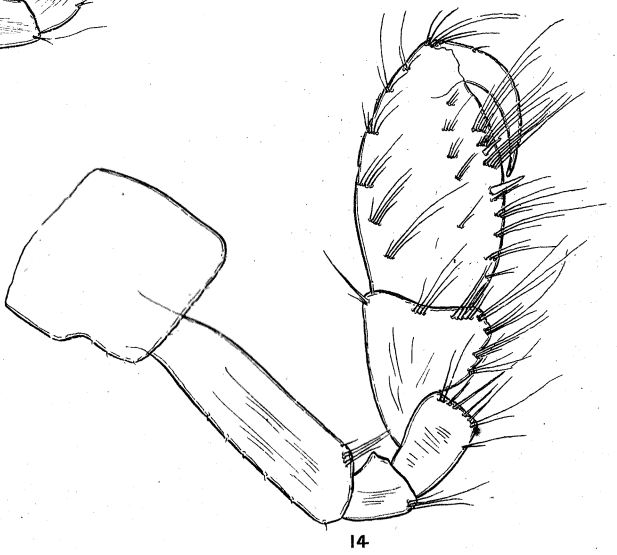
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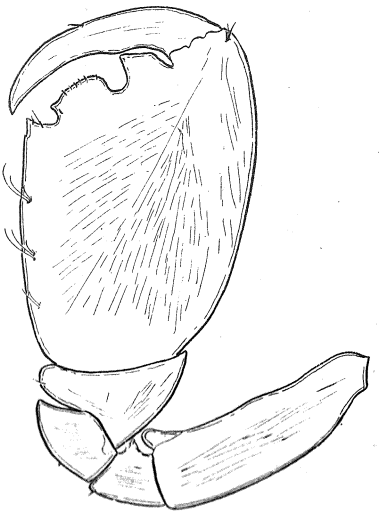

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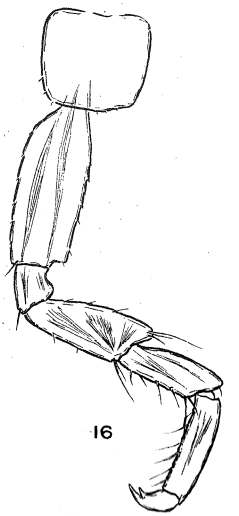

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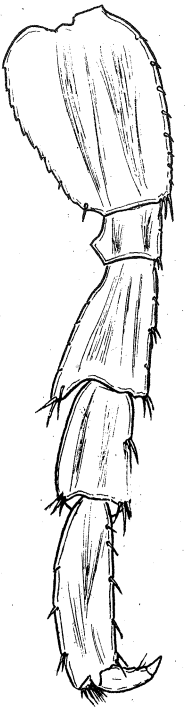

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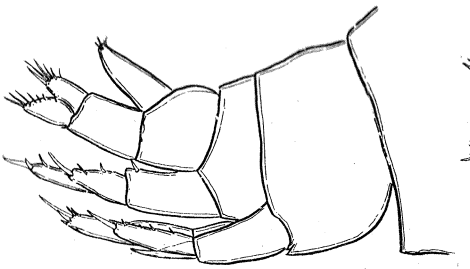

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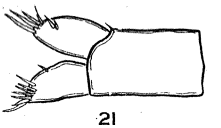

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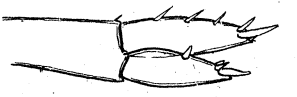

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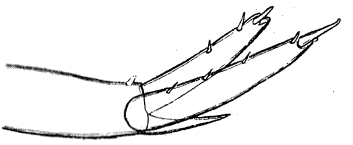

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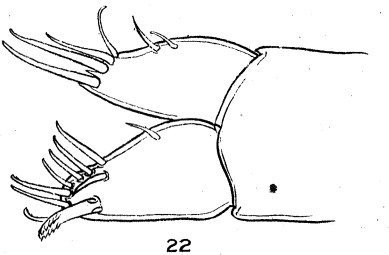

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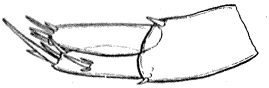

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