

The only marked differences between the several species of *Hyalella* and *Chiltonia australis* are that in the latter the first maxillae does not possess a minute rudimentary one-jointed palp, and the second pair of gnathopoda in the male is without a conspicuous lobe to the wrist; but this latter difference is only one of degree, for it has a minute unarmed one, as shown in my drawing.

In *Chiltonia mihiwaka*, besides the loss of the maxillary palp, the terminal uropoda are only one-jointed, and in Dr. Chilton's drawing the wrist of the second gnathopods is quite without any lobe.

*Chiltonia australis* therefore forms an interesting connecting link between the New Zealand and American forms, and affords good evidence of *C. mihiwaka* having migrated from America to New Zealand through Victoria, as some other forms of life appear to have done.

Through the kindness of Professor Baldwin Spencer, from whom I received some material collected from Lake Hindmarsh, I am now able to add another species to this genus.

*Chiltonia subtenuis*, sp. nov. (Pl. IV.).

*Male*.—Body comparatively slender, first four side-plates of subequal depth to their respective segments. Epimeral plates of last two segments of metasome with posterior angles a little produced acutely backwards, ventral margins evenly convex. Cephalon large, as long as first two segments of mesosome combined, lateral edges deeply excavated. Eyes large, slightly oval.

Mouth parts large and strong, possessing all the characteristics of the type. Maxillipedes relatively stouter, but of quite the same form and armature.

Upper antennae equal in length to cephalon, and first three segments of mesosome combined, peduncle with second and third joints of equal length, each shorter than the first; flagellum a little longer than peduncle with about nine rather long joints. Lower antennae a little shorter than the upper, gland cone prominent, following joint produced below distally to a conical spur tipped with setae; flagellum of about six joints.

First gnathopoda with anterior margin of side-plates slightly produced anteriorly, lower margin evenly convex, carpus with

evenly rounded lobe bearing about eight stout faintly feathered setae; propodus a little longer than carpus, subtrigonal, widening distally, anterior margin strongly curved, palm nearly transverse, slightly convex and entire, meeting the posterior margin in an evenly rounded narrow curve bearing a little spine, posterior margin a little convex and free from setae. Second gnathopoda with propodus normally large, almost as broad as long, posterior margin equalling half the length of the anterior, both nearly straight, palm transverse, convex and setose, defined by a small rounded tubercle. Dactylus of equal length to the palm, inner margin entire, and on the outer margin a plumose setae.

First two pairs of pereopoda equal in length and form, the third also of similar length, fourth longer, fifth of equal length to the fourth. In each of the last three pairs the basos is expanded, the last greatly so, being as wide as its length, with the hind margin strongly convex and deeply and irregularly serrated.

Uropods normal to the genus, terminal pair one-jointed. Telson subrectangular, lateral angles rounded, distal margin with a small rounded expansion medianly; armed distally above, on each side of the median line, with two spinules.

*Female*.—Similar in form to the male, except in the second gnathopoda which are, except for being rather longer, like the first pair.

*Colour*.—Spirit specimens uniformly yellowish.

*Length*.—♀ 4 mm. ♂ rather larger.

*Occurrence*.—From Lake Hindmarsh, North-Western Victoria (received from Professor Baldwin Spencer).

*Remarks*.—This species is easily distinguished from the New Zealand *C. mihiwaka*, by the much more slender body, and the larger head and eyes; and from *C. australis*, by the shorter urosome, one-jointed terminal uropoda, shape of the hands, and much shorter antennae. Amongst about twenty specimens there were only two males.

*Atyloides fontana*, sp. nov. (Pl. V.).

In general appearance very like *A. gabrieli*, but with deeper side-plates, the antennae not bearing fascicles of long setae, and

the upper with shorter peduncle, also the mandibular palp has not the penultimate joint so widely expanded.

Body with short setae thinly scattered over the surface. First four pairs of side-plates considerably deeper than their respective segments, evenly rounded below and unclothed, the first not in the least expanded distally; the fourth slightly deeper than wide. Last pair of epimeral plates of metasome with posterior angle minutely angularly produced, margin above entire and a little convex, ventral margin almost straight and unarmed, anterior angle narrowly rounded.

Cephalon equalling in length the first two segments of mesosome combined. Eyes circular, black.

Upper antennae less than half the length of the body, with few setae; peduncle short, not longer than the cephalon and half of the first joint of mesosome combined, its ultimate joint rather more than half the length of the penultimate; flagellum considerably longer than twice the length of peduncle, with 40-50 short articuli, secondary appendage, normal, one-jointed. Lower antennae of about equal length to the upper, with few setae; peduncle extending to the limit of upper, flagellum more than twice the length of peduncle with 30-40 joints.

Gnathopoda subequal, the second with the basal joint a little longer than the first, hands small, not any larger than the first, and of identical form, carpus equal in length to the propodus, lobed posteriorly and thickly clothed with long spineform setae; propodus oblong, subquadrate, palm oblique, very slightly concave, fringed with a few spinules, and at the limit a row of four or five stout spines; forming with the hind margin a right-angle; hind margin broken by two or three transverse ridges of long spineform setae, the distal one being the most prominent, anterior margin with four fascicles of setae, and on the outer face a single bunch near the palm. Dactylus as long as the palm, inner margin with about four equidistant fine spines, and on the outer margin a faintly pectinated one a little more proximally than the middle length.

First two pairs of pereopoda much longer than the gnathopoda, of equal length and form; last three pairs quite similar in form to each other, gradually increasing in length distally;

freely spinulose; basos of each well expanded, the hind margin evenly curved and minutely serrate.

Uropoda with the peduncles of each extending to an even distance behind, first two pairs with outer ramus a little shorter than the inner, upper margins thickly fringed with little spines. Terminal uropoda extending to the limit of the lower pair, rami lanceolate, margins fringed with little spines and a few plumose setae.

Telson of even width to its length, deeply cleft, lateral edges almost straight, apex of each piece broadly rounded and bearing three setae, also a little below, one on each of the inner and outer sides.

*Colour.*—Spirit specimens uniformly yellow.

*Length.*—10 mm.

*Occurrence.*—From a rivulet near Wood's Point; altitude about 3000 feet (collected by Mr. S. W. Fulton).

*Remarks.*—This species agrees well in general characters with *Atyloides gabrieli*, described in my last paper; it is, however, more normal to the genus as instituted by Stebbing, notably in the inner lobe of the first maxillae bearing a lateral fringe of many plumose setae (not only tipped by three), also by the mandibular palp not being so widely expanded. The only notable feature of difference from the other known species of that genus appears to be in its possession of a distinctly lobed wrist in the gnathopods; in all other respects it is in close agreement. In the latter respect it agrees with *Calliopius*, but that genus has the telson entire, and the upper antennae have no accessory appendage. From *Pontogeneia*, with which *Atyloides* appears to be closely allied, it differs in possessing a secondary antennary appendage, as well as by the lobed wrists. In both *Calliopius* and *Pontogeneia* also the antennae, of at least the male, bear numerous large calceoli on the antennae, which does not appear to be the case in any of the *Atyloides*, certainly not in my two species.

#### *Gammarus australis*, Sayce.

Proc. Roy. Soc. Vict., xiii., n.s., pt. 2, pp. 233-237, pl. xxxix.

Since describing this species, I have received some further specimens of it, and am now able to define the sexual characters.

Also I find that some of the text in the supplementary description was left out in the printing; on page 235 under first maxillae, the description of the maxillipeds is given, and the first and second maxillae are omitted, I shall now add these.

*First Maxillae.*—Inner lobe apically pointed, inner margin straight, facing obliquely, fringed along its whole length with many plumose setae. Outer lobe stout, and apically bearing at least ten denticulated spines which are set in a double row, so that their number is difficult to determine, and there may possibly be one or two more of them. The palp is two-jointed, that of the right-hand side terminates in six teeth, that of the left bears ten apical spines, and on the outer face, at the base of these, three longer ones.

*Second Maxillae.*—Inner lobe extending almost to the extremity of the outer one, summit rounded and thickly clothed with fine spinules, inner margin sparsely fringed with spinules, and also having a submarginal oblique row of plumose setae. Outer lobe broadly rounded at the extremity and bearing many spinules, some of which, toward the outer margin, are longer than the others and faintly pectinated.

*Body.*—I find on further examination that in the last segment of the urosome the dorsum bears on each side of the median line a small spine, which is hidden by many long fine spinules, which also arm the other segments of the urosome and last two segments of the metasome.

*Gnathopoda.*—Dactyli bearing on the inner margin a secondary claw, and at its base two or three setae; on the outer margin near to the articulation a single setae.

*Sexual Characters.*—In the gnathopoda the first pair has no apparent difference in the two sexes, but the second has the propodus and carpus rather longer and more slender in the female than in the male. The palm also is set more obliquely in the male, but this is subject to variation.

The termination of the inner ramus of the last uropoda also shows a slight sexual difference. In the female the apex is narrowly rounded and bears about seven spinules, and just below these on the dorsal surface there are two spinules situated medianly, and a long stout spine on each side of them. In the male the corresponding part is rather broader and bears at the

inner angle two stout spines, and the margin between them and the outer angle is fringed with long slender spinules; also on the dorsal surface there is a row of eight long subapical spinules.

*Occurrence.*— Besides Dandenong Creek, near Bayswater, where the type specimens came from, I have three specimens found in association with *Atyloides gabrieli*, and a blind species (*Gammarus haasei*) described below, which Mr. Haase collected from a little rivulet in a fern gully at Monbulk, at an altitude of about 800ft.

*Gammarus haasei*, sp. nov. (Pl. VI.).

Body of similar form to *G. australis*, but rather deeper, appendages not so densely setose, and not possessing eyes. Segments of metasome dorsally possessing few, those of urosome with many long fine spinules, which, in the two last segments, almost obscure a small stout submarginal spine on each side of the median line. Cephalon of equal length to the first two segments of the mesosome combined. Coxal-plates more or less spinose and setose, fourth as wide as its depth. Last pair of epimeral plates of metasome with postero-lateral angle acute, slightly acuminate, margin above with a few minute hairs, ventral margin with two stout and two minute spines.

Peduncle of upper antennae extending beyond the limit of the penultimate joint of the lower, flagellum about two-thirds the length of the body with 40-50 joints, accessory appendage with 3-5 joints. Lower antennae with flagellum of about 19 joints; in the male with last joint of peduncle and about the first six joints of flagellum bearing calceoli.

Gnathopoda much more slender in female than in male. In the *female*, hands comparatively small, the second with carpus and propodus considerably longer than in the first pair, but of subequal form, carpus fully as long as propodus, propodus oblong, subquadrate, palm almost transverse and straight, fringed with spinules, and at the posterior angle, which is narrowly rounded, three conspicuous spines, posterior margins of the two mentioned joints with many transverse rows of setae, some of which are faintly feathered, also a few little fascicles of setae along the anterior margins, and, in the propodus, a few bunches scattered

over the outer face. Dactyli at about the middle length bearing a secondary claw and three setae near to its base; on the outer margin a seta towards the proximal end. In the *male* the two pairs of gnathopoda are much more strongly built, the second compared with the first rather longer, and propodus a very little larger; the second, compared with the female with the basis shorter, carpus much shorter, being less than two-thirds the length of the propodus, and propodus much larger, in other respects they are subequal.

Pereiopoda with dactyli of each having a stout fine-pointed spinule on the inner margin at the base of the claw, and near to it on the side a seta, also on the outer margin more proximally one, and sometimes two plumose setae. Last three pairs of almost equal length, the penultimate a very little longer than the other two.

Terminal uropoda of medium length, differing in form in the two sexes. In the *female* with the outer ramus twice the length of the inner, terminating in a rudimentary joint, outer margin with four, inner with three ridges of spines, and a longitudinal series of plumose setae. Inner ramus lanceolate, outer margin with three equidistant spines, inner with about six plumose setae, apex with four long spinules. In the *male*, outer ramus subequal to the female, inner ramus rather longer and of different shape, its inner margin being almost straight and fringed with plumose setae, the outer margin straight for about two-thirds of its length when it is angularly deflected and runs straight to the narrowly rounded apex, and is fringed with about six long spinules. The apex carries a stout spine and a few spinules.

The telson is cleft to the base, each piece is broadly rounded at the end and furnished with numerous long spinules, also a few on the upper surface.

*Colour.*—Spirit specimens white.

*Length.*—Largest 10 mm.

*Occurrence.*—From a little runnel in a fern gully at Monbulk, near Lilydale, Victoria. Altitude about 800ft. In association with *Gammarus australis* and *Atyloides gabrieli* (collected by Mr. J. F. Haase).

*Remarks.*—This species agrees rather closely with *G. australis*, but, although inhabiting surface waters, is peculiarly character-

ized in being without the slightest trace of eyes. It is also more differentiated in the male, the hands of the gnathopoda being conspicuously stronger and the wrists shorter, also the lower antennae possess calceoli, which are not to be seen in *G. australis*.

I have had the opportunity through the kindness of Mr. G. M. Thomson, of New Zealand, of examining his *Niphargus mortoni*, from Tasmanian fresh-waters, which is certainly congeneric with the two species just mentioned, and is in rather close agreement with *G. australis*. He provisionally placed it in the genus *Niphargus*, and some may think it necessary to institute a fresh genus to receive these three forms, but the characters are so close to those of *Gammarus*, that it does not appear to me to be necessary. The number of dorsal spines on the urosome are certainly few, but in respect to the mouth parts and other features they are quite normal. Thomson's species has normal eyes like *G. australis*, and has the coxal-plates shallower than in that species, the dorsum is not clothed with nearly so many fine spinules, the inner branch of the terminal uropoda is shorter and inner ramus much shorter, the upper antennae have a smaller secondary appendage and relatively rather longer terminal peduncular joint, also the body and appendages are not nearly so setose.

The above new species is named in compliment to Mr. J. F. Haase, who collected it.

*Supplementary description.*—In all I received 11 specimens, and 4 of these are males.

*Eyes.*—There is not the slightest trace of any crystalline lense or pigment.

*Mouth parts.*—These agree very closely with those of *G. australis* and *G. mortoni*, and call for no special mention.

*Upper Antennae.*—The first antennae of the male compared with the female is rather longer, being about four-fifths the length of the body, while in the female it is not more than two-thirds, and the flagellum has respectively about 50 and 40 joints. In each sex the flagellum has, besides a large number of ordinary tactile setae, on the inner side of each joint, except above the first ten and the last three or four, a single "olfactory cylinder," also the peduncle bears on the first joint about five or



six and the second and third joints, distally, two or three plumose sensory setae.

*Lower Antennae.*—The peduncle is a little longer than the flagellum, the two last joints subequal and clothed thickly with bunches of setae, and, at the distal end of each, two or three plumose sensory setae. There are about 19 joints in the flagellum, which are also thickly setose, but they are not so long or as dense as in *G. australis*. In the male the last joint of the peduncle, on the inner side, has a row of four calceoli, and one on each of the first six joints of the peduncle. In *G. australis* there are no calceoli, but *G. mortoni*, which has relatively shorter antennae, possesses one on each of the first six joints of the flagellum, but none on the peduncle. The former has longer and more numerous setae than the other two local species.

*Coxal-plates.*—The first three pairs are fringed with spineform setae as in *G. australis*, but they are not so numerous nor as long as in that species; each also bears three or four spines on the posterior margin. The fourth is of even depth to its length, and its ventral margin bears only a few setae.

*Branchial and Incubatory Lamellae.*—The former are simple and pedunculated, and the latter large and fringed with setae.

*First and Second Pereiopoda.*—The first is a little longer than the second, the latter compared with the third being about as long as from the proximal end of the basos to near the limit of the carpus.

*Third, Fourth and Fifth Pereiopoda.*—The third and fifth are of equal length and the fourth is a little longer. In *G. australis* it is relatively longer. The bases of each are expanded, that of the third being rather wider than the others, being in the proportion of three-quarters as wide as its length. In lateral outline it is oblong, subquadrate; the fourth has the posterior margin narrowing rather irregularly to the succeeding joint; the fifth also only differs in the hind margin which is concave, it is irregularly serrate, and besides a fringe of setules bears a rather stout spine at the distal extremity.

*Pleopoda and Uropoda.*—These are normal and call for no special mention, the terminal pair and the telson have already been described.

*Neoniphargus fultoni*, sp. nov. (Pl. VII).

Similar in general features to *N. spenceri*, coxal-plates scarcely so deep, with only a few marginal setae and no spines, the first pair relatively shorter and distally narrower; legs rather longer and not so spinulose, eyes smaller and subspherical.

Last two segments of urosome dorsally bearing a spine on each side of the median line, and one or two little spinules on each of the four preceding segments. Last pair of epimeral plates of metasome with postero-lateral angles acute, but not produced, margins above with but one or two setae, ventral margins nearly straight and anteriorly bearing a conspicuous submarginal spine, anterior angles rather narrowly rounded. Cephalon scarcely as long as the two succeeding segments combined, lateral corners broadly rounded.

Upper antennae rather more than half the length of the body, peduncle with its last joint subequal in length to the preceding one, flagellum nearly twice the length of peduncle, of about 18 articuli; secondary appendage normal (two-jointed). Lower antennae with last joint of peduncle a little shorter than the preceding one, flagellum a little shorter than the two last joints of peduncle combined, of about nine articuli. In the male with upper and lower antennae bearing numerous calceoli.

Gnathopoda similar in form and armature to *G. australis*, but with hands relatively a little longer and the coxal-plates of first pair distinctly shorter than the second, also narrower at the apex.

Pereiopoda with last joint of each having a stout spine on the inner margin. Three last pairs long and slender, coxal-lobes not bearing any stout marginal spines, penultimate considerably longer than the other two, which are equal to each other; basal plates widely expanded, the last being two-thirds as wide as its length.

Terminal uropoda of similar length, but not so spinulose as in *N. spenceri*, the outer ramus with the terminal, rudimentary joint longer, and the minute scale-like inner ramus tipped with one plumose setae, also on the inner margin another one.

Telson long, deeply cleft, each piece narrow at the end, with two subapical spines, and on the upper surface a few little spinules.

*Colour.* Spirit specimens uniformly dark yellow.

*Length.*—6.5 m.m.

*Occurrence.*—From a spring at Collin's coach stage, near to Wood's Point. Altitude about 3000 feet. (Collected by Mr. S. W. Fulton.)

*Remarks.*—This species is easily distinguished from *N. spenceri* by its narrower side-plates (that of the first pair being distally much narrower and somewhat shorter than the succeeding one), by the penultimate segment of the metasome having its ventral margin not so curved, and furnished with a stout spine, by longer legs, and the dactyli only possessing one spine on the inner margin, not three, by the almost circular eyes, and by a much narrower telson. From *N. thomsoni* by the deeper side-plates, the much longer terminal uropods and antennae, which in the upper ones bear a longer terminal peduncular joint, by the character of the eyes and telson, as well as by several other features.

#### EXPLANATION OF PLATES.

##### PLATE IV.

*Chiltonia subtenuis*, n. sp.

##### PLATE V.

*Atyloides fontana*, n. sp.

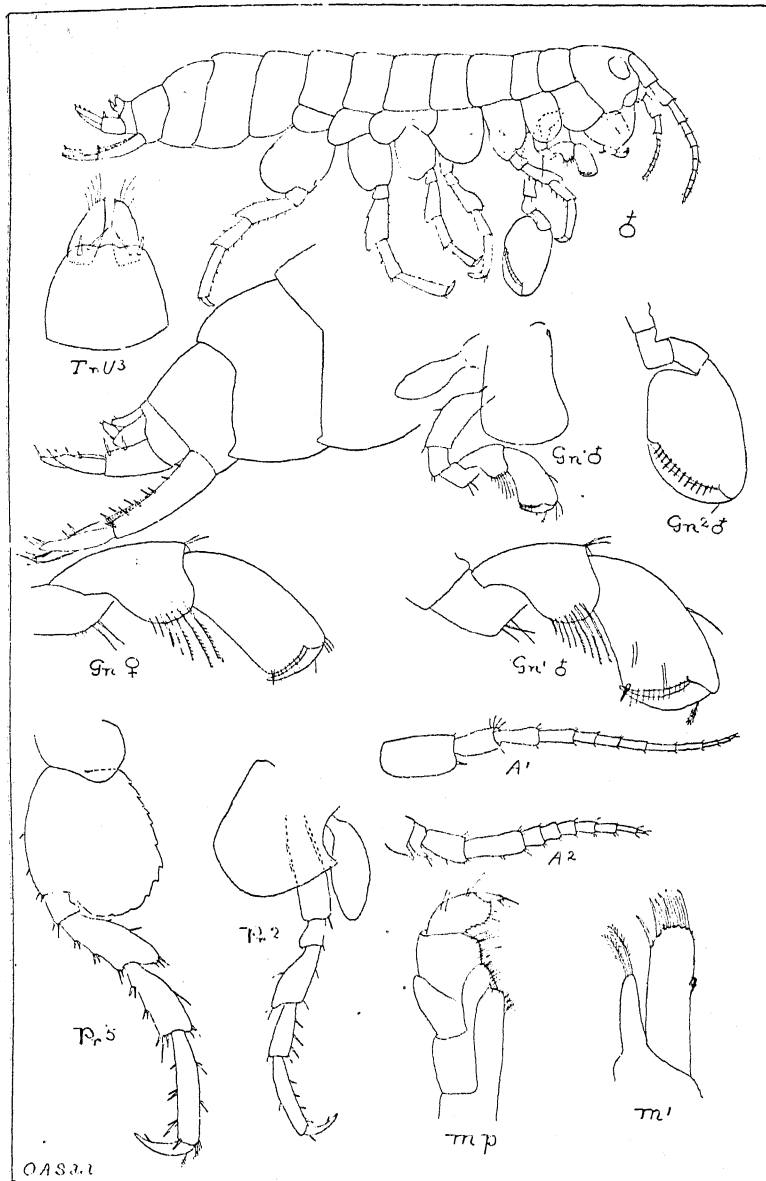
##### PLATE VI.

*Gammarus haasei*, n. sp.

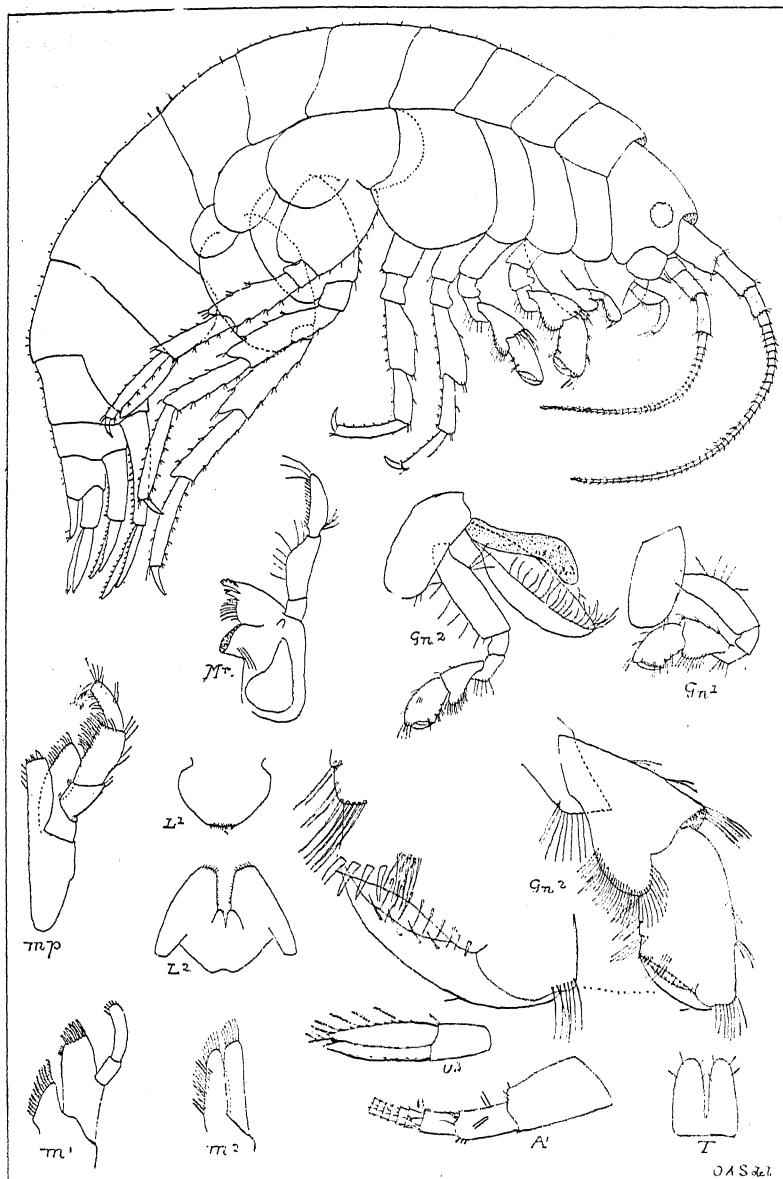
##### PLATE VII.

*Neoniphargus fultoni*, n. sp.

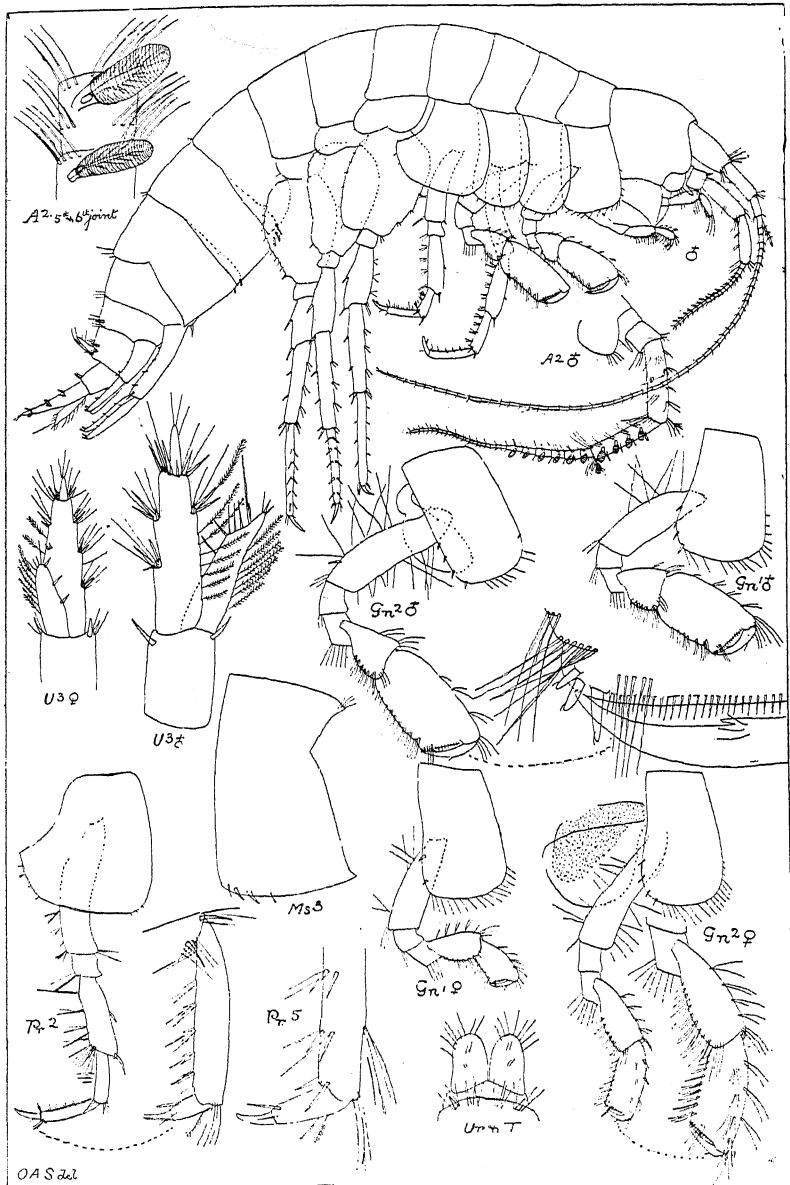
The following lettering is used to designate the corresponding parts:—C. cephalon; Ms., mesosome; Mts., metasome; Ur., urosome; A<sup>1</sup>, superior antennae; A<sup>2</sup>, inferior antennae; L<sup>1</sup>, anterior lip; L<sup>2</sup>, posterior lip; M., mandibles; m<sup>1</sup>, first maxillae; m<sup>2</sup>, second maxillae; mp., maxillipedes; Gn<sup>1</sup> and Gn<sup>2</sup>, gnathopoda, first and second pairs; Pr<sup>1</sup>-Pr<sup>5</sup>, pereiopoda, first to fifth pairs; U<sup>1</sup>-U<sup>3</sup>, uropoda, first to third pairs; T., telson.



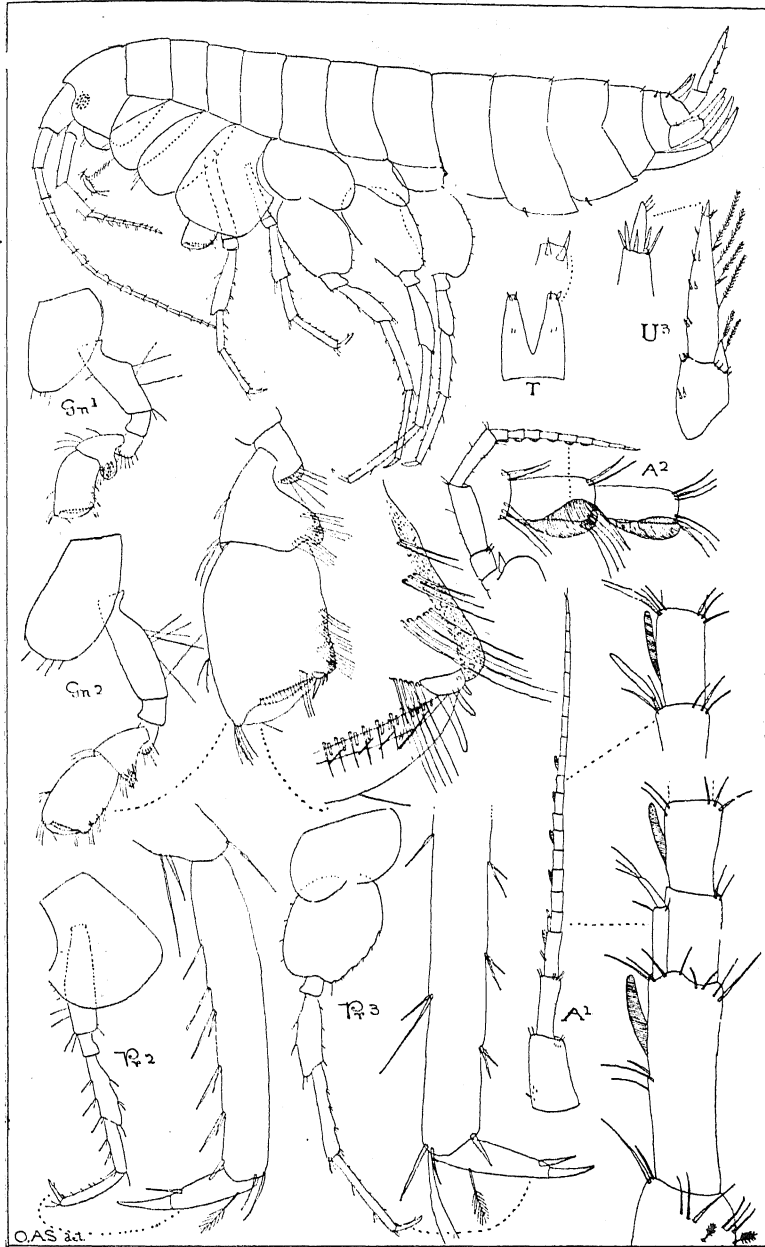
*Chiltonia subtenuis*, sp. n.



*Atyloides fontana*, sp. n.



*Gammarus haasei*, sp. n.



*Neoniphargus fultoni*, sp. n.