14. A Small Collection of Amphipoda from Juan Fernandez.

By

Dr. CHARLES CHILTON,
Professor of Biology, Canterbury College, New Zealand.

With 4 textfigures.

The Amphipoda described in this paper were collected at the Juan Fernandez Islands by Mr. K. BÄCKSTRÖM of the Swedish Pacific Expedition of 1916-17. For the opportunity of examining them I am indebted to the leader of the expedition, Professor C. SKOTTSBERG and to Professor T. ODHNER of Stockholm. The collection is a small one including only five species and a new variety of one of the species, the others being already known. I give below a list of the species with a note as to the distribution of each.

The only point calling for special attention concerns the first species, *Orchestia chiliensis* Milne-Edwards. This has long been known from Chile and from New Zealand; in the latter country it is extremely common in most places on the sea shore, and does not appear to extend far beyond high water mark, although under favourable conditions it may be found at some little distance from the beach. In Juan Fernandez it appears to be common also, one bottle being labelled »under stones throughout the island», but here it appears to extend also to considerable distances from the shore and to heights above the sea up to 500 metres. The tube labelled »500 m. above sea level» contains several specimens similar in size and structure to those collected on the sea shore. Other specimens labelled »in a brook» are much smaller, but I think are only to be looked upon as young forms of the same species and the same is true of another tube labelled »under stones,» the altitude of the last two not being given. Another specimen of larger size, 13 mm. in length, labelled »Portezuelo, under stones» shows certain differences, and I am describing it as a new variety. Its antennae and peraeopoda are much longer and more slender than in the typical form of *O. chiliensis,* and the second gnathopod also shows some differences in the shape of the palm. The pleopoda are, however, well developed, showing no reduction in size such as is found in terrestrial species of *Parorchestia,* and the telson has numerous spines on its lateral mar-

gins. On the whole I look upon this form as a modified descendant of *O. chiliensis*. No altitude is given for the locality at which it was taken, but Portezuelo is a mountain pass about 590 metres high and I presume that the animal is a true terrestrial one found at about this elevation above the sea. The point of interest is that in the Juan Fernandez Islands we apparently have the shore species *Orchestia chiliensis* extending on to the land and reaching considerable altitudes, and in one case acquiring characters which make its general appearance similar to that of purely terrestrial species of *Talorchestia*, while in other examples no modification appears to have taken place. Presumably the form I have described as a new variety has adopted a terrestrial mode of life for some considerable time, though not long enough to have caused any modification in the pleopoda, while the others that show no modification are to be looked upon as forms that have more recently taken to life on land.

The figures accompanying this paper have been prepared by Miss E. M. Herriott, M. A., Assistant at the Canterbury College Biological Laboratory to whom my thanks are due.

The following is a list of the species with their distribution: —

1. **Orchestia chiliensis** Milne-Edwards.
   Chile, South America; New Zealand.

2. **Aora typica** Kröyer.
   Widely distributed in all seas.

3. **Amphithoe femorata** (Kröyer).
   South Pacific and South Atlantic.

4. **Jassa falcata** (Mont.).
   Widely distributed in all seas.

5. **Caprella cornuta** Dana.
   Rio Janeiro, Brazil.

Orchestia chiliensis Milne-Edwards.

Orchestia chiliensis Milne-Edwards, 1840, vol, 3, p. 18.[1]
Orchestia chiliensis Thomson, 1899, p. 199.
Orchestia chiliensis Stebbing, 1906, p. 537.
Orchestia serrulata Dana, 1853—55, p. 870, pl. 57, figs. 7 a—l (♂), m—o (♀).
Orchestia selkirki Stebbing, 1888, p. 603, pls. 1, 2; 1906 p. 538.

Localities.

Masatierra, »under stones throughout the island,» S. P. E. No. 259. About 20 males, averaging 15 mm. in length, though one with the second gnathopod subchelate as in the male is only 8 mm. long; 12 females (or immature males) averaging 10 mm. long. One male has abnormal second antennae.

[1] The references are made by the year of publication to the list on p. 92.

Masafuera, »under stones, 500 metres above sea level», S. P. E. No. 327. 27. II. 17. Two tubes.

One tube contains about one dozen specimens, one male, the others apparently females. These average about 12 mm. in length. In the other tube there are several specimens, all small, about 4 mm. in length.

Masatierra, »under stones.» S. P. E. No. 729. 31. VII. 17.

Several varying in size from 4 mm. in length up to 8 mm. Young specimens, none of them having the second gnathopod subchelate and none bearing eggs.

Masatierra, »among withered leaves.» S. P. E. No. 494. 7. IV. 17.

Several varying in size up to 8 mm., none with subchelate second gnathopods nor bearing eggs.

Masatierra, »in a brook.» S. P. E. No. 724. 31. VII. 17.

12 specimens, the largest 9 mm., two of them being apparently immature males.

I have no hesitation in identifying all the specimens named above as belonging to *O. chiliensis* M.-Edw., a species already known from South America and from New Zealand. In New Zealand it is the commonest of the shore hoppers and is usually found under stones, etc. about high water mark, though under favourable circumstances it may sometimes extend a little distance away from the sea. It is well described by STEBBING in Das Tierreich. Amphipoda (1906, p. 537), and the fully developed male can generally be easily recognised by the stout second antenna, by the large rounded tooth or lobe near the finger hinge on the palm of the second gnathopod and by the broadening of the meral and carpal joints of the fifth peraeopod and, to a little extent, of the fourth peraeopod. The species was collected at the Juan Fernandez Islands by the Challenger Expedition and both male and female specimens were very fully described and figured by Stebbing under the name *O. selkirki.* The male examined and figured by him was probably somewhat immature for the fifth peraeopod shows no broadening of the joints, and the second gnathopod has not acquired the final adult form.

I think there is no doubt that *O. serrulata* Dana is a synonym of *O. chiliensis* M.-Edw. This is clearly indicated by his figure of the last peraeopod (pl. 58, fig. 7, l) which shows the broadened carpus usually met with in this species; the figure of the second gnathopod (fig. 7, i) though too small to be of much value, indicates the tooth near the finger hinge with the rest of the palm slightly convex; figure 7, k, showing the serrulate margin of the basal joint of the fifth peraeopod, applies well to *O. chiliensis* though the character is possessed by other species also. Moreover DANA's specimens were collected at the »Black Rocks, in the Bay of Islands, New Zealand» where *O. chiliensis* is abundant. STEBBING (1906, p. 536) has adopted DANA's name *O. serrulata* for the species described as *O. aucklandiae* by SPENCE BATE but that species is well marked in the male by the raised ridges or corrugations on the peraeon segments, a character which is not found in *O. chiliensis.* The second gnatho-

pod of *O. aucklandiae* also differs from DANA's figure in the more transverse and well defined palm. *O. aucklandiae* is found on the southern coasts of the South Island of New Zealand but, so far as I am aware, does not reach the North Island at all.

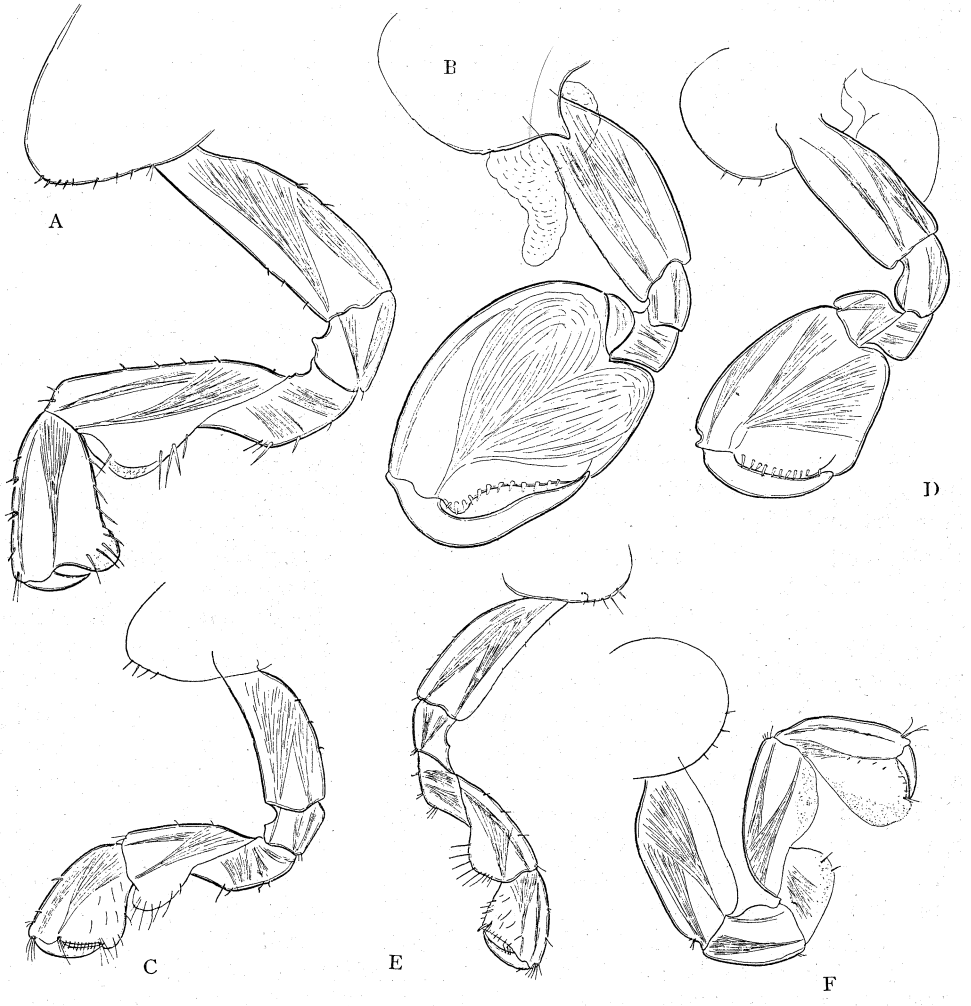

Fig. 1. *Orchestia chiliensis.*
A and B, First and second gnathopods of adult male;
C and D, First and second gnathopods of immature male;
E and F, First and second gnathopods of a very young male.

Figures I, A and I, B show the first and second gnathopoda of a male from tube No. 259. In the first gnathopod there is a very small pellucid lobe on the merus (not large enough to show in the figure) similar to those on the carpus and propod.

The specimens in tube No. 259, labelled »Masatierra, under stones throughout the island» are quite similar in size and structure to those found i New Zealand and, as noted above, the tube contained more males than females. This, how-

ever, may be due to the selection of larger specimens by the collector, though when collecting this species on the coast of New Zealand I have usually found the males fairly numerous. The other specimens which have the second gnathopod small and not subchelate are considered to be either females or immature males, all of these are smaller than the males.

The specimens in tube No. 729 marked »Masatierra, under stones» are I think young forms of the species now under consideration. The same is true of those in tube No. 494, labelled »Masatierra, among withered leaves.» None of the specimens in these two tubes shows the adult characters of the male or bears eggs.

The specimens in the two tubes, No. 327, are of special interest as they were obtained 500 metres above sea level. In one tube are about a dozen large specimens, averaging about 12 mm. in length. One of these is a male, fully developed, showing the usual male characters as mentioned above and having the expansion of the joints of the fifth peraeopod slightly greater than in any of the specimens in tube 259 which, presumably, were obtained from about the sea level. The other specimens in tube 327 are apparently females or young males. One of them which I dissected was a female with about 7 or 8 eggs in the brood pouch. Most of these eggs were very hard, almost stony, but whether this was the result of the action of the preservative or from pathological cause, I cannot say. In the other tube, also marked »No. 327, under stones, 500 metres above sea level,» were small specimens about 4 mm. in length which are doubtless young of this same species.

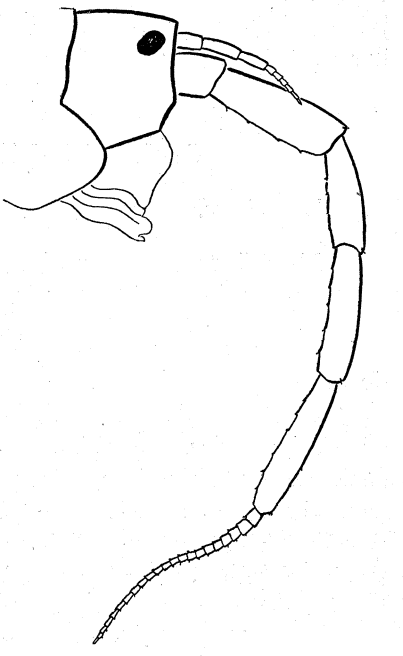

Fig. 1. G, *Orchestia chiliensis*, Head and antennae of male with abnormal number of joints in the second antenna.

Of the specimens found »in a brook» No. 724, two appear to be immature males showing male characters in the gnathopods, and the rest apparently females. These two males illustrate to some extent the stages passed through in the development of the adult male characters. The larger one about 6 mm. long, has the first gnathopod (fig. 1, C) well developed, the carpus and propod being produced posteriorly into the characteristic pellucid lobes but not to the same extent as in more adult males, while there is no sign of a similar lobe on the merus; the second gnathopod (fig. 1, D) has the propod large, widening a little distally, the palm nearly transverse and regularly even with a small groove as usual for the reception of the tip of the finger. In the other much smaller specimen, the first gnathopod (fig. 1, E) is stouter than in the females, but none of the pellucid lobes are developed, the palm being straight or slightly concave and not extending beyond the tip of the finger; the second gnathopod (fig. 1, F) is rather stouter than in the female

but has the same general shape and structure. Evidently the very young male in this species passes through a stage in which the second gnathopod is similar to that of the female, in the same way as it does in *Talorchestia deschayesii, T. martensii,* etc.

In all the specimens examined the pleopoda are well developed, double branched, each branch consisting of numerous joints. I have not noticed any difference between the shore forms and those taken at higher levels as regards the size and development of the pleopoda.

One of the males in tube No. 259 has both the lower antennae much longer than usual and with an abnormal number of joints in the peduncle. Figure 1, G shows that in addition to the normal number there are two other joints of the peduncle each a little longer than the last normal joint and similar to it in shape; the flagellum is normal and so is the upper antenna.

Orchestia chiliensis, var. **gracilis** nov. var.

Locality.

Masatierra, Portezuelo, »under stones.» 3. XII. 16. S. P. E. No. 32. One male specimen only.

This specimen measures about 13 mm. in length. It is a male with well developed subchelate second gnathopods. The lower antennae and the 3rd to 5th peraeopods are much longer and more slender than in typical specimens of *O. chiliensis.* In this respect the animal resembles true terrestrial species such as *Parorchestia sylvicola* from New Zealand and *Parorchestia hawaiensis* from the Hawaiian Islands. The three pairs of pleopoda are, however, all well developed, extending well beyond the side plates of their respective segments, the third pair being about as long as the first. The first gnathopod (fig. 2, C) is slightly more elongated than in *O. chiliensis* but otherwise of quite similar structure. The telson bears numerous lateral spinules as in *O. chiliensis.* The second gnathopod (fig. 2, D) is not distinctive, the strong rounded tooth near the base of the finger not being well developed, the rest of the palm is slightly uneven, the finger regularly curved and fitting into a slight groove at the end of the palm. There is nothing very characteristic about this gnathopod, but it may be looked upon as a slight modification of the form usually found in *O. chiliensis.* For the sake of comparison I give figures of the antennae (fig. 2 A, B), of the first and second gnathopods (figs. C, D) and of the fifth peraeopod (fig. 2, E) which will render further description unnessary.

I feel pretty confident that this specimen is to be looked upon as a modified descendant of *O. chiliensis.* There are no particulars given of the conditions under which it is living except that it is found under stones in Portezuelo. It was collected at a considerable height above the sea shore (590 m.) and has become more adapted to terrestrial life than the forms described above with the result that the appendages have increased in length, though the well developed character of the pleopods shows that i thas not been so long adapted to terrestrial conditions as the species of *Parorchestia* mentioned above.

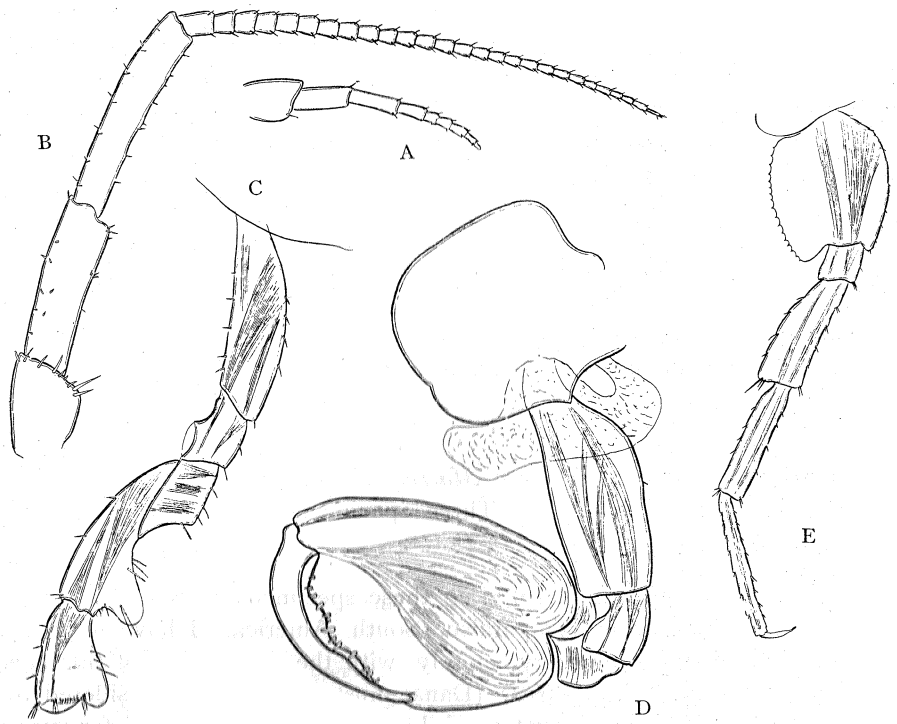

Fig. 2. *Orchestia chiliensis* M.-Ed., var. *gracilis*, male. A. Upper Antenna. B. Lower Antenna. C. First Gnathopod, D. Second Gnathopod. E. Fifth Peraeopod (less magnified than the other figures).

Aora typica Kröyer.

Aora typica Kröyer, 1845, Naturh. Tidsskr., ser. 2, i, p.328, pl. iii, figs. 3 a—l.
Lalaria longitarsis Nicolet, 1849, in Gay Hist. Chile, vol. 3, p. 243, Crustacea, pl. 2, fig. 8 a—f.
Aora typica Chilton, 1885, Ann. & Mag. Nat. Hist., ser. 5, xvi, p. 370.
Aora typica Stebbing, 1906, p. 587.
Aora typica Chilton, 1909, p. 645.

Localities.

Masatierra, Cumberland Bay, 20—25 m., 6. XII. 16. S. P. E. No. 53. One male, form 1, and two females.

Masatierra, 30—45 m., 28. III. 17. No. 406. Among calcareous algae. Two females, imperfect.

The male specimen has the triangular process or spine on the front margin of the basis of the first gnathopod as described and figured by NICOLET and myself. NICOLET's specimens were from the coast of Chile and the same form is found in New Zealand where it is accompanied by another form of

the male in which the second gnathopod has no triangular process on the basis and differs a little in the shape of the propod. The second form of the male was described as *Lonchomerus gracilis* by BATE from British seas and is now known to be widely distributed in all seas, while the first form does not appear to have been recorded from any locality except South America, New Zealand and Juan Fernandez.

Amphithoe femorata (Kröyer).

Amphithoe femorata Stebbing, 1906, p. 636.
Amphithoe brevipes Stebbing, 1906, p. 637.

Locality.

Masatierra, »among floating *Macrocystis* drifting from the continent.» S. P. E. No. 598. April 1917. Three specimens, female, the largest about 13 mm. in length.

I feel pretty confident in referring these specimens to KRÖYER's species, which was described from Valparaiso, South America. I have only female specimens, but they agree very closely with the description of this species given by STEBBING. *A. brevipes* (Dana) must, I think, be considered to be the same species. The parts that are fully figured by DANA, such, for example, as the antennae, are quite similar. *A. brevipes* as understood by Stebbing, is known from the South Atlantic (Tierra del Fuego, Falkland Islands) and also from the South Pacific (Valparaiso). There is close general resemblance also between my specimens and *A. rubricata* (Mont.) of Europe, etc. I have been able to compare the Juan Fernandez specimens with two of *A. rubricata* from England as well as with SARS' figures and though there are slight differences in some of the mouth parts, etc. these do not appear to be of much importance. DELLA VALLE grouped *A. rubricata, A. femorata, A. brevipes* and also *A. brasiliensis* (Dana) together as one species under the name *A. rubricata,* and they certainly appear to form a fairly defined group in which the extreme forms will probably be shown to be more and more closely connected by transitional forms as specimens from different localities are examined.

In his description of *A. femorata,* STEBBING says »in many respects resembling *Sunamphitoe pelagica.*» When first examining my specimens before I had dissected one to ascertain the presence of the mandibular palp I had independently noticed the strong resemblance to this species, and indeed for the presence of the palp of the mandible it would not be easy to know to which of these two species to refer female specimens. The palp in my specimens (fig. 3, A) is small and slender, more so than in SARS' figure of *A. rubricata.* In each of the two specimens of *A. rubricata* from England that I have examined the palp of the mandible is distinctly smaller in comparison with the rest of the appendage than in the figure given by SARS and is much less abundantly supplied with setules, those on the third joint being nearly confined to the extremity. Probably the mandible is tending to become vestigial in this group

of species and shows variation, having become completely lost in *Sunamphitoe pelagica*. The lower lip of *A. femorata* (fig. 3, B) seems to correspond more to that of *S. pelagica* than of *A rubricata*. In the first (fig. 3, C) and second peraeopoda the basal joint is very broad and has the distal half broader than the proximal, the two portions being separated by a slight constriction.

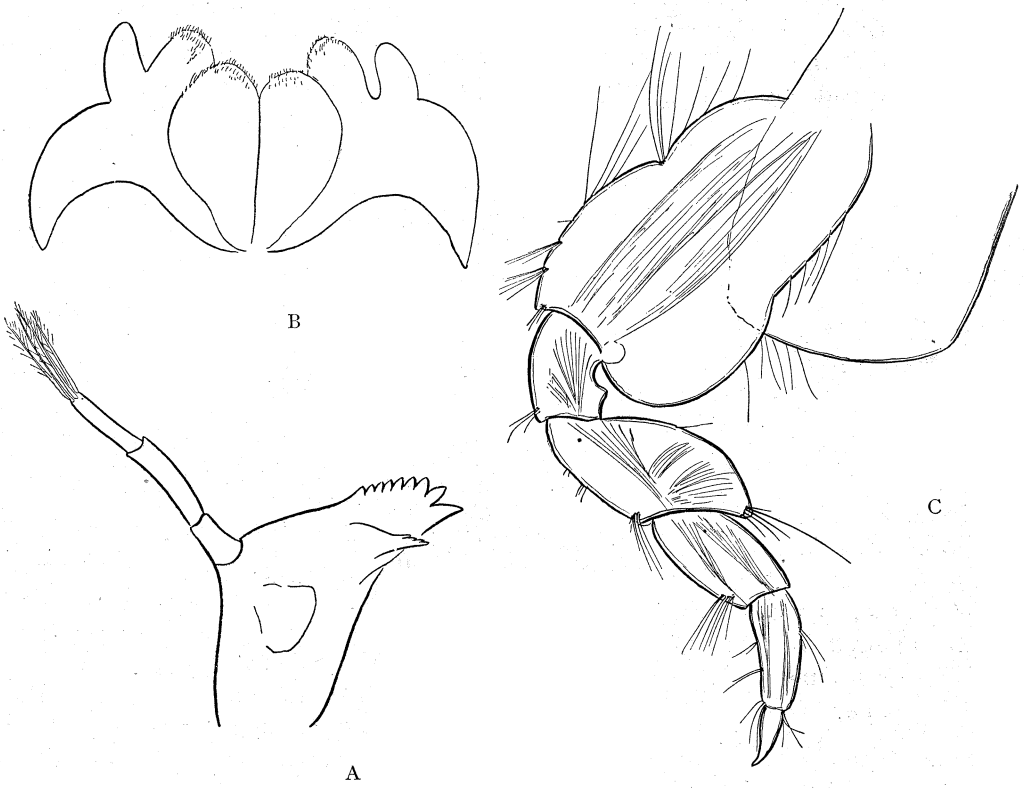

Fig. 3. *Amphithoe femorata* (Kröyer), female. A. Mandible. B. Lower Lip. C. First Peraeopod.

Jassa falcata (Montagu).

Cancer (*Cammarus*) *falcatus* Montagu, 1888, Trans. Linn. Soc., vol. 9, p. 100, pl. 5. fig. 2.
Podocerus falcatus Sars, 1894, pl. 212.
Jassa pulchella and *Jassa falcata* Stebbing, 1906, pp. 654 and 656.
Jassa falcata Sexton, 1911, p. 212.
Jassa falcata Chilton, 1912, p. 511.
Jassa falcata Stebbing, 1914, p. 371.

Localities.

Masatierra, Cumberland Bay, 20—25 m. S. P. E. No. 53. Several males. Same locality, »on a buoy», S. P. E. No. 206. Many specimens, males, females and young of all stages.

These specimens agree very closely with the figures and description given by SARS for *Podocerus falcatus* (1894, pl. 212) as regards the males and also the females. The tube marked »On a buoy in Cumberland Bay,» contains a great many specimens, mostly young, though there are a few fully developed males and females. Among the young males are several showing some of the stages in the development of the adult characters, all of which can be paralleled by specimens obtained in similar situations in New Zealand. The species is very widely distributed both in northern and southern seas and includes a number of forms towards the full life history of which notable contributions have been made by Mrs. E. W. SEXTON of Plymouth.

Caprella cornuta Dana.

Caprella cornuta Dana, 1853—55, p. 816, pl. 54, figs. 5 a—g.

Locality.

Masatierra, Cumberland Bay, 20—25 m., 6. XII. 16. No. 53. Several specimens, males and females, the longest being about 10 mm. long.

These specimens agree well with the description given by DANA and must I think be referred to his species. The following appear to be the important characters. The head bears a well marked acute tooth projecting forwards and a little upwards. The second gnathopod of the male (fig. 4, C) is somewhat elongated with the propod oblong, the palm nearly straight, defined by an acute tooth, having another acute tooth a little distal of the middle of the palm, followed by a truncate projection with minutely crenated edge near the base of the finger. In an ovigerous female the second gnathopod (fig. 4, B) has a similar shape but is somewhat smaller and the acute tooth near the centre of the palm is absent or only very slightly represented. In both sexes the basal joint is fairly long and has the upper margin produced into a thin flange which projects at the distal end in a subacute tooth. The branchiae are narrow-elliptical.

In addition to the points already mentioned the specimens agree with DANA's fuller description of minor points. The upper antennae are fairly long and have the flagellum composed of nearly 20 joints, the first three or four of which are united into one as described by DANA. The inferior antennae are about as long as the flagellum of the upper, the two-jointed flagellum being equal in length to the preceding joint. The first gnathopod (fig. 4, A) is about the same in male and female, and has the propod somewhat triangular, the palm occupying the whole of the posterior margin, slightly convex and fringed with long setules, a few setules arising also in a row parallel to the anterior margin. In some specimens examined the third and fourth segments have the pleura produced downwards into a prominence similar to that mentioned by DANA except that is not quite so regularly oblong, being deeper posteriorly.

The species also shows a very close resemblance to *Caprella dentata* Haller as described by MAYER in 1882, the gnathopods being apparently in

very close correspondence except that the second one is somewhat longer. The first gnathopod agrees very closely with the figure given by MAYER. The

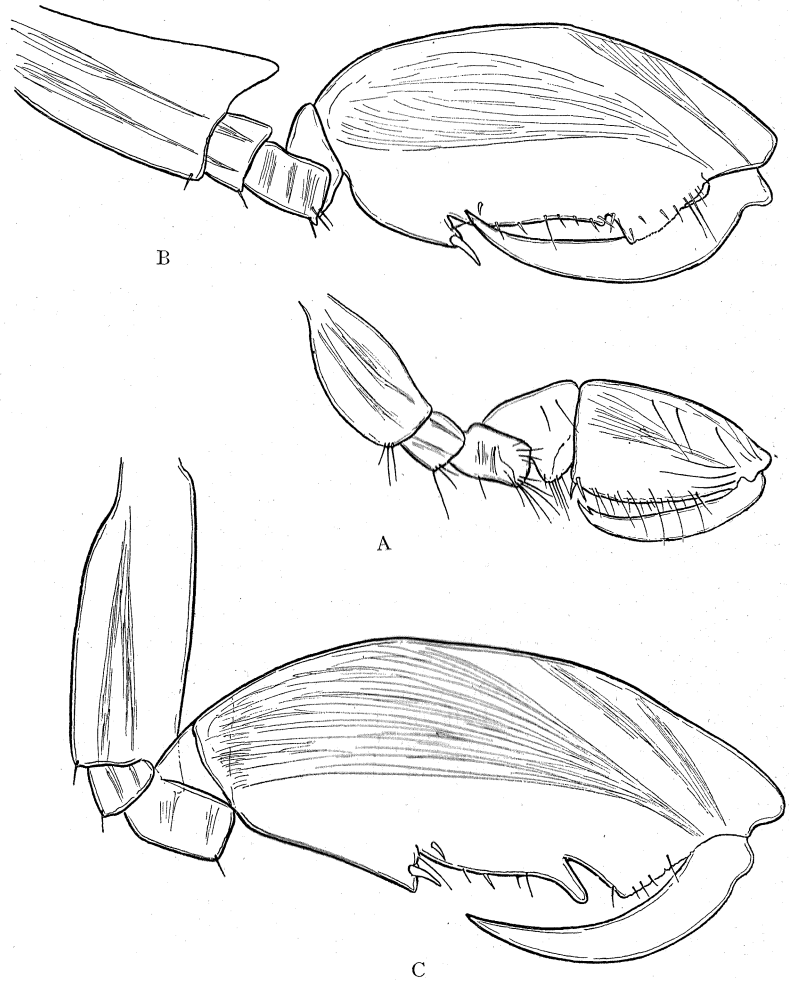

Fig. 4. *Caprella cornuta* Dana. A. First Gnathopod of female. B. Second Gnathopod of female. C. Second Gnathopod of male.

Juan Fernandez specimens, however, appear to differ from *Caprella dentata* in the absence of the small tubercles on the fifth and sixth segments and of the lateral teeth on the third, fourth and fifth segments.

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