Art. I.—*Some New Zealand Amphipoda: No. 1.*

By Charles Chilton, M.A., D.Sc., LL.D., C.M.Z.S., Hon. Member Roy. Soc. N.S.W., F.N.Z.Inst.; Professor of Biology, Canterbury College, N.Z.

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During recent years many additional facts have become known with regard to the Amphipoda of New Zealand through the investigation of collections from the various Antarctic and other expeditions. As circumstances are not at present favourable for the publication of a comprehensive review of the group, it is proposed to issue, under the title given above, a series of notes briefly detailing some of the new facts, and giving references to sources where additional information can be obtained. It will be seen that frequent use has been made of the MS. notes and drawings and of the specimens placed in my hands by the Hon. G. M. Thomson; in several cases these are most useful for elucidating points in connection with some of the earlier records of Amphipoda from New Zealand.

The names of authors followed by a date in parentheses refer to the list on page 8.

Leptamphopus novae-zealandiae (G. M. Thomson). Figs. 1 to 5.

Pherusa novae-zealandiae G. M. Thomson, 1879, p. 239, pl. 10 C, figs. 2, 2 *a–c*. *Pherusa neo-zelanica* G. M. Thomson and Chilton, 1886, p. 148. *Panoploea debilis* G. M. Thomson, 1880, p. 3, pl. 1, fig. 3; G. M. Thomson and Chilton, 1886, p. 150. *Acanthozone longimana* (part) Della Valle, 1893, pp. 604, 620. *Oradarea longimana* Walker, 1903, p. 56, pl. 10, figs. 77–89; Stebbing, 1906, p. 727; Chevreux, 1906, p. 54; Walker, 1907, p. 32. *Leptamphopus novae-zealandiae* Stebbing, 1906, p. 294; Chilton, 1909, p. 621; Chilton, 1912, p. 488; Chevreux, 1913, p. 143.

There has been considerable confusion in connection with this species, and it seems desirable to support the synonymy given above by the following historical account.

In 1879 Mr. G. M. Thomson published his first paper dealing with New Zealand Crustacea. In it he described several new species, including *Pherusa novae-zealandiae* from Dunedin, of which he gave a brief description and figures of the whole animal, of the gnathopoda, and of the telson (1879, p. 239, pl. 10 C, fig. 2).

The only work of reference on the Amphipoda available to Mr. Thomson at that time was Spence Bate's *Catalogue of the Amphipoda in the British Museum*. The amount of dissection and minute examination that is necessary to distinguish between allied species was not then realized, and

it will be seen from what is recorded below that Mr. Thomson's description was a composite one based on specimens belonging to more than one species.

In the next year Mr. Thomson described and figured another new species under the name *Panoploea debilis*, also from Dunedin Harbour, the genus *Panoploea* being new and including *P. debilis* and *P. spinosa*, another new species described at the same time (1880, p. 3).

In 1882 I had identified specimens collected at Lyttelton Harbour as *Panoploea debilis* G. M. Thomson, and later on was able to compare them with specimens from Dunedin named by Mr. Thomson and to ascertain that they were identical with his species. This species proved to be moderately common in New Zealand seas, and was long known to New Zealand workers under the name *Panoploea debilis* G. M. Thomson.

In 1893 Della Valle placed the species in the genus *Acanthozone* as a doubtful synonym of *Acanthozone longimana* (Boeck), a species which is now placed under the genus *Leptamphopus*, and remarked that *Pherusa novae-zealandiae* G. M. Thomson seemed to coincide with *Panoploea debilis* G. M. Thomson.

In his account of the Amphipoda Gammaridea in *Das Tierreich*, Stebbing (1906, p. 294) includes both *Pherusa novae-zealandiae* and *Panoploea debilis* under the name *Leptamphopus novae-zealandiae* (G. M. Thomson), but without making any reference to the differences in the descriptions of the two species as given by Thomson. In 1903, before Stebbing's *Das Tierreich Amphipoda* was published, Mr. A. O. Walker, in his account of the "Southern Cross" Antarctic Expedition, had described and figured a new genus and species, *Oradarea longimana* (1903, p. 56), and in the appendix of *Das Tierreich Amphipoda* Stebbing quotes this species and says of it "strangely like *Leptamphopus novae-zealandiae*" (1906, p. 727).

In 1906 Chevreux recorded *Oradarea longimana* Walker from Flanders Bay and other localities in Graham Land visited by the French Antarctic Expedition, 1903–5 (1906, p. 54).

In his account of the Amphipoda of the National Antarctic Expedition, Walker in 1907 records *Oradarea longimana* from Coulman Island and other localities visited by the expedition, and in a footnote referring to Stebbing's remarks points out that his species differs from Thomson's description of *Pherusa novae-zealandiae* "in having only the first two pleon segments dorsally produced into one tooth, instead of the two posterior segments of the mesosome and two anterior of the pleon produced into two teeth; also in the upper antennae having an appendage" (1907, p. 32).

In 1909, in the account of the Crustacea in the *Subantarctic Islands of New Zealand*, I followed Stebbing in considering *Panoploea debilis* to be the same as *Pherusa novae-zealandiae*, and recorded the species under the name *Leptamphopus novae-zealandiae* (G. M. Thomson), from Carnley Harbour, in Lord Auckland Islands, and after comparing it with Walker's description came to the conclusion that *Oradarea longimana* Walker was identical with *Leptamphopus novae-zealandiae* (G. M. Thomson), as Stebbing had suggested, the differences pointed out by Walker being apparently due to individual variation or to errors in the descriptions (1909, p. 621). In his account of the Amphipoda of the second French Antarctic Expedition, 1908–10, Chevreux adopted this view, referred specimens from Petermann Island to *Leptamphopus novae-zealandiae* (G. M. Thomson), and gave a few further particulars of the species. This species was collected by the Scottish National Antarctic Expedition at South Orkneys, and was recorded by me in the account of the Amphipoda of the expedition under the name *Leptamphopus novae-zealandiae* (G. M. Thomson) (1912, p. 488).

Though I have all along been convinced that Stebbing was right in combining *Panoploea debilis* G. M. Thomson with *Pherusa novae-zealandiae* G. M. Thomson, it has been a little difficult to understand the differences in the descriptions of these species, and how it was that Mr. Thomson came to describe the same form as two different species in two successive years.

In January, 1914, in the collections of the Dunedin Museum, I found a bottle labelled "*Pherusa novae-zealandiae* G. M. Thomson, Dunedin; Type," in the handwriting of the late Captain Hutton, who was Curator of the Museum at the time when the species was first described, and through the kindness of Professor Benham I have been able to make an examination of its contents. The bottle contained altogether ten specimens, all more or less imperfect; seven of them are without doubt the species common in New Zealand and long known under the name *Panoploea debilis* G. M. Thomson. All of these specimens have lost their antennae except the peduncles, but the character of the gnathopoda, of the projection of some of the segments into dorsal teeth, and of the uropoda and telson, leaves no doubt as to the identity of the species. Of the other three specimens, two, one of them imperfect, are small examples of *Paradexamine pacifica* (G. M. Thomson), which have apparently been included by accident, and are of no importance in the present discussion. The remaining specimen, which is the largest of the lot, and of which the head and anterior part of the peraeon are missing, is a specimen of a different species altogether, *Panoploea spinosa* G. M. Thomson, which is no longer considered congeneric with *Panoploea debilis* and is placed by Stebbing in a different family.

It seems evident that these specimens had been grouped together owing to the fact that in all of them some of the segments are produced posteriorly into dorsal teeth and that a portion of the original description of *Pherusa novae-zealandiae* had been based on the specimen of *Panoploea spinosa: e.g.*, the statement that "two posterior segments of the pereion and two anterior segments of the pleon produced dorsally into two teeth," and "three last pairs of pereiopoda much longer than the preceding; their coxae with comb-like teeth on their posterior margins"; also, "third segment of pleon with the sides produced posteriorly, and ending abruptly in a serrated margin." The characters thus quoted agree well with this specimen of *Panoploea spinosa*, and some of them are indicated in the figure given by Thomson in describing *Pherusa novae-zealandiae*. These points do not show clearly in the very small figures accompanying Mr. Thomson's published paper, for "instead of lithographing the plates, the draughtsman *traced* them on to a large sheet, from whence they were photo-lithographed" (see Stebbing, 1888, p. 500), and in the process they were so much reduced that many of the points shown clearly in the original drawings cannot be made out. Mr. Thomson has, however, given me the tracings of the originals, and in the tracing of the figure of the whole animal of *Pherusa novae-zealandiae* it is evident that the dorsal teeth, the basal joints of the posterior peraeopoda, and the hind-margin of the third pleon segment have been drawn from the specimen of *Panoploea spinosa*, and not from the genuine *Pherusa novae-zealandiae*. The other characters have been based on the specimens really belonging to *Pherusa novae-zealandiae*, and the description is therefore composite, being based on more than one specimen, as is shown by the statement that the posterior margin of the third segment of the pleon "is almost smooth in young specimens," the "young specimens" being the genuine *Pherusa novae-zealandiae*, and quite different from the *Panoploea spinosa* which was confused with them.

It is therefore evident that *Panoploea debilis* (G. M. Thomson) is indeed the same as *Pherusa novae-zealandiae* G. M. Thomson, but was thought to be different owing to the errors in the original description and figures; and that the differences pointed out by Walker between his *Oradarea longimana* and the description of *Pherusa novae-zealandiae* are due to the fact that the original description was based on the examination and confusion of two different species.

The history of this species has perhaps been detailed at tedious length, but it is interesting as another example of the necessity of examining type specimens, whenever they are available, in order to settle disputed points, instead of trusting too greatly to published descriptions and figures and relying too much upon their accuracy.

The exact generic position of this species is a little doubtful, owing to the fact that in the group to which it belongs there are so many genera much alike and distinguished by characters which are perhaps not all of generic importance. It will be seen that the species was first placed under *Pherusa*, then under *Panoploea*, next under *Acanthozone*, then under *Oradarea* (a genus specially created for it), and finally under *Leptamphopus*. In *Das Tierreich Amphipoda* there is only one other species, *L. longimana* (Boeck), placed in this genus, and that was originally described by Boeck under the genus *Amphithopsis*.

If we compare the species under consideration with the generic characters of *Leptamphopus* as given by Stebbing (1906, p. 293) it is found to agree in most points. The first point mentioned, however, "Body not acutely dentate," requires some modification, for in this species the last segment of the peraeon and the first two of the pleon are dentate; again, in the generic characters it is stated that there is no accessory flagellum, though Walker describes and figures one in the specimens of this species obtained from Cape Adare, and his observation is confirmed by Chevreux, and there is certainly a minute accessory flagellum in a specimen in my collection collected at the South Orkneys by the "Scotia" Expedition. On the other hand, there is none in the New Zealand specimens nor in the northern species *L. longimanus* (Boeck). In the mouth parts there is nothing that appears to me specially characteristic of the genus, which seems best recognized by the long slender gnathopoda and the entire telson. Most of the characters of *Leptamphopus* are the same as those of *Djerboa* Chevreux, but in that genus the telson is deeply cleft.

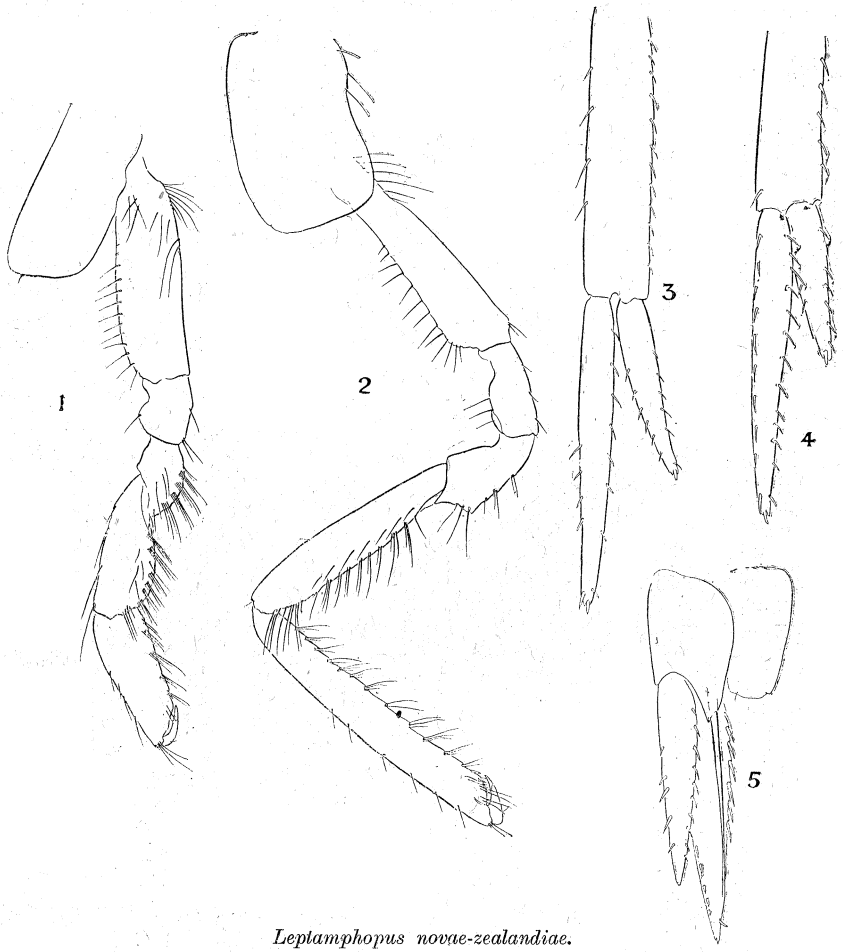
The following brief description will be sufficient to distinguish *L. novae-zealandiae* from the northern species, *L. longimanus*:—

Back rounded, peraeon segment 7 and pleon segments 1 and 2 each produced posteriorly into a dorsal tooth. Antennae subequal, slender, about as long as body. Antenna 1 with second joint of peduncle produced on each side into a short subacute lobe, a minute accessory appendage present in Antarctic specimens but not in those from New Zealand. Gnathopod 1 with carpus and propod subequal, narrow-oblong, palm short, oblique. Gnathopod 2 much longer and more slender, carpus and propod elongate, linear, with small tufts of setae on their posterior margins, propod longer than the carpus, palm short, oblique. Uropods 1 and 2 with outer branch much shorter than the inner; uropod 3 with basal joint acutely produced on inner side, outer branch not much shorter than inner, both lanceolate, slightly flattened and broader than in uropods 1 and 2, inner branch with an elevation or ridge on its upper surface near the inner margin. Telson tapering slightly, extremity broadly rounded or truncate, sometimes a little irregular, and with one or two minute setae.

Length of New Zealand specimens, about 9 mm.; Antarctic specimens, up to 12 mm. or more.

Colour greyish or light-brown, made up of dark dots or stellate markings.

Distribution: New Zealand (Dunedin Harbour, Lyttelton, Akaroa, &c.); Cape Adare; Coulman Island; McMurdo Strait; Petermann Island; Flanders Bay; Port Charcot; Orkney Islands: probably circumaustral.



Leptamphopus novae-zealandiae.

FIG. 1.—First gnathopod.
FIG. 2.—Second gnathopod.
FIG. 3.—First uropod.
FIG. 4.—Second uropod.
FIG. 5.—Third uropod and telson, showing ridge on inner branch of the third uropod.

This species very closely resembles *P. longimanus* (Boeck), a species found in the Arctic and North Atlantic Oceans, the chief difference being that in *P. longimana* no segment of the body is produced into teeth.

The Antarctic specimens appear to differ constantly from those occurring in New Zealand in the presence of a minute accessory appendage on the upper antenna. Both Walker and Chevreux remark on the variation in the dorsal teeth of the body-segments in Antarctic specimens of different sizes; all the mature New Zealand specimens seem to agree in having the last peraeon and first two pleon segments produced into teeth.

As I have previously suggested (1909, p. 621), the small side lobes at the end of the second basal joint of the upper antenna, which were first noticed by Walker, appear to be for the support of the rest of the antenna, allowing it to move freely in a vertical plane but not from side to side. In a similar way there is a slight hollow or depression on the upper surface of the inner branch of uropod 3 formed on the outer side of the ridge mentioned above, and into this the outer branch fits closely when it is not in use (see fig. 5). Analogous structures will probably be found in other Amphipoda of similar habits.

Ampelisca eschrichtii (Kröyer).

Ampelisca eschrichtii Chilton, 1917, p. 75.

In the Index Faunae Zealandiae two species of *Ampelisca* are put down as found in New Zealand, *A. chiltoni* and *A. acinaces*, both described by Stebbing in the report on the "Challenger" Amphipoda. In the paper quoted above I attempt to show that these are only forms of the species long known in Arctic seas as *A. eschrichtii* Kröyer, and that *A. macrocephala* Liljeborg should also be considered as belonging to this species. The species is widely distributed both in Arctic and in Antarctic seas, where it may attain a length of 34 mm. In intermediate seas it is represented by forms of smaller size, in which the distinctive characters of the species are less evident.

Urothoides lachneëssa (Stebbing).

Urothoe lachneëssa Stebbing, 1888, p. 825, pl. 57. *Urothoides lachneëssa* Stebbing, 1906, p. 132.

This species was described from specimens obtained from Kerguelen Island by the "Challenger" Expedition. I have a specimen, washed on to the shore of Stewart Island and sent to me by Mr. Walter Traill, that I feel confident belongs to the same species. The specimen had been dried and somewhat shrivelled, but by mounting it in dissected form sufficient of the appendages can be made out to render the identification pretty certain. The first and second gnathopods agree closely with Stebbing's figure except that in the first the propod is narrower. The first, second, and third peraeopods are also closely similar. The fourth and fifth cannot be distinctly made out, but appear to agree except in having fewer setae. One of the uropods also can be seen to agree with Stebbing's figure.

This appears to be the first specimen that has been seen since the original ones were taken by the "Challenger."

Parapherusa crassipes (Haswell).

Harmonia crassipes Haswell, 1879, p. 330, pl. 19, fig. 3. *Parapherusa crassipes* Stebbing, 1906, p. 383; Chilton, 1916, p. 199, pls. 8–10.

This is a species widely distributed in Australia and New Zealand, and for some time there was an uncertainty as to its systematic position. It seems, however, rightly placed under the genus *Parapherusa* in the family Gammaridae, to which it was assigned by Stebbing. A full account of its external structure and of the marked sexual differences is given in the last of the references quoted above.

Eurystheus haswelli (G. M. Thomson).

Maera haswelli G. M. Thomson, 1897, p. 449, pl. 10, figs. 6–10. *Wyvillea haswelli* Stebbing, 1899, p. 350, and 1906, p. 648.

In Mr. Thomson's collection are two imperfect specimens labelled "*Maera haswelli* G. M. T., Bay of Islands, 8 fathoms," which are presumably co-types of his species. These are identical with specimens from

Akaroa and Lyttelton obtained years ago, and provisionally labelled as an undescribed species of *Eurystheus*. Stebbing in 1899 placed the species under *Wyvillea*, a genus of doubtful validity, and retained it in the same position in 1906. The species is, however, quite evidently a *Eurystheus*, and comes near to *E. dentifer* (Haswell); the third side plate in the male is produced anteriorly below that of the second gnathopod in the same way as described for *Paranaenia typica* Chilton (1884, p. 259), a species which Stebbing considers a synonym of *Eurystheus dentifer* (Haswell).

In addition to the Bay of Islands specimens I have others of *E. haswelli* from Lyttelton; Akaroa; Longbeach, near Otago Harbour; Stewart Island; Chatham Islands; and also one from Port Jackson, New South Wales, sent to me in 1918 by Professor W. A. Haswell.

Eurystheus crassipes (Haswell).

Maera crassipes Haswell, 1880, p. 103, pl. 7, fig. 2. *Eurystheus crassipes* Stebbing, 1906, p. 612.

I have specimens from Wellington and Auckland Harbours that evidently belong to this species, which was described from Port Jackson and Jervis Bay in Australia by Haswell; it is well characterized by the large size and breadth of the fourth peraeopod, and has rightly been placed in *Eurystheus* by Stebbing. The species has not hitherto been recorded from New Zealand.

Eurystheus chiltoni (G. M. Thomson).

Maera chiltoni G. M. Thomson, 1897, p. 447, pl. 10, figs. 1–5. *Eurystheus chiltoni* Stebbing, 1906, p. 617. *Eurystheus longicornis* Walker, 1907, p. 35, pl. 12, fig. 21.

This species was described by Mr. Thomson from specimens dredged in the Bay of Islands. I have a specimen from Mokohinou, found by Mr. C. R. Gow on seaweed at a depth of 25 fathoms. I think there is no doubt that *E. longicornis* (Walker) is the same species; the descriptions agree generally, and the drawing given by Walker of the second gnathopod of the male agrees well with my specimen from Mokohinou and also with co-types of Mr. Thomson's species which I have been able to examine. Walker's specimens were collected at the winter quarters of the "Discovery" in McMurdo Strait during the National Antarctic Expedition, 1901–4.

Eurystheus dentatus (Chevreux).

Gammaropsis dentata Chevreux, 1900, p. 93, pl. 12, fig. 1. *Eurystheus afer* Chilton, 1912, p. 510, pl. ii, figs. 30–34.

I have a few specimens of *Eurystheus* that I have had some difficulty in identifying. I find, however, in the better-developed specimens that the lower margin of the first side plate is distinctly dentate, as described and figured by Chevreux for the species named above, and the general agreement in other characters shows that they must be referred to that species. In the New Zealand specimens, both in the male and the female, the gnathopoda are more elongated and slender than those figured by Chevreux, but in others from the Kermadec Islands which seem to be otherwise the same the gnathopoda are stouter and like those of Chevreux' specimens. The New Zealand specimens are certainly the same as those from Gough Island collected by the "Scotia" Expedition that I referred with much hesitation to *E. afer* Stebbing in 1912, and in two the merus of one or more of the last three pairs of peraeopoda is expanded in the same way as it is in one of the Gough Island specimens, though not quite to the same extent.

The terminal segments of the pleon are dentate as in *E. thomsoni* Stebbing, to which I was at first inclined to refer my specimens, and, indeed, the two species may possibly prove to be identical; in the meantime, however, I have not been able to satisfy myself on this point.

Chevreux' specimens were from the Azores. It should be remembered that another, quite different, species from Alaska was described under the same name by Holmes in 1908; for this Stebbing has suggested the name *alaskensis* (1910, p. 613).

The specimens that I refer to *E. dentatus* (Chevreux) are from Cook Strait; off Cape Saunders; Stewart Island; and the Kermadec Islands. If I am correct in my identifications, it is also found at Gough Island and at the Azores.

Paracorophium excavatum (G. M. Thomson).

Corophium excavatum G. M. Thomson, 1884, p. 236, pl. 12, figs. 1–8.
Paracorophium excavatum Stebbing, 1906, p. 664; Chilton, 1906, p. 704.

This species was described by Mr. Thomson from specimens taken in Brighton Creek, near Dunedin. Since then it has been found in several localities around the New Zealand coast where the water is more or less brackish, and also in the fresh-water lake Rotoiti, in Auckland. In 1918 some amphipods were sent me from brackish water in Brisbane River, Queensland, where they had been collected, along with the destructive wood-boring isopod *Sphaeroma terebrans* Bate, by Dr. T. Harvey Johnston, and these prove to belong to the same species. The males are distinguished from the females by a lobe on the end of the penultimate joint of the peduncle of the lower antenna, and by a differently shaped second gnathopod. The form originally figured by Thomson is an immature male. I have redescribed the species and given an account of the development of the sexual characters in a paper which will shortly be published in the *Queensland Museum Memoirs*, vol. vii.

The occurrence of the species in brackish waters in New Zealand and also in northern Australia is of considerable interest.

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