

*Stenothoe valida* Dana.

*Stenothoe validus* Dana, 1853-55, p. 924, pl. 63, fig. 1, a-o. *S. valida* Stebbing, 1906, p. 194; Walker, 1910, p. 621; Kunkel, 1910, p. 16; Chevreux, 1913, p. 3. *S. valida* (part) Della Valle, 1893, p. 566, pl. 58, figs. 74-78; Chilton, 1923, p. 95. *S. adhaerens* Chilton, 1892, p. 259 (? not Stebbing, 1888, p. 1999). *S. assimilis* Chevreux, 1908, p. 4; Walker, 1910, p. 621. *Montagua miersii* and *M. longicornis* Haswell, 1880, p. 323, pl. 24, figs. 4, 5. *Montaguana miersii* Chilton, 1883, p. 79. *Probolium miersii* Chilton, 1885, p. 1043. *Stenothoe miersii* Stebbing, 1906, p. 200. ? *Stenothoe dollfusi* Chevreux, 1887, p. 327; 1891, p. 260 Stebbing, 1906, p. 196.

This species is common on the New Zealand coasts; and I have series of specimens from several localities. There are great differences in the length of the antennae, especially of the second antenna, and in the shape of the gnathopods, due to age and sex. In the more mature males the second antenna increases very considerably in length, especially in that of the peduncle, and the second gnathopod becomes very large and assumes the form shown in Chevreux's figure of *S. assimilis*. In addition to this form and the variations in it which are presumably due to age, there is another in which the teeth at the distal end of the palm of the second gnathopod project more or less at right angles to the palm, instead of being a continuation of it as in the first form. This second form appears to be identical with the one described by Chevreux under the name of *Stenothoe dollfusi*, and it is apparently this form that Kunkel had before him when recording *Stenothoe valida* from the Bermudas. As I have found the two forms *Stenothoe valida* and *S. dollfusi* together on two separate occasions in Cook Strait, and as both forms also occur together in Port Jackson, New South Wales, and apparently elsewhere, I have little doubt that they both belong to one species, and that we have here another example of a species with dimorphic males.

In the older males the mouth-parts appear to become degenerate. I have, however, discussed this question more fully, and also the reasons for referring the species to the one originally described by Dana, in the *Records of the Australian Museum*, vol. 14, p. 95.

I have recently received specimens from the Hawaiian Islands which appear to belong to this species.

*Localities*.—Lyttelton; Dunedin Harbour; Cook Strait.

*Distribution*.—Australia; North and South Atlantic Oceans; Hawaiian Islands.

*Bovallia monoculoides* (Haswell).

*Bovallia monoculoides* Chilton, 1909, p. 622; 1912, p. 494; 1921, p. 66. *Eusiroides monoculoides* Chevreux, 1908, p. 478; Stebbing, 1910, p. 595; Barnard, 1916, p. 174. *Eusiroides caesaris* Walker, 1904, p. 264.

In 1909 I referred to this species specimens from the Auckland Islands; but it has not hitherto been recorded from the coasts of the main islands of New Zealand. I have now, however, in my collection numerous specimens from different localities extending from the Three Kings to Otago Harbour.

These are all much smaller than the specimens from the Auckland Islands, none of them measuring more than about 8 mm. in length, but they

agree closely with specimens of similar size from Port Jackson, New South Wales, the type-locality. In none of them are any of the segments produced into definite dorsal teeth, but all have the posterior margin of the third pleon segments serrate, as described by Stebbing for *Eusiroides caesari*, though in one or two instances the teeth are rather indistinct, thus approaching the condition found in *E. crassi*.

The species has been recorded from South Africa by Barnard, from Ceylon by Walker, and from the Gambier Archipelago by Chevreux. Of the two specimens from the latter locality, one was a female bearing young, though only 4 mm. in length. Of them Chevreux says, "Chez ces exemplaires, le bord postérieur des plaques épimérales du dernier segment du métasome, moins convexe que chez le type, ne présente que des crénelures peu distincts."

If *Bovallia gigantea* Pfeffer is considered as belonging to the same species, corresponding to the form described by Stebbing under the name *Eusiroides crassi*, then the range of the species is extended to the subantarctic and antarctic seas to the south of South America.

I have been able to compare my New Zealand specimens with examples of *Eusiroides della-vallei* Chevreux from Banyuls-sur-mer, on the south coast of France, and can find little difference between the two.

*Localities*.—Off Three Kings, 60–65 fathoms (Chilton); Cook Strait cable, off Oterangi Bay (H. B. Kirk); Cook Strait cable (Captain J. W. Grey); north-west of Cape Maria van Diemen, 50 fathoms (Chilton); Moeraki, east coast Otago (Chilton); Otago Harbour, surface (G. M. Thomson); Lyttelton Reef (R. M. Laing); Lyall Bay (R. M. Laing).

#### *Chiltonia mihiwaka* Chilton.

*Chiltonia mihiwaka* Stebbing, 1906, p. 555: Chilton, 1909A, p. 644; 1909B, p. 57.

This species was described from specimens obtained in streams on Mount Mihiwaka, near Port Chalmers, at heights up to about 1,000 ft. above sea-level. Later on Mr. G. M. Thomson collected it in similar localities on Mount Maungatua and other hills in the neighbourhood of Dunedin. During the expedition of the Philosophical Institute of Canterbury to the Subantarctic Islands of New Zealand in 1907, specimens were taken in fresh-water pools and streams on Enderby Island, Auckland Island, and Campbell Island, at places not far above sea-level. These specimens differed from the type in having the palm of the second gnathopod in the male oblique instead of transverse, and prove to be the same as *C. subtenuis* Sayce, a species found in New South Wales, Victoria, and Western Australia.

In December, 1922, I found two specimens, male and female, *in coitu*, in a small fresh-water stream at Riverton, Southland, just about high-water mark. It was low tide at the time, and the water in which the animals were living was quite fresh, but the sea-water would reach the place at high tide. Both specimens were deeply pigmented of a dark-grey colour, while the Port Chalmers specimens are usually much lighter, some being almost white. The Riverton specimens resemble those from Mount Mihiwaka so much that they must be considered as belonging to the same species, but there are some slight differences. The second gnathopod of the male (fig. 1)\* has the palm quite transverse, and the dactyl has a rounded

\* The illustrations for this paper were drawn for me by Miss Beryl Parlane, one of my students.

lobe on the concave margin towards its base which is not found in the type. In the male specimen the first or upper antennae are distinctly shorter than the second, while in the type they were of equal length. In the Enderby and Auckland Islands specimens the first antennae are considerably longer than the second. The relative lengths of the antennae in a few of the specimens in my collection are shown in the diagram given below, the first being represented by unbroken lines, the second by dotted

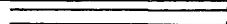
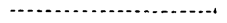

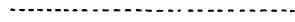

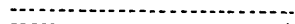
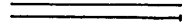
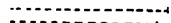
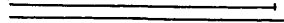


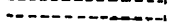
Specimen	Relative lengths of Antennae
♂ Mt Mihiwaka	Ant. 1 
	Ant. 2 
♂ Enderby Island	Ant. 1 
	Ant. 2 
♀ Auckland Islands	Ant. 1 
	Ant. 2 
♀ Mt Mihiwaka	Ant. 1 
	Ant. 2 
♂ Riverton	Ant. 1 
	Ant. 2 
♀ Riverton	Ant. 1 
	Ant. 2 

Table showing relative lengths of the antennae in different specimens of *Chiltonia mihiwaka*.

lines. It will be seen that the antennae vary in length on the two sides, and in specimens from different localities. The generic diagnosis given by Stebbing (1906, p. 555), which says "Antennae 1 and 2 equal in length," must be altered to "Antennae 1 and 2 nearly equal in length."

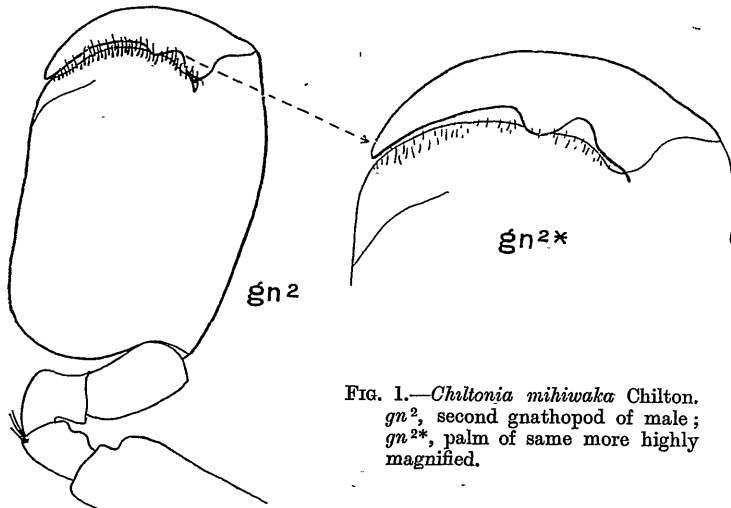


FIG. 1.—*Chiltonia mihiwaka* Chilton.  
 $gn^2$ , second gnathopod of male;  
 $gn^{2*}$ , palm of same more highly magnified.

The genus was established by Stebbing for the species now under consideration, which had been described under *Hyaletta*. Two fresh-water species from Australia described by Sayce belong to *Chiltonia*, and other

species have been described by Geoffrey Smith. Several fresh-water species of *Hyalella* are known from South America, and one that I have examples of (*H. warmingii* Stebbing) presents many resemblances to *Chiltonia*, but has a small palp on the first maxilla and a fringed lobe on the carpus of the second gnathopod in the male. In *Chiltonia mihivaka* the third uropod is represented by a single small joint, and this character has been incorporated in Stebbing's generic diagnosis. In the Australia species, *C. australis*, the uropod is two-jointed, as in *Hyalella*, so that the characters of the genus require further modification.

From brackish water at Cape Town, South Africa, Barnard has described *Chiltonia capensis*, which has no palp on the first maxilla and has the third uropod single-jointed, but differs in having the two gnathopods alike in both sexes—thus requiring another modification of the characters of the genus.

The presence of very similar species in fresh and brackish waters in New Zealand, Australia, South America, and South Africa is important from a zoogeographical standpoint, and it is desirable that a careful comparison of the species in question should be made.

#### Genus PARALEPTAMPHOPUS.

This genus was established in 1899 by Stebbing for the subterranean species described under the name *Callopius subterraneus* and the one found by Mr. G. M. Thomson in a little stream on top of the Old Man Range in Otago and named *Pherusa caeruleus*. In 1893 Della Valle had placed the first species under *Acanthonostoma*, and had stated that the second species was very close to and perhaps identical with the first. I gave some details as to the distribution of the two species in 1909 (1909B, p. 54). Since then I have obtained numerous specimens of each from additional localities, and an examination of them shows that the two species are undoubtedly closely related, and that forms exist that are to a large extent intermediate both as regards structure and mode of life. It will be best to give the facts under each "species" separately.

#### *Paraleptamphopus caeruleus* (G. M. Thomson).

*Paraleptamphopus caeruleus* Chilton, 1909B, p. 54 (with synonyms).

This species is now known to be widely spread over the southern portions of Otago and Southland. It has been recorded from Swampy Hill (near Dunedin), from the Old Man Range, from the neighbourhood of Invercargill, from Ruapuke Island, and I have recently collected it in abundance from several localities at Drummond and Otautau in Southland. In these places it lives in ditches and small streams on the various weeds that grow in the water, in much the same way as the ordinary fresh-water *Paracaliope fluviatilis* does, though this species was not found by me in the same ditches. With *P. caeruleus* there was, however, the other species, *P. subterraneus*, but it was usually found a little deeper down, either on the surface of the mud or actually in the mud. *P. caeruleus* is slightly smaller than *P. subterraneus*, and can readily be distinguished by its dark-blue colour. Most of the specimens are so darkly coloured that they appear black, but some are paler, especially on the appendages.

The differences in structure from some of the forms of *P. subterraneus* are few and unimportant. The one that seems most constant is in the telson,

which is evenly rounded posteriorly and free from setules; its upper surface is slightly convex; the third uropods have the branches not much longer than the peduncle (fig. 2, *urp*<sup>3</sup>) and, when seen in side view, slightly

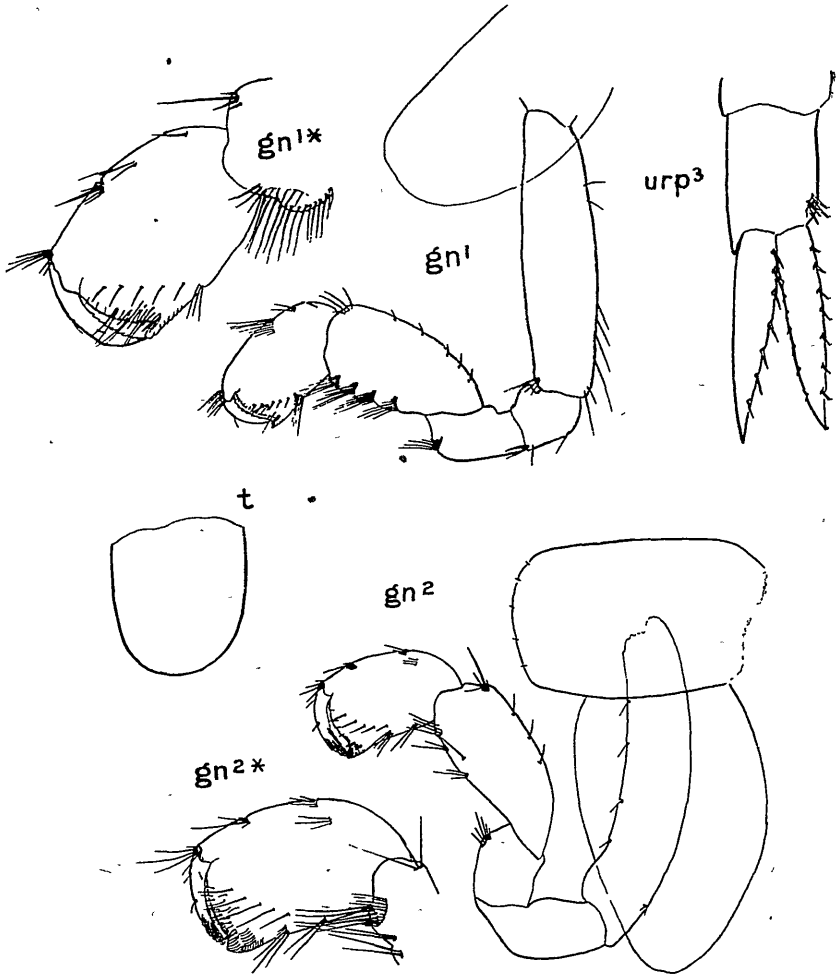


FIG. 2.—*Paraleptamphopus caeruleus*. female specimen, from Drummond. *gn*<sup>1</sup>, first gnathopod; *gn*<sup>1\*</sup>, extremity of same, more highly magnified; *gn*<sup>2</sup>, second gnathopod; *gn*<sup>2\*</sup>, extremity of same, more highly magnified; *urp*<sup>3</sup>, third uropod; *t*, telson.

curved upwards; the gnathopoda are rather more slender than in *P. subterraneus*, with the armature of the palm somewhat different, the propod bearing crenulate markings at the point where the finger impinges, and the finger having numerous setules towards the extremity (see figs. 2, *gn*<sup>1\*</sup>, *gn*<sup>2\*</sup>).

*Paraleptamphopus subterraneus* (Chilton).

*Paraleptamphopus subterraneus* Stebbing, 1906, p. 294; Chilton, 1909B, p. 54 (with synonyms).

This species is very widely distributed in New Zealand. It was first obtained in wells at Eyreton not far from the River Waimakariri; it has since been found in wells in Christchurch, Lincoln, Leeston, Ashburton, and Winchester. Later on I collected it in surface streams issuing from river-terraces near the River Porter, a tributary of the Waimakariri, and it is common in streams and ditches near Drummond and Otautau, Southland, where it is found associated with *P. caeruleus*, as already mentioned. Messrs. Lucas and Hodgkin took it in Lake Wakatipu, and in 1908 I found it in a small stream at Duck Cove, Doubtful Sound, in places where the stream was almost covered and shut out from the light by the overhanging rocks and trees. In the North Island it was taken by Lucas and Hodgkin in Lake Taupo at a depth of 700 ft., and in 1911 Mr. W. F. Howlett sent me numerous specimens from a well at Eketahuna. All these specimens are pale and colourless, with eyes imperfect or completely absent, and, though they show considerable differences in the exact shape of the telson, the third uropoda, and the gnathopoda, there is no difficulty in considering them as all belonging to the same species.

In 1914, however, Mr. T. Hall sent me specimens which he had collected at "Clippings," on the range of mountains known as the Remarkables, near Lake Wakatipu, and from Mount Dick, in the same neighbourhood, the animals in the latter case being found at a height of 3,000 ft. above sea-level. These specimens were rather stouter in body than the forms obtained from wells, the third uropods were shorter and similar to those of *P. caeruleus*, and they showed the dark-blue colour characteristic of the latter species, though it was not quite so intense, and some of the specimens were much lighter than others; the telson, too, proved to differ distinctly from that of the type. At first I was inclined to consider them as a new species, but a careful comparison of the forms of *P. subterraneus* from the different localities mentioned has shown that numerous transitional forms exist as regards the individual characters, and that if a new name were given to the forms from "Clippings" and Mount Dick several new names would have to be established for the others. Though largely intermediate between the two species, the "Clippings" and Mount Dick specimens approach more nearly to *P. subterraneus* in the telson, and I therefore look upon them as a variety of that species.

The structure of *P. subterraneus* was somewhat fully dealt with by me in 1894 so far as the underground forms were concerned. It will only be necessary to mention now a few of the points in which differences occur in specimens from other localities. In all specimens the gnathopoda are of similar shape, the first stouter than the second; in the Eyreton specimens the palm of the first is minutely crenulate, but it is even in these from surface waters in Southland. The appearance of the third uropod varies when seen from the side or from above. Fig. 4 shows those of a specimen from Eketahuna, fig. *urp*<sup>3</sup> being one of the pair seen from above, fig. *urp*<sup>3\*</sup> the other from the side; the branches are not much longer than the base, on the latter there is usually a small tuft of setules at the upper distal angle, and two or three separately placed on each upper margin. In specimens from Southland streams the tuft at the distal

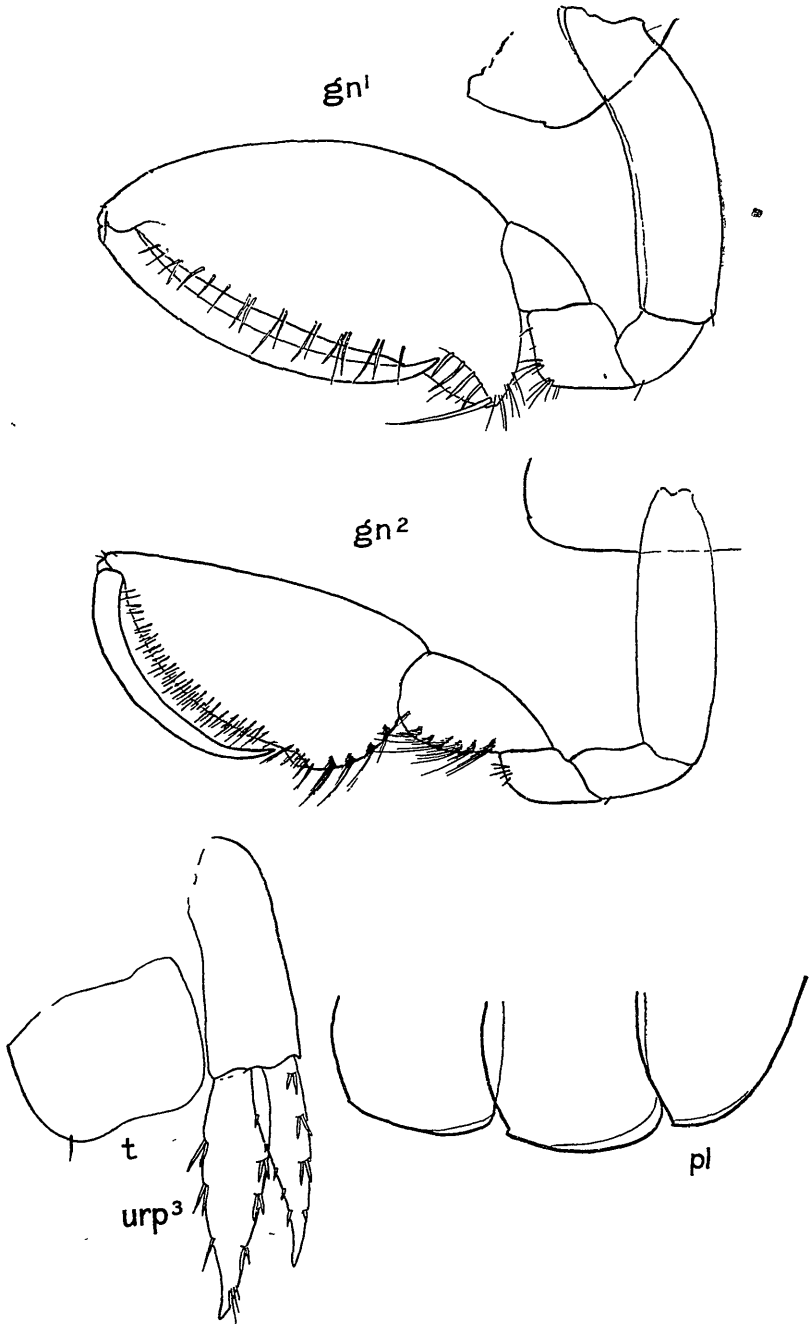


FIG. 3.—*Paraleptamphopus subterraneus*: male specimen from Eyreton (in well), probably immature. *gn*<sup>1</sup>, first gnathopod; *gn*<sup>2</sup>, second gnathopod; *pl*, inferior margins of pleon segments 1, 2, 3; *urp*<sup>3</sup>, third uropod; *t*, telson.

angle may be larger, and there is sometimes a smaller but distinct tuft about the middle of the upper outer margin (see fig. 6). The telson is a flat oblong plate with lateral margins nearly straight, posterior corners narrowly rounded, and each usually bearing a single small setule, the posterior margin slightly concave. All these characters, and especially the last, are subject to modification even in individuals from the same locality; thus one from wells at Ashburton has the posterior margin much more deeply concave, and one corner without a setule (fig. 7).

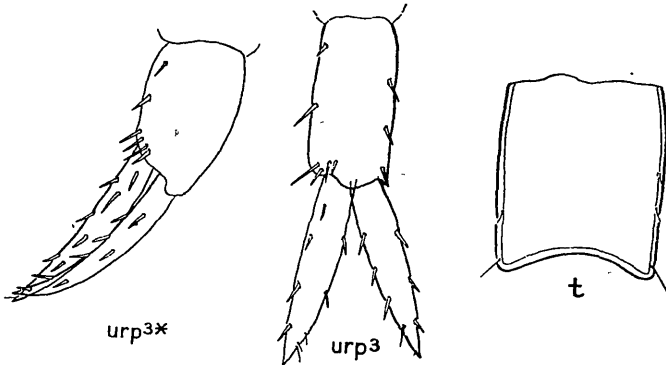


FIG. 4.—*Paraleptamphopus subterraneus*: female specimen from Eketahuna (in wells). *urp*<sup>3</sup>, third uropod, from above; *urp*<sup>3\*</sup>, the same, side view; *t*, telson.

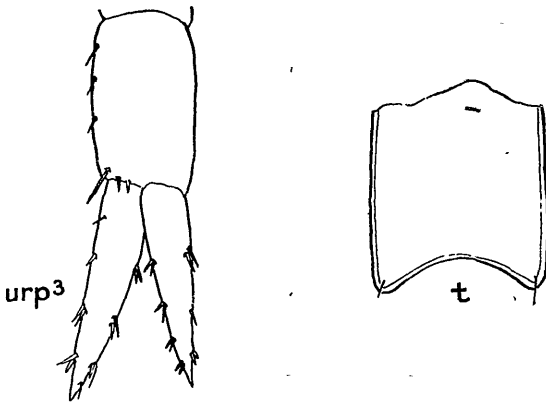


FIG. 5.—*Paraleptamphopus subterraneus*: female specimen, from surface stream, Castle Hill. *urp*<sup>3</sup>, third uropod; *t*, telson.

In the "Clippings" and Mount Dick specimens the telson differs markedly from the more typical forms. The lateral margins are distinctly convex, the telson itself shorter and broader, the posterior margin deeply concave, and there are three or four setules at each corner and two or three more anteriorly placed on the lateral margin (see figs. 8 and 9).

In 1894 I described from the Eyreton wells a form larger than the usual one, and differing very considerably in having the antennae stouter and plentifully supplied with calceoli, and the gnathopoda very large and



differently formed. The ordinary form is undoubtedly a female, being often found with eggs or young in the brood-pouch, and I looked upon the form with the large peculiar gnathopoda as the male. It differs so much, however, that it is not surprising that Stebbing says (1906, p. 295),

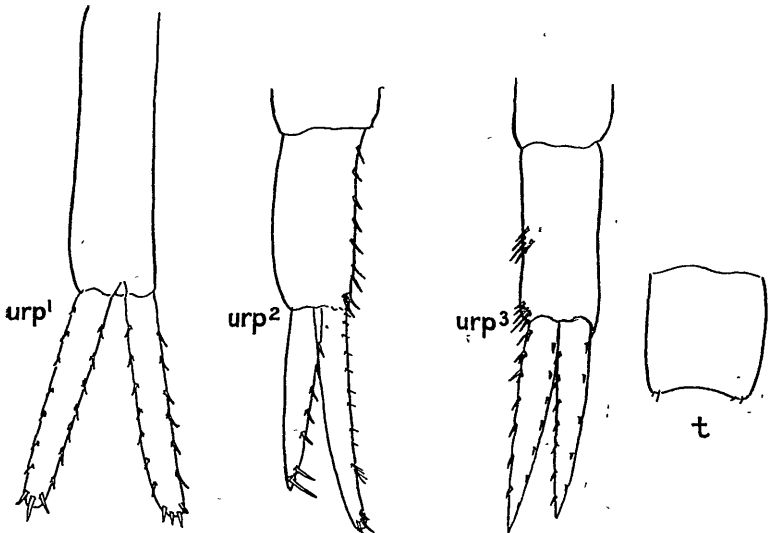


FIG. 6.—*Paraleptamphopus subterraneus*: female specimen, from surface stream, Drummond. *urp*<sup>1</sup>, first uropod; *urp*<sup>2</sup>, second uropod; *urp*<sup>3</sup>, third uropod; *t*, telson.

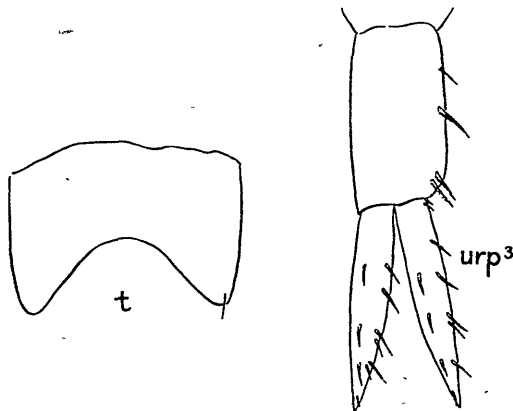


FIG. 7.—*Paraleptamphopus subterraneus*: specimen from a well at Ashburton. *urp*<sup>3</sup>, third uropod; *t*, telson.

“The supposed male is uncertain in respect to sex and to identity with the species.” Unfortunately I have seen very few specimens of the supposed male, and have now records of four only. One was dissected for use in drawing up the description I gave in 1894 and I have now

only its gnathopoda; another specimen was similar in size and structure, and I have all its appendages mounted as micro-slides; a third specimen which appears quite the same is in my collection, undissected; and the fourth, which was rather smaller, I have recently dissected and mounted in the hope that it would perhaps show intermediate characters in the

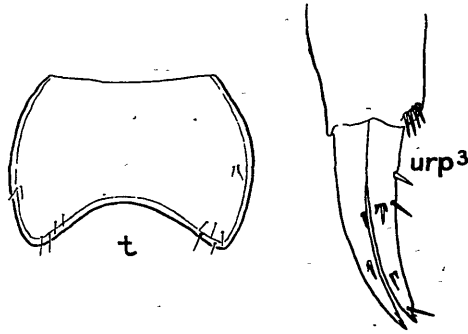


FIG. 8.—*Paraleptamphopus subterraneus*: specimen from surface stream, "Clippings," The Remarkables. *urp*<sup>3</sup>, third uropod; *t*, telson.

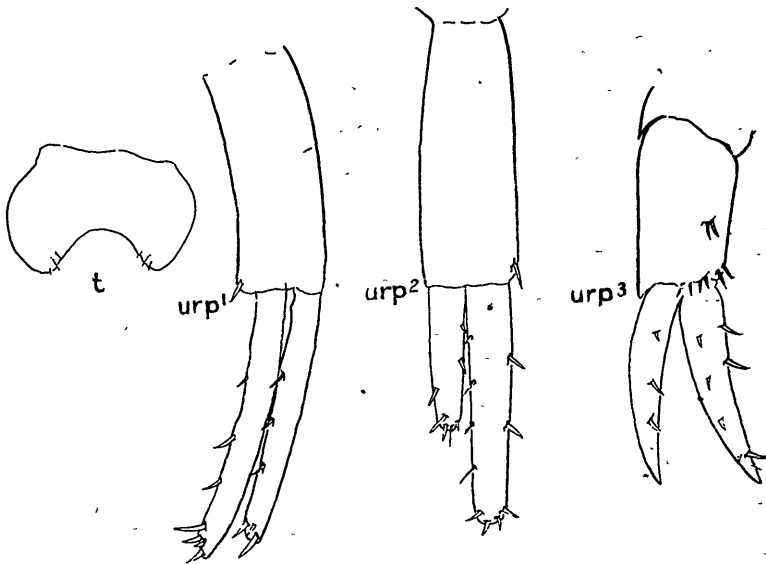


FIG. 9.—*Paraleptamphopus subterraneus*: female specimen from Mount Dick. *urp*<sup>1</sup>, first uropod; *urp*<sup>2</sup>, second uropod; *urp*<sup>3</sup>, third uropod; *t*, telson.

gnathopods between those of the female and the fully developed male. Unfortunately this was not the case, for its gnathopoda, though smaller and less bountifully supplied with spinules (fig. 3, *gn*<sup>1</sup> and *gn*<sup>2</sup>), are essentially the same as those figured in 1894.

I still feel convinced that the specimens in question are really males of *P. subterraneus*, for they are closely similar in all the characters except

those that may be looked upon as secondary male characters; none of them bears eggs, and it seems unlikely that there should be two species living in the underground waters drawn upon by the one well, that many dozens of specimens of one species, all females, have been obtained, but of the other only less than half a dozen and these all males. It must be mentioned, however, that among the numerous specimens of *P. subterraneus* examined from other localities I have seen no similar males; it is, of course, possible that some may have been overlooked, for the gnathopoda are more or less concealed by the deep side-plates.

I give figures of the telson and uropoda of *P. subterraneus* from different localities. It will be seen that there is considerable variation, just as there is in the subterranean forms of *Niphargus* in Europe, and that in consequence there is room for much difference of opinion as to the number of "species" into which they should be divided. In New Zealand the subterranean species is also found in surface waters, most of these specimens being still colourless and apparently blind; though some—viz., those from "Clippings" and Mount Dick—are found at great heights above sea-level, and in colour and other characters show distinct transitions leading to the true surface form, *P. caeruleus*, from which the subterranean forms may be presumed to have been descended.

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*Material for a Monograph on the Diptera Fauna of New Zealand:*  
*Part 2, Family Syrphidae, Supplement A.\**

By DAVID MILLER, Government Entomologist.

[Read before the Wellington Philosophical Society, 24th October, 1922; received by Editor, 31st December, 1922; issued separately, 18th June, 1924.]

\* Genus PARAGUS Latreille (1805).

*P. myersii* n. sp.

♂. Head large and globular, wider than thorax, shining greenish-black with pruinose reflection. Eyes bare, completely holoptic, occupying posterior half of head only, their anterior orbits forming an almost straight line across top; in profile, lower eye-angle well above oral margin; facial orbits almost perpendicular and slightly concave. Face, cheeks, crown of head in front of eyes, and antennae black in ground-colour, but greyish pruinose, except for a black area extending from lower part of facial orbits to anterior oral margin. Sides of face, cheeks, and crown hairy, hairs on sides of face and crown black, erect and dense, so that when seen from above head is tufted in front of eyes; hairs of cheeks grey; a distant groove originating in a distinct depression below eyes runs diagonally to base of antennae. Middle of face bare, not depressed but rather rounded below antennae; a moderate central tubercle, black on centre, below which oral margin slightly projects. Proboscis blackish-brown, palpi paler, linear and swollen at end. Occiput black, depressed, orbits somewhat swollen, greyish-pruinose, wider and clothed below with short pale hair, narrower and clothed with longer hairs above, the hair extending over the rather large ocellar triangle. Top of head comparatively horizontal, antennae situated high up, separated basally, greyish-yellow pruinose, comparatively short, 3rd joint oval, short; arista stout and very short-haired.

Thorax and scutellum shiny blue-black, clothed with long delicate greyish hair. Wings clear, stigma faintly marked; halteres greyish-black. Legs blue-black, femora with long delicate greyish hair; tarsi rather greyish-yellow owing to short closely-set vestiture; posterior protarsi somewhat swollen; anterior tarsi flat, their protarsi broad with anterior inner angle produced, remaining joints broad but shortening and narrowing to onychotarsi.

Abdomen clothed with delicate greyish hair, linear, sides parallel; five visible segments; dull blue-black in colour, a pale opal-white triangular spot at anterior angles of 3rd, 4th, and 5th segments. Genitalia brownish-black.

♀. Eyes broadly dichoptic, their facial orbits convex; vestiture of head shorter than in ♂; a deep sinuated transverse groove across front from eye to eye. Thorax shorter-haired; anterior protarsi not produced at inner angle. Abdomen rectangular, shiny greenish-black; a pair of indistinct spots, seen only in some lights, on 2nd, 3rd, 4th, and 5th segments.

♂. Length, 11 mm. ♀. Length, 10 mm.

Holotype: No. 1261, D. M.

*Habitat.*—Tararua, 4,300 ft.; captured by J. G. Myers on flowers of *Ranunculus geraniifolius*.