

FRESHWATER HARPACTICOID COPEPODS OF NEW ZEALAND

2. *ANTARCTOBIOTUS* (CANTHOCAMPTIDAE)

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ABSTRACT

Six new species of the freshwater harpacticoid copepod genus *Antarctobiotus* are described, all collected from damp moss. Because these differ slightly from the three previously recorded species of the genus (in having two, not three, setae on the antennal exopodite), the generic description is modified to fit all species within its terms.

INTRODUCTION

In 1928 Pesta described an harpacticoid copepod taken from stream moss off the island of South Georgia in the Antarctic as *Attheyella* (*Canthocamptus*) *koenigi*. Chappuis (1930) later placed this species in a new genus, *Antarctobiotus*, to which he also added *Canthocamptus robustus* Richters 1908, collected from the Crozet Islands (Possession Islands), also in the Antarctic region (Chappuis 1940). The third known species of the genus, *A. nichollsi*, was described from Tasmania in 1951 by Chappuis who stated that the presence of *A. nichollsi* in Tasmania completed the circle of distribution of the species around the Antarctic continent, but that probably other *Antarctobiotus* spp. would be found when further sampling was carried out in Australia, New Zealand, Tierra del Fuego, etc.

The six species described here differ slightly from those previously described in that all have two, not three, setae on the exopodite segment of the antenna (*see* Fig. 1d). Because the setation on this segment often varies within other genera, and all other distinctive characters are very similar, there seems little doubt that the species belong to the genus *Antarctobiotus*, and the generic description in Lang (1948) has been modified so that all nine species can fit within its terms.

The new species were all found in damp moss; the moss was vigorously washed, and then the washing water was filtered through fine bolting silk of mesh aperture about 0.15 mm. Animals were preserved in 60% alcohol and dissections carried out in PVA lactophenol with chlorazol black added. Drawings were done with a camera lucida, and type specimens are lodged in the Dominion Museum, Wellington. These, unless otherwise stated, comprise a holotype female, allotype male and paratype female, all dissected and mounted on slides, and several intact paratypes of both sexes in alcohol.

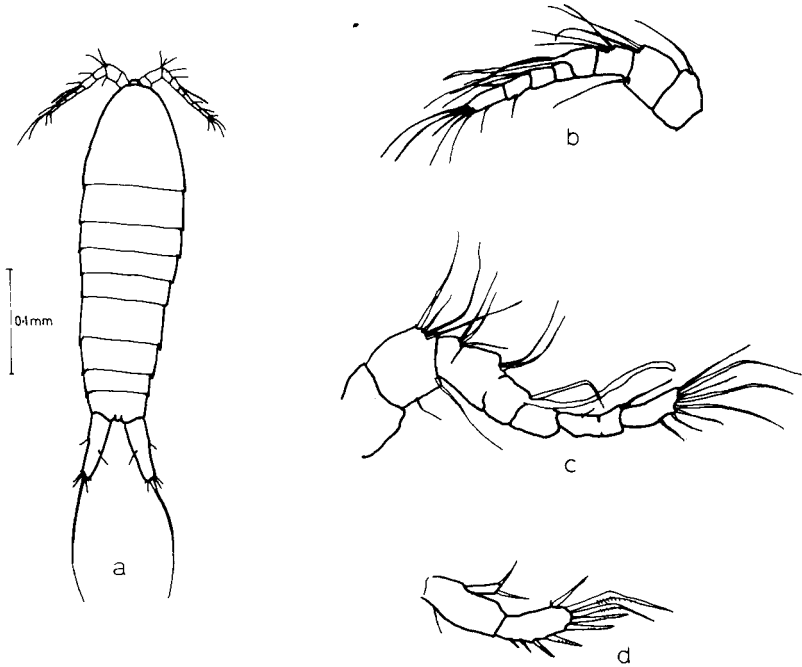


FIG. 1.—(a) *Antarctobiotus elongatus*, dorsal view to show typical body form of the genus; (b) *A. exiguus*, antennule of female; (c) *A. elongatus*, antennule of male; (d) *A. exiguus*, antenna showing typical exopodite of N.Z. species.

DESCRIPTIONS

Genus *Antarctobiotus* Chappuis 1930

Canthocamptus Richters 1908 (part)

Attheyella (*Canthocamptus*) Pesta 1928

Furca variable in shape, little variation between sexes, with only one well-developed terminal seta. Antennule eight segmented, slightly geniculate in the male (Fig. 1c). Antennal exopodite of one segment, bearing two or three setae. Mandibular palp reduced. Exopodites legs 1-4 three segmented, segment 2 of each usually with an inner seta; formula of segment 3 of these legs usually 0 (inner seta). 2 (apical setae). 2 (outer setae). 0.2.2., 1.2.2., 2 (or 1).2.2., respectively. Endopodite leg 1 two segmented, with segment 1 well developed and bearing an inner seta; endopodites legs 2-4 two segmented, segment 2 slightly modified in the male. Basal expansion leg 5 of the female with six setae, some of which may be reduced or modified; male with two or three setae. Exopodite segment of leg 5 female with four setae, male usually with five; in both sexes one seta, usually the second from outermost, is inclined at an angle to the segment.

Modifications to the generic description of Lang (1948) are slight: New Zealand specimens have only two setae on the antennal exopodite while the previously described species have three; the terminal segment

of the exopodite of leg 4 may have none (*A. diversus* sp. nov. has no inner setae on this segment in any of legs 1-4), one or two setae present (two listed in Lang); and the basal expansion of the leg 5 of the male may have two or three setae (two in Lang).

These modifications do not appear to weaken the boundaries which set *Antarctobiotus* apart from other genera, except, perhaps, in the case of *A. diversus*, a problem species which is discussed later in this paper. Using the generic key of Lang (1948), all other species run straight through to *Antarctobiotus*. With Gurney's (1932) key, New Zealand examples, because of the two setae on the antennal exopodite, could be mistakenly placed in *Epactophanes*, but the latter genus has differing apical setae on the caudal rami, a one-segmented endopodite to leg 4, and a completely different male leg 5. In the key below, the female is the easier sex to key out, and identification is usually possible from the structure of leg 5 alone (Figs 2, 3).

KEY TO *Antarctobiotus* SPECIES

FEMALES

1. Endopodite leg 1 equal to or shorter than exopodite. 2
Endopodite leg 1 longer than exopodite. 4
2. Inner margin segment 3 of exopodite leg 4 without setae. **A. diversus** sp. nov.
Inner margin segment 3 of exopodite leg 4 with 2 setae. 3
3. Basal expansion leg 5 with 6 setae arranged in 3 pairs of similar form (Fig. 2e). **A. australis** sp. nov.
This expansion with outermost 4 setae well developed, the inner two very fine. **A. exiguus** sp. nov.
4. Terminal segment exopodite leg 4 with 6 spines and setae. 5
Terminal segment exopodite leg 4 with 5 spines and setae. 6
5. Basal expansion leg 5 with the outer 4 setae well developed, 2 inner ones like fine spines (Fig. 2a). **A. ignobilis** sp. nov.
Basal expansion leg 5 with the 4 outer setae short, but thick, 2 inner ones fine (Fig. 3a). **A. robustus** (Richters 1908)
Basal expansion leg 5 with central 2 setae well developed, 2 lateral pairs reduced (Fig. 3b). **A. koenigi** (Pesta 1928)
6. Basal expansion leg 5 with third from outermost seta by far the longest (Fig. 2b). **A. triplex** sp. nov.
Basal expansion leg 5 with setae increasing in size towards the apex (Fig. 2c). **A. elongatus** sp. nov.
Basal expansion leg 5 with longest setae the outermost and 3rd from outermost (Fig. 3c). **A. nicholli** Chappuis 1951

MALES

1. Basal expansion leg 5 with 3 setae. 2
Basal expansion leg 5 with 2 setae. 3
2. Antennal exopodite with 3 setae. **A. nicholli** Chappuis 1951
Antennal exopodite with 2 setae. **A. triplex** sp. nov.
3. Exopodite of antenna with 3 setae. 4
Exopodite of antenna with 2 setae. 5
4. Exopodite leg 5 with inner apical spine increased in length so that 5 setae appear to be present on this segment (Fig. 3d). **A. robustus** (Richters 1908)
Exopodite leg 5 with 4 setae (Fig. 3e). **A. koenigi** (Pesta 1928)

- 5. Inner margin segment 3 of exopodite leg 4 without setae. **A. diversus** sp. nov.
 Inner margin of this leg with 1 seta. **A. elongatus** sp. nov.
 Inner margin of this leg with 2 setae. 6
- 6. Endopodite leg 1 longer than exopodite **A. ignobilis** sp. nov.
 Endopodite leg 1 shorter than the exopodite. 7
- 7. Exopodite segment of leg 5 with inner apical spine long,
 equal in length to inner lateral seta (Fig. 10i) **A. australis** sp. nov.
 Exopodite segment leg 5 with upper apical seta short
 (Fig. 11i). **A. exiguus** sp. nov.

Antarctobiotus ignobilis sp. nov.

Figs 2a, 4a, 4b, 5

ADULT FEMALE: Average body length 0.44 mm excluding caudal setae. Posterior dorsal margins of body segments smooth, posterior ventral margins of abdominal segments spinose and adorned as follows: genital segment with a row of small spines extending almost to the outer edges of the segment; the following segment with a central group of spines, a small break, then a lateral group on each side out to the edge of the segment; subterminal segment with a central group of about 6 spines and a lateral group on each side; anal segment with spines around the bases of the two caudal rami.

Rostrum small. Anal operculum small, smooth and rounded. Caudal rami short, greatest width at the proximal end, about 1.5 times as long as wide; three apical setae, the two lateral ones very small and delicate, the central one strongly developed and about twice the length of the ramus; one outer subapical seta, delicate and small; an outer seta at about the mid point of the outer edge of the ramus; dorsal seta projecting towards the inner edge of the ramus, where several small spinules are present. Antennule eight segmented, sensory cylinder extending almost to the end of the terminal segment. Antennal appendage one segmented, with two setae.

Exopodites legs 1-4 three segmented. Endopodites of these legs two segmented, that of leg 1 slightly longer than the exopodite, those of legs 2-3 shorter by at least the length of the terminal exopodite segment. Setae/spine formulae for these legs (after Lang 1948):

Leg 1		Leg 2		Leg 3		Leg 4	
exp.	enp.	exp.	enp.	exp.	enp.	exp.	enp.
0.1.022	1.120	0.1.022	1.130	0.1.122	1.030	0.1.222	1.120

Basal expansion of leg 5 with two short, innermost spines, and four well-developed setae, the second from the innermost the longest, the other three of equal length. Exopodite segment with the innermost seta short and stout, the apical one elongate, the outer, subapical seta slender and inclined at an angle to the segment, and the outermost spine smooth, extending past the apex of the segment (Fig. 2a).

ADULT MALE: Usually slightly smaller than the female, averaging 0.41 mm in length, excluding the caudal setae. Body shape similar to the female, spines more regular in their arrangement. Antennule slightly geniculate. Leg 1 and exopodites legs 2-4 as in female. Endopodites legs 2-4 modified as follows: leg 2 terminal segment bears an elongate apical seta towards the inner margin, and a short apical spine towards the outer; leg 3 terminal segment elongate, with two apical setae, one almost twice the length of the other; leg 4 terminal segment with a long, fine, subapical seta and two apical ones. The inner slightly longer than the outer. Basal expansion of leg 5 with two setae at the apex, with a group of four short spinules on the inner margin, and two on the outer. Exopodite segment of leg 5 with five setae, the proximal ones on both the inner and outer margins originate at equivalent levels; the apical seta is long, at least twice the length of the segment.

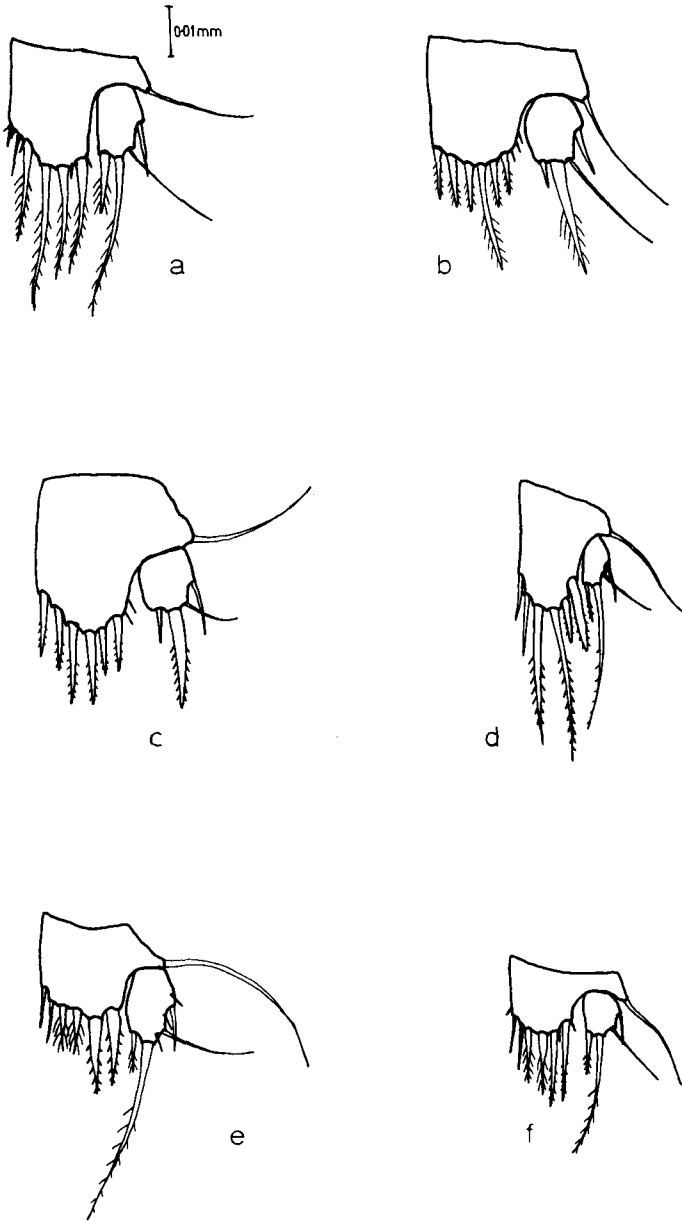


FIG. 2—Female leg 5 (a) *Antarcticbiotus ignobilis*; (b) *A. triplex*; (c) *A. elongatus*; (d) *A. diversus*; (e) *A. australis*; (f) *A. exiguus*.

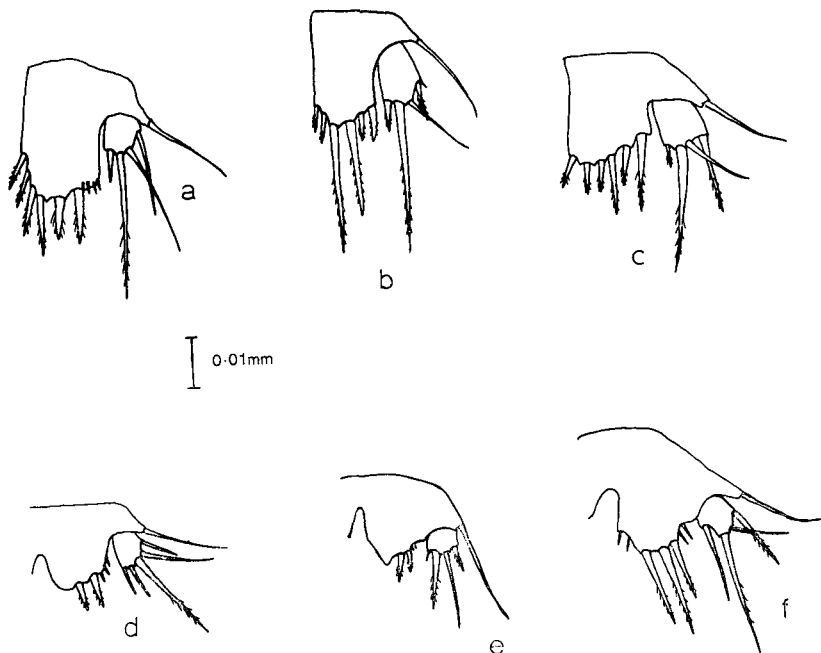


FIG. 3—Female leg 5 (a) *Antarcticobiotus robustus*; (b) *A. koenigi*; (c) *A. nichollsi*. Male leg 5 (d) *A. robustus*; (e) *A. koenigi*; (f) *A. nichollsi*. (a) and (d) after Chappuis (1940); (b) and (e) after Chappuis (1930); (c) and (f) after Chappuis (1951).

TYPE LOCALITY: Type specimens were washed from moss samples removed from a dripping bank alongside the Nihotupu reservoir in the Waitakere ranges, near Auckland, at approximately 216 m above sea level (grid reference: 090484 NZMS 1 sheet N41).

DISTRIBUTION: Wet bank, Nihotupu Reservoir, 3.6.68; moss alongside tributary into Wairoa Gorge, Clevedon, 29.3.68; stream moss, Red Hill, Papakura, 12.10.71; moss at edge of Lake Rotoiti, Rotorua, 19.9.68; stream moss alongside Lake Rotowhero, Rotorua, 5.12.67; Big Hole, Five Forks, Oamaru, 30.11.66 (coll. C. McLay); moss alongside Roaring Meg stream, Cromwell, 26.12.66 (coll. M. A. Chapman).

REMARKS: In common with most examples of the genus, this species prefers to inhabit mossy material kept moist by water in movement, and is found mainly in the splash zone alongside streams; the Lake Rotoiti examples were found where the moss was being continually splashed by waves. The specific name (*ignobilis*) was chosen because of the lack of any significant distinguishing character to use in the name.

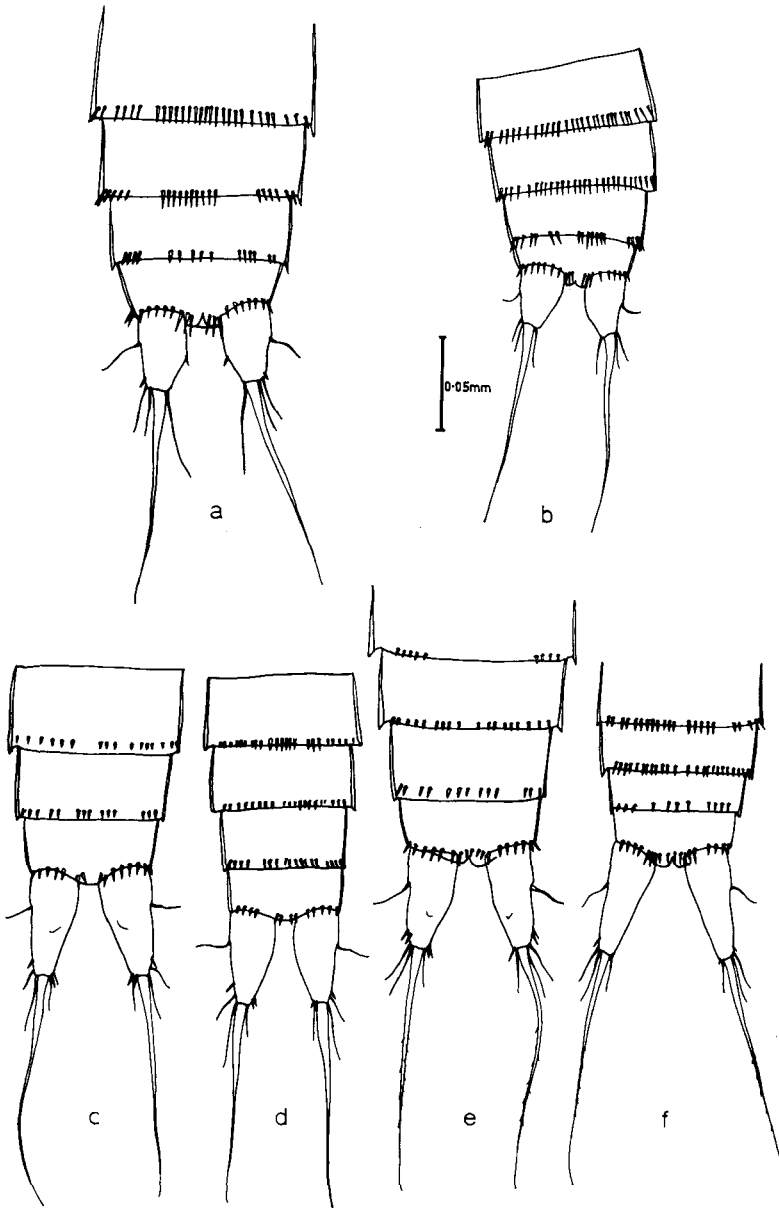


FIG. 4—Ventral view posterior abdominal segments of (a) *Antarcticobiotus ignobilis*, female; (b) *A. ignobilis*, male; (c) *A. triplex*, female; (d) *A. triplex*, male; (e) *A. elongatus*, female; (f) *A. elongatus*, male.

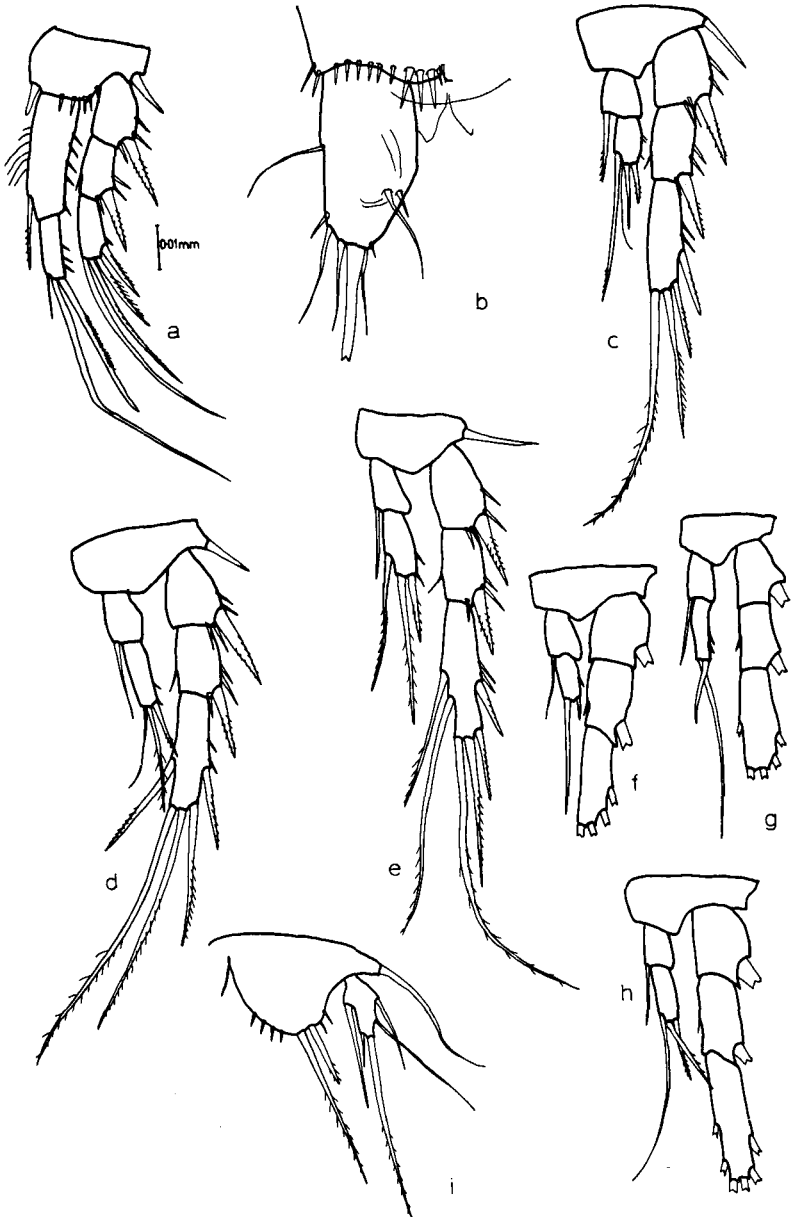


FIG. 5—*Antarcticobiotus ignobilis* sp. nov. (a) Leg 1 female, male; (b) caudal ramus, female; (c) leg 2, female; (d) leg 3, female; (e) leg 4, female; (f) leg 2 endopodite, male; (g) leg 3 endopodite, male; (h) leg 4 endopodite, male; (i) leg 5, male.

Antarctobiotus triplex sp. nov

Figs 2b, 4c, 4d, 6

ADULT FEMALE: Average length 0.41 mm, excluding caudal setae. Posterior dorsal margins of body segments smooth, posterior ventral margins of abdominal segments lightly spinose and adorned as follows: genital segment mostly smooth, with a small lateral group of spines on each side; the following segment with an irregular row of short spines extending right across the margin; subterminal segment with a central group of six spines arranged as two groups of three, and an outer lateral group on each side; anal segment with spines around the bases of the two caudal rami. -

Rostrum small. Anal operculum small, rounded and smooth. Caudal rami elongate and tapered evenly towards their apices; three terminal setae, the two outer ones small, of almost equal size, and delicate, the central one strongly developed, extending at least three times the length of the ramus; on the outer edge of the ramus are three setae, one about one third of the way down the ramus and two subapical, the first small, the second equal in length to the anterior seta; inner margin of the ramus smooth; dorsal seta inserted at about the centre of the ramus. Antennule eight segmented, sensory cylinder on segment 4 extending almost to the end of the terminal segment. Antennal appendage of one segment with two setae.

Exopodites legs 1-4 three segmented. Endopodites of these legs two segmented, first segment of leg 1 elongate, extending beyond the terminal segment of the exopodite. Setae/spine formulae of these legs as follows:

Leg 1		Leg 2		Leg 3		Leg 4	
exp.	enp.	exp.	enp.	exp.	enp.	exp.	enp.
0.0.022	1.120	0.1.022	1.020	0.0.122	1.020	0.1.122	1.020

There is no inner spine present on the exopodite segment 2 of leg 3, and the one on leg 2 is very delicate and can escape detection.

Leg 5 basal expansion with four setae: a small, inner one; a long, stout apical one; an outer, subapical hair, inclined at an angle; and a smooth, outermost setae, about half the length of the apical (Fig. 2b).

ADULT MALE: Body slightly smaller than the female, about 0.39 mm in length, excluding the caudal setae. Abdominal segments with ventral posterior margins decorated with spines in a similar fashion to the female, except for the genital segment, which has a row of spines right across it.

Antennule geniculate. Exopodites legs 1-4 similar to female, although the inner spine on segment 2 of leg 2 is more obvious. Endopodite legs 1 and 2 as in female, legs 3 and 4 with the terminal segments modified: leg 3 has this segment narrowed, with a small, terminal spine and hair, and in leg 4 there is an inner spine, a terminal claw-like spine and, between these two, a fine seta. Leg 5 basal expansion with three setae; one apical (the longest), and two lateral, the one on the outer margin being inserted closer to the apical than the one on the inner margin; exopodite segment with five spines and setae, the innermost spine at least twice the length of the next; the third, at the apex, the longest; the outer, subapical seta inclined at an angle to the segment; and a stout, outermost spine.

TYPE LOCALITY: Type specimens were washed from moss samples taken from a dripping bank alongside the Nihotupu Reservoir in the Waitakere Ranges, near Auckland, at approximately 216 m above sea level (grid reference: 090484 NZMS 1 sheet N41).

DISTRIBUTION: Wet bank, Nihotupu Reservoir, 3.6.68; moss alongside Cascades stream, Waitakere Ranges, 4.3.70; moss alongside tributary into Wairoa Gorge, Clevedon, 29.3.68; moss on dripping wet bank, road between Coromandel and Kuaotuna, Coromandel Ranges, -4.69; stream moss, Rainbow Springs, Rotorua 6.12.67; Reids Creek, Ohakune, 27.11.68 (coll. D. R. Cowley); Whangaehu River, 19.1.65 (coll. D. R. Cowley); stream, 15 miles up Upper Holyford Valley, -.2.65 (coll. D. R. Cowley).

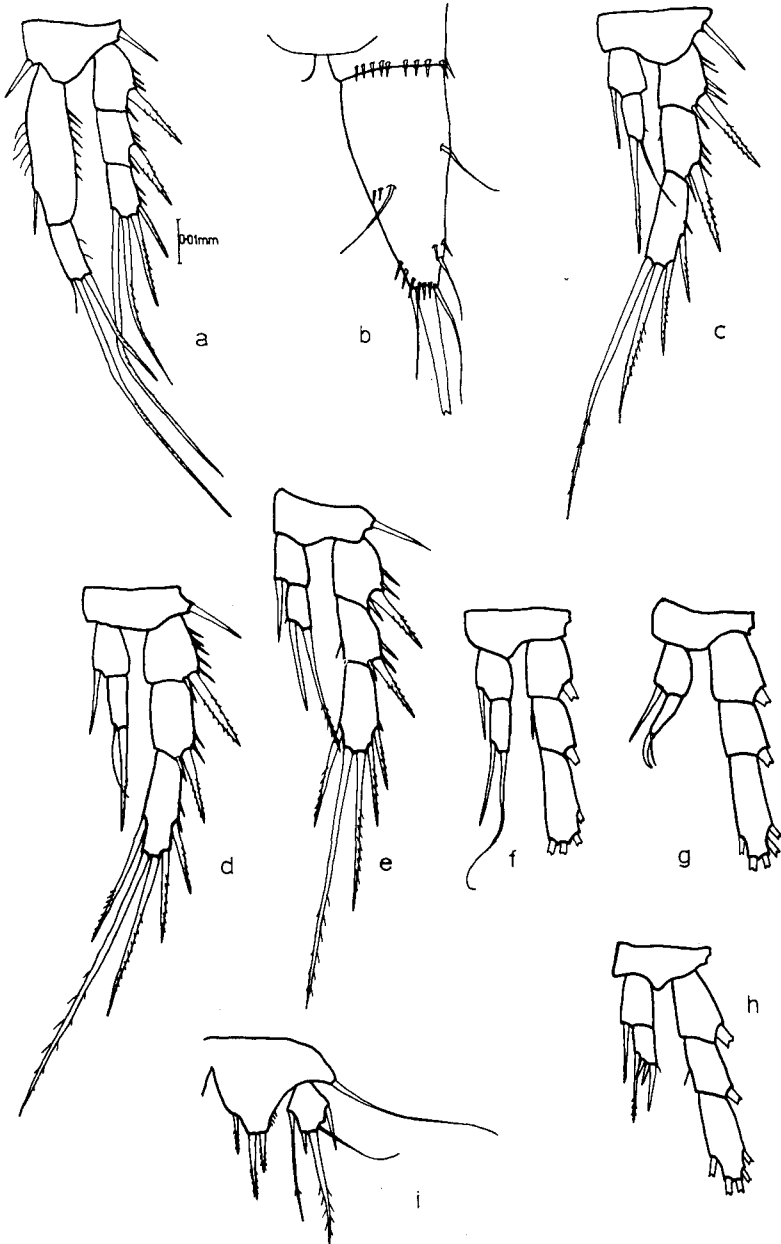


FIG. 6—*Antarcticbiotus triplex* sp. nov. (a) Leg 1, female, male; (b) caudal ramus, female; (c) leg 2, female; (d) leg 3, female; (e) leg 4, female; (f) leg 2 endopodite, male; (g) leg 3 endopodite, male; (h) leg 4 endopodite, male; (i) leg 5, male.

REMARKS: Another species with a preference for moss alongside moving water, this animal has sometimes been found in association with *A. ignobilis*. It can be easily distinguished from the latter by the elongate caudal rami and the structure of the male leg 5. The specific name (*triplex*) refers to the three setae on the basal expansion of the male leg 5, a character unique among New Zealand *Antarctobiotus* spp.

***Antarctobiotus elongatus* sp. nov.**

Figs 1a, 1c, 2c, 4e, 4f, 7

ADULT FEMALE: Average length 0.40 mm excluding caudal setae. Posterior dorsal margins of body segments smooth, posterior ventral margins of abdominal segments spinose and adorned as follows: genital segment mostly smooth, with a few spines on each side, towards the edge of the segment; next segment with a complete row of spines right across the margin; subterminal segment with a central group of spines and a lateral group on each side, towards the outer edge of the segment; anal segment with spines around the bases of the rami. The spines on this animal are short and stout.

Anal operculum small, smooth and rounded. Rostrum small. Caudal rami elongate and narrow, about 2.5 times as long as broad, the maximum width at the proximal end; two delicate apical setae and one subapical, with one well developed apical seta, situated between the two smaller ones and equal to twice the length of the ramus; one seta on the outer margin of the ramus, just before the mid-point; dorsal seta on the dorsal margin, just beyond the midline, placed more towards the inner margin of the ramus. Antennule eight segmented, sensory cylinder on segment 4 extending to the tip of the subterminal segment. Antennal appendage one segmented, with two setae.

Exopodites legs 1-4 three segmented. Endopodites of these legs two segmented, that of leg 1 longer than the exopodite by almost the complete length of the terminal segment of the endopodite; those of the other legs shorter than the exopodites. Setae/spine formulae of these legs as follows:

Leg 1		Leg 2		Leg 3		Leg 4	
exp.	enp.	exp.	enp.	exp.	enp.	exp.	enp.
0.1.022	1.120	0.1.022	1.120	0.1.122	1.020	0.1.122	1.120

The inner spine on segment 2 of the exopodites is rather small and not always immediately obvious.

Leg 5 basal expansion well developed with six setae, increasing in size towards the apex of the expansion, the longest being the third from innermost; two small spinules present on the outer margin. Exopodite segment with its apex at a level equivalent to that of the basal expansion and bearing four setae—a small, slender innermost one; a stout, apical one, 1.5 times the length of the segment; a slender, outer, subapical seta inclined at an angle to the segment; and an outermost spinose seta at about the midpoint of the outer edge of the segment (Fig. 2c).

ADULT MALE: Body slightly smaller than the female, average length 0.38 mm excluding caudal setae. Spine decorations on the posterior ventral margins of the abdominal segments similar to the female, except on the genital segment, which has a row of spines right across the margin. Antennule slightly geniculate (Fig. 1c). Leg 1, and exopodites legs 2-4 as in female. Endopodites legs 2-4 two segmented, segment 1 of all three legs with an inner seta; segment 2 of leg 2 with a fine terminal seta and a spine; this segment in leg 3 with a terminal, claw-like spine and a seta; in leg 4 there is a subterminal spine and a terminal spine and seta. Leg 5 basal expansion with two setae; exopodite segment with five, the inner, apical spine being very much reduced.

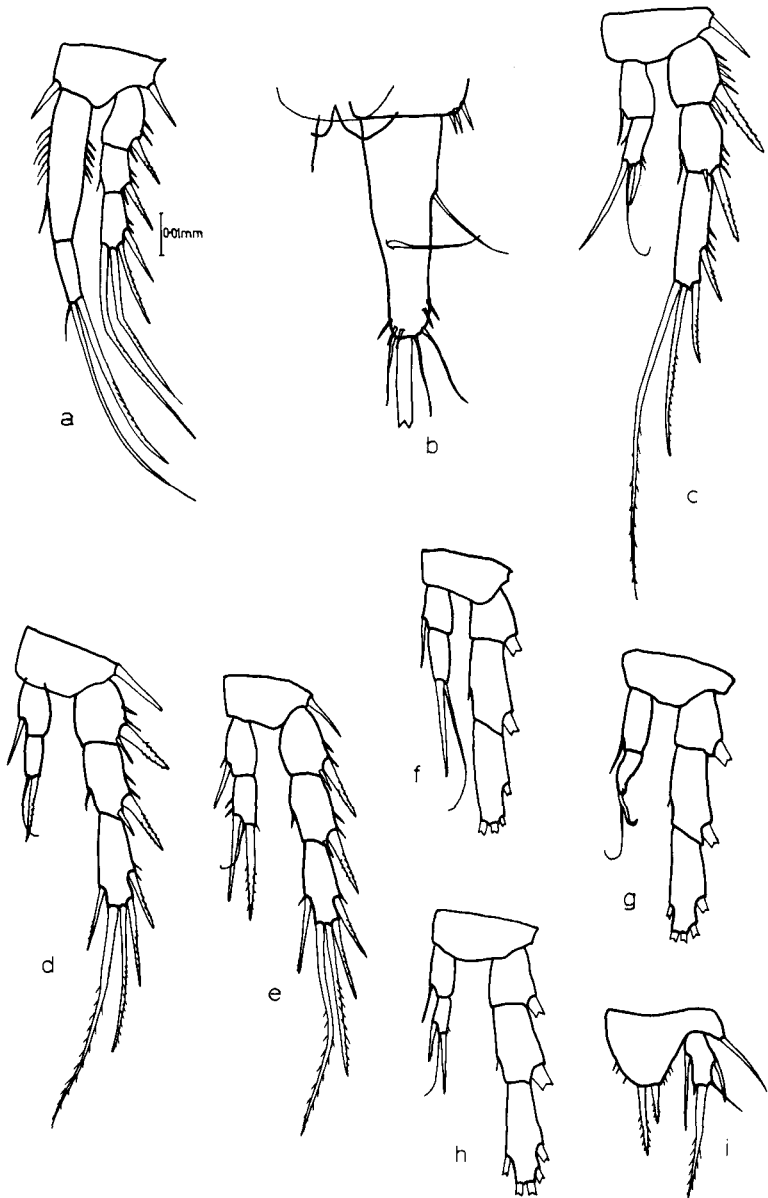


FIG. 7—*Antarcticobiotus elongatus* sp. nov. (a) Leg 1, female, male; (b) caudal ramus, female; (c) leg 2, female; (d) leg 3, female; (e) leg 4, female; (f) leg 2 endopodite, male; (g) leg 3 endopodite, male; (h) leg 4 endopodite, male; (i) leg 5, male.

TYPE LOCALITY: Type specimens were taken from a dripping mossy bank, near the Maruia Falls on the Shenandoah Saddle in Westland, at approximately 361.3 m above sea level (grid reference: 648596 NZMS 1 sheet S32).

DISTRIBUTION: Roadside spring 6 miles between Ohika and Westport, 16.4.66 (Coll. I. McLellan, sorted D. R. Cowley); dripping mossy bank, Maruia Falls, Westland, 7.11.68; mossy bank, Mt Hercules, Westland, 10.11.68; moss in stream alongside Lake Matheson, 11.11.68.

REMARKS: With its elongate caudal rami (for which it is named *elongatus*), this species appears superficially very similar to *A. triplex*. However the rami are slightly longer than in the latter species and the male fifth leg bears the more common two seta on the basal expansion rather than three as in *A. triplex*. Records so far confine the species to the West Coast of the South Island.

Antarctobiotus diversus sp. nov.

Figs 2d, 8a, 8b, 9

ADULT FEMALE: Average body length 0.47 mm excluding caudal setae. Posterior dorsal margins of body segments smooth, posterior ventral margins of abdominal segments adorned with spines as follows: genital segment with a long row of spines which stops just before the edge on both sides; following segment with a complete row right across the margin; subterminal segment with one central group of spines and a lateral group on each side; anal segment with spines around the bases of the caudal rami.

Rostrum small. Anal operculum small, smooth and rounded. Caudal rami slightly longer than broad with the usual three apical setae, the central one strongly developed and extending almost four times the length of the ramus; one subapical seta on the outer margin with one other seta on this margin about one-third of the way down the ramus. Antennule eight segmented. Antennal appendage of one segment, with two setae.

Exopodites legs 1-4 three segmented. Endopodites of these legs two segmented; that of leg 1 approximately the same length as the exopodite; those of legs 2-4 much smaller than the exopodites, not reaching past the midpoint of exopodite segment two. Setae/spine formulae of these legs as follows:

Leg 1		Leg 2		Leg 3		Leg 4	
exp.	enp.	exp.	enp.	exp.	enp.	exp.	enp.
0.1.022	1.120	0.1.022	1.120	0.1.022	1.020	1.1.022	1.120

The terminal exopodite segment of both legs 2 and 3 does not carry any setae on the inner margin. The inner seta on exopodite segment two of legs 1-3 is small and delicate.

Basal expansion of leg 5 strongly developed with a total of six spines and setae of various forms: two short, inner spines; two long, apical setae; two stout short, outer spines, the outermost the longest. Exopodite segment with the usual four setae, the outer subapical one being inclined at an angle to the segment (Fig. 2d).

ADULT MALE: Body slightly smaller than the female, 0.45 mm in length excluding the caudal setae. Armature of body segments similar to that of the female, except for the genital segment, where the row of spines extends right across the posterior ventral margin. Antennule slightly geniculate. Leg 1 as in female, as are exopodites of legs 2-4. Terminal segments of endopodites legs 2-4 modified as follows: leg 2 with one inner subapical seta, a long, apical seta and three spinules on the outer margin of this segment; leg 3 with a strong apical seta and a fine subapical one; leg 4 with an inner, subapical seta and a slightly longer

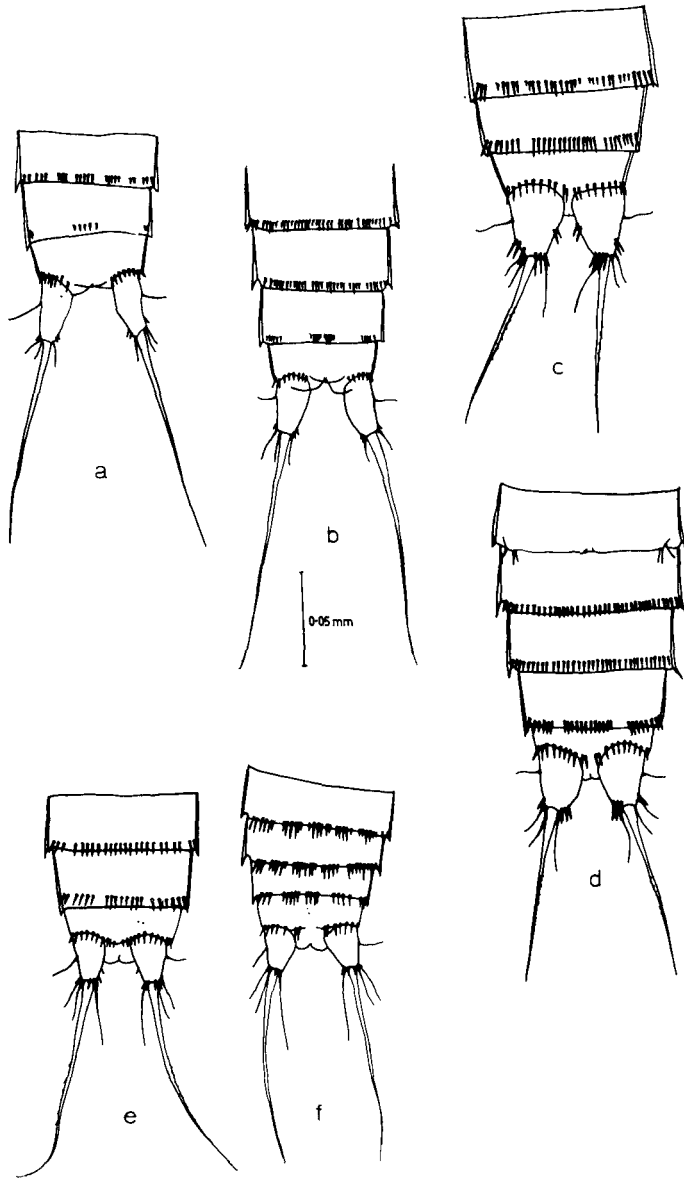


FIG. 8—Ventral view, posterior abdominal segments of (a) *Antarcotobiotus diversus*, female; (b) *A. diversus*, male; (c) *A. australis*, female; (d) *A. australis*, male; (e) *A. exiguus*, female; (f) *A. exiguus*, male.

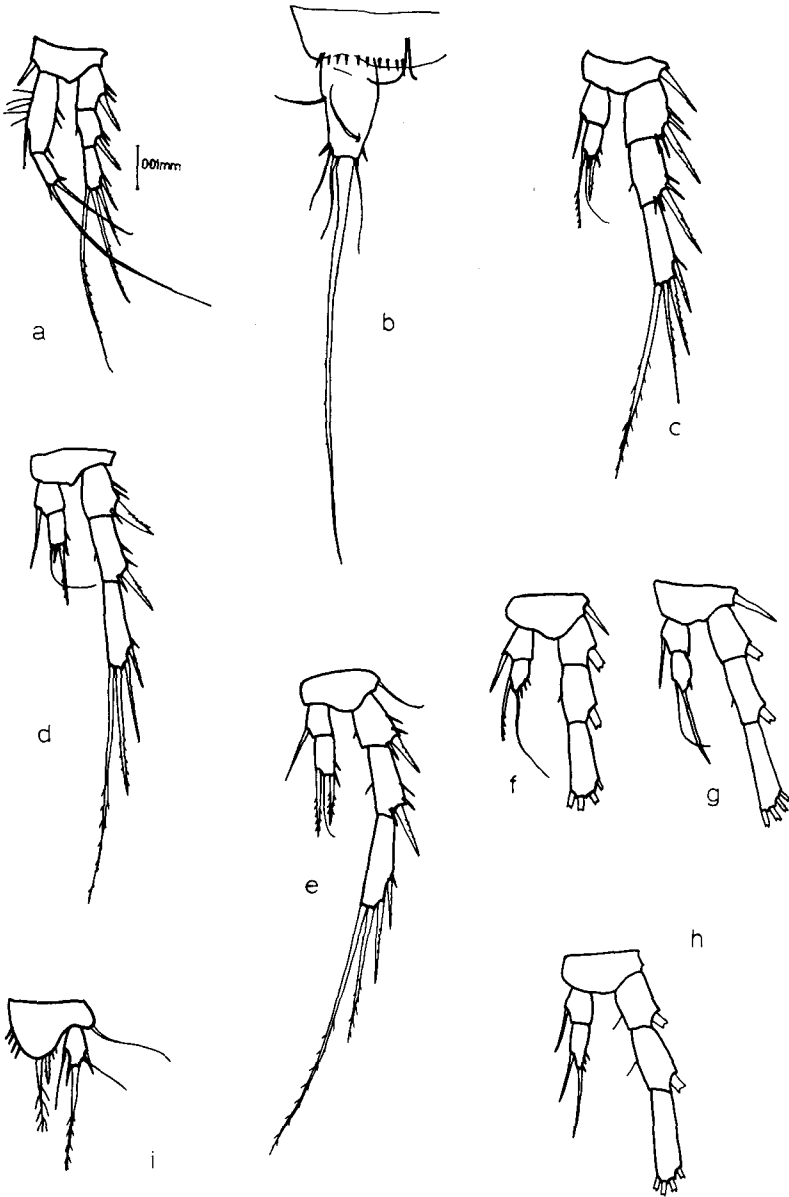


FIG. 9—*Antarcticbiotus diversus* sp. nov. (a) Leg 1, female, male; (b) caudal ramus, female; (c) leg 2, female; (d) leg 3, female; (e) leg 4, female; (f) leg 2 endopodite, male; (g) leg 3 endopodite, male; (h) leg 4 endopodite, male; (i) leg 5, male.

apical one, this about the length of the entire endopodite. Basal expansion of leg 5 with two apical setae, the inner one twice the length of the outer, four small spinules on the inner margin and two small outer spinules; exopodite segment normal for the genus, with five setae.

TYPE LOCALITY: Type specimens were taken from damp moss samples from alongside a small waterfall six miles south of Port Waikato (grid reference: 266868 NZMS 1 sheet N51).

DISTRIBUTION: Stream moss, Port Waikato, 7.9.68; dripping mossy bank, Waioeka Gorge, 10.12.70.

REMARKS: Unlike all the other species placed in the genus *Antarctobiotus*, this animal has no inner setae on the terminal segment of the exopodites of legs 3 and 4. Using the key of Lang (1948) the species thus falls into the genus *Paracamptus*, to which it obviously does not belong, and from which it differs in setation of the antennal segment, lack of sexual dimorphism in the caudal rami, and structure of leg 5. Apart from lack of setae, the animal so closely resembles the other described species that I believe it falls within the genus *Antarctobiotus*, and I have modified the generic description to permit the entry of *A. diversus*. The specific name (*diversus*) was chosen because of these structural anomalies.

Antarctobiotus australis sp. nov.

Figs 2e, 8c, 8d, 10

ADULT FEMALE: Average length 0.40 mm excluding caudal setae. Posterior dorsal margins of body segments smooth, posterior ventral margins of abdominal segments slightly spined as follows: genital segment with a group of spines on either side of the midline, each placed midway between the centre of the segment and the outer margin; following segment with a row of spines right across; sub-terminal segment has a central group and a lateral one on each side, and the anal segment bears spines around the bases of the rami.

Rostrum small. Anal operculum small, smooth and rounded. Caudal rami rectangular, very slightly broader towards the proximal end and only slightly longer than broad; three apical setae, the central by far the best developed, about twice the length of the ramus itself; on the outer edge a subapical seta associated with a row of spinules with another seta at the mid-point of this outer edge; inner margin with two spines, one mid-way, the other subapical, and from this latter a row of small spines extends in towards the insertion of the central apical seta; dorsal seta inserted two-thirds of the way down the ramus. Antennule eight segmented, sensory cylinder on segment four extending just past the terminal segment. Exopodite segment of the antenna one segmented, bearing two setae.

Exopodites legs 1-4 three segmented. Endopodites of these legs two segmented, all shorter than exopodites; on leg 1 segment 1 well developed, extending to the end of exopodite segment 2, terminal segment small. Setae/spine formulae for these legs as follows:

Leg 1		Leg 2		Leg 3		Leg 4	
exp.	enp.	exp.	enp.	exp.	enp.	exp.	enp.
0.1.022	1.120	0.1.022	1.120	0.1.122	1.130	0.1.222	1.120

There is a small spine present on the inner margin of exopodite segment 2 of every leg.

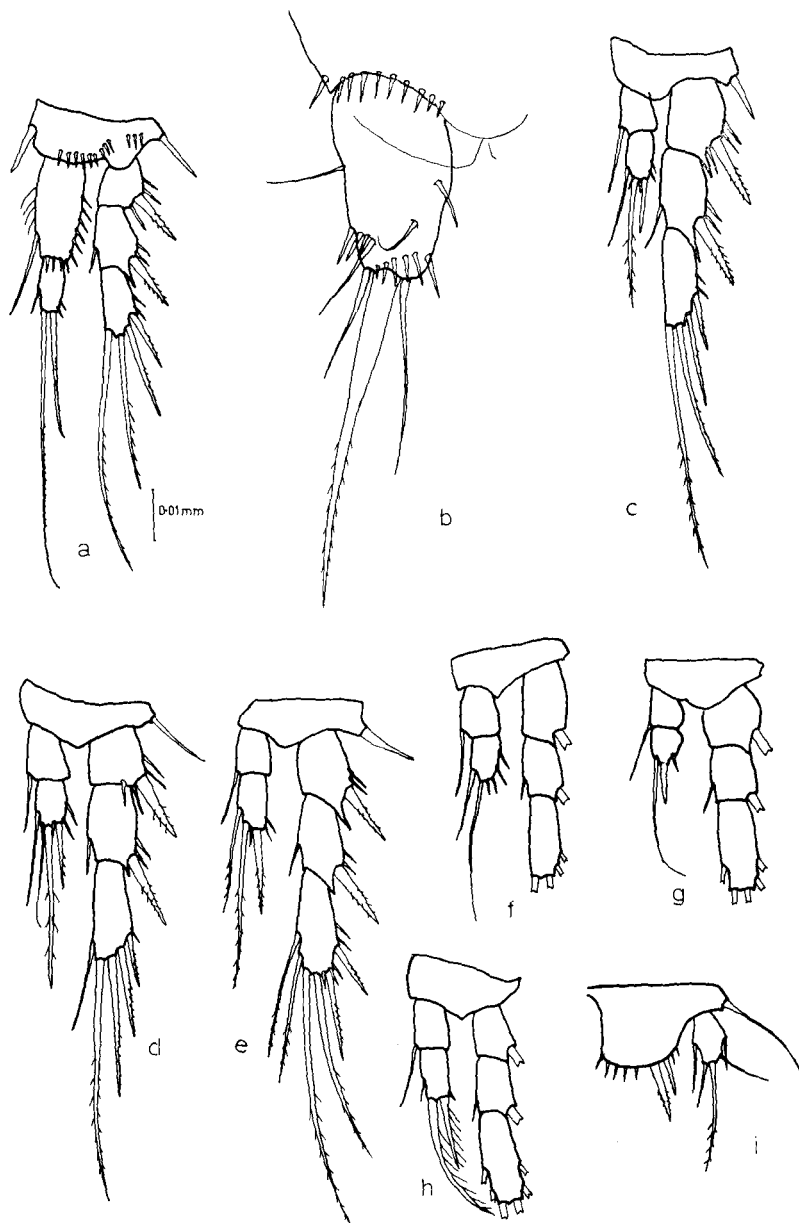


FIG. 10—*Antarctobiotus australis* sp. nov. (a) Leg 1, female, male; (b) caudal ramus, female; (c) leg 2, female; (d) leg 3, female; (e) leg 4, female; (f) leg 2 endopodite, male; (g) leg 3 endopodite, male; (h) leg 4 endopodite, male; (i) leg 5, male.

Leg 5 basal expansion with six setae arranged in three pairs, each pair similarly ornamented; the innermost pair small and smooth; the central pair slightly larger and plumose, with expanded bases; and the outer pair elongate, about twice the length of the central ones, and toothed. Exopodite segment with four setae; a short, inner, apical one; a long apical one, over twice the length of the segment; a subapically placed fine seta inclined at an angle to the segment; and a slightly shorter outer seta inserted at about half the distance from the base to the apex of the segment (Fig. 2e).

ADULT MALE: Body slightly smaller than the female, 0.38 mm in length excluding the caudal setae. Armature of body segments similar to that of the female, except for the genital segment, where the row of spines extends right across the posterior ventral margin. Antennule geniculate. Leg 1 and exopodites of legs 2-4 as in female. Endopodite segment 2 of leg 2 with two setae only, representing the inner subapical and inner apical of the female: the outer apical is lost; leg 3 endopodite segment 2 with an inner subapical seta, about twice the length of the endopodite, an apical spine not quite half the length of the seta, and an outer subapical spinule; terminal segment leg 4 endopodite with an inner subapical spinule and two apical setae, the innermost one extending to the tip of the exopodite, the outermost about two-thirds as far. Leg 5 basal expansion hemispherical, with two setae placed towards the exopodite; five or six spinules on the inner margin, two on the outer. Exopodite segment bears five setae.

TYPE LOCALITY: Type specimens were removed from sphagnum moss alongside Margaret's tarn on Mount Rolleston, Arthur's Pass, at about 975 m above sea level (grid reference: 046315 NZMS 1 sheet S59).

DISTRIBUTION: Margaret's tarn, Mt Rolleston, Arthur's Pass, 27.1.68; terrestrial moss alongside Lake Brunner, Greymouth, 9.11.68; terrestrial moss, Waiuta, Westland, 7.11.68.

REMARKS: This apparently uncommon species has been recorded from only three localities on the West Coast of the South Island. In both this and the following species the mossy habitat is kept moist by other than stream water. The specific name (*australis*) relates to the southern distribution of the species.

Antarctobiotus exiguus sp. nov.

Figs 1b, 1d, 2f, 8e, 8f, 11

ADULT FEMALE: Average length 0.36 mm excluding caudal setae. Posterior dorsal margins of body segments smooth, posterior ventral margins of abdominal segments lightly spinose, ornamented as follows: genital segment with a small clear central area and spines each side of the midline, extending out to the edge of the segment; following segment with spines right across the margin; subterminal segment with a central group of spines whose heights vary to give a 'W' shape, a small group on either side of the central group, and a lateral group on the two outer edges of the segment; anal segment with spines around the caudal rami.

Rostrum small. Anal operculum relatively large, extending half way down the caudal ramus, smooth and semicircular. Caudal rami broadest at the proximal end, tapering slightly distally, maximum width equal to length; three apical setae, the centrally placed one the largest, the innermost about twice the length of the outermost; a subapical seta is situated alongside the latter and equal to it in length; spinules are present on both the inner and outer margins; on the outer edge a seta at about the midpoint and directly opposite this, on the inner margin, a small spine; dorsal seta situated close to the distal end of the ramus. Antennule eight segmented, sensory cylinder extending just beyond the terminal segment (Fig. 1b). Antennal appendage of one segment with two setae (Fig. 1d).

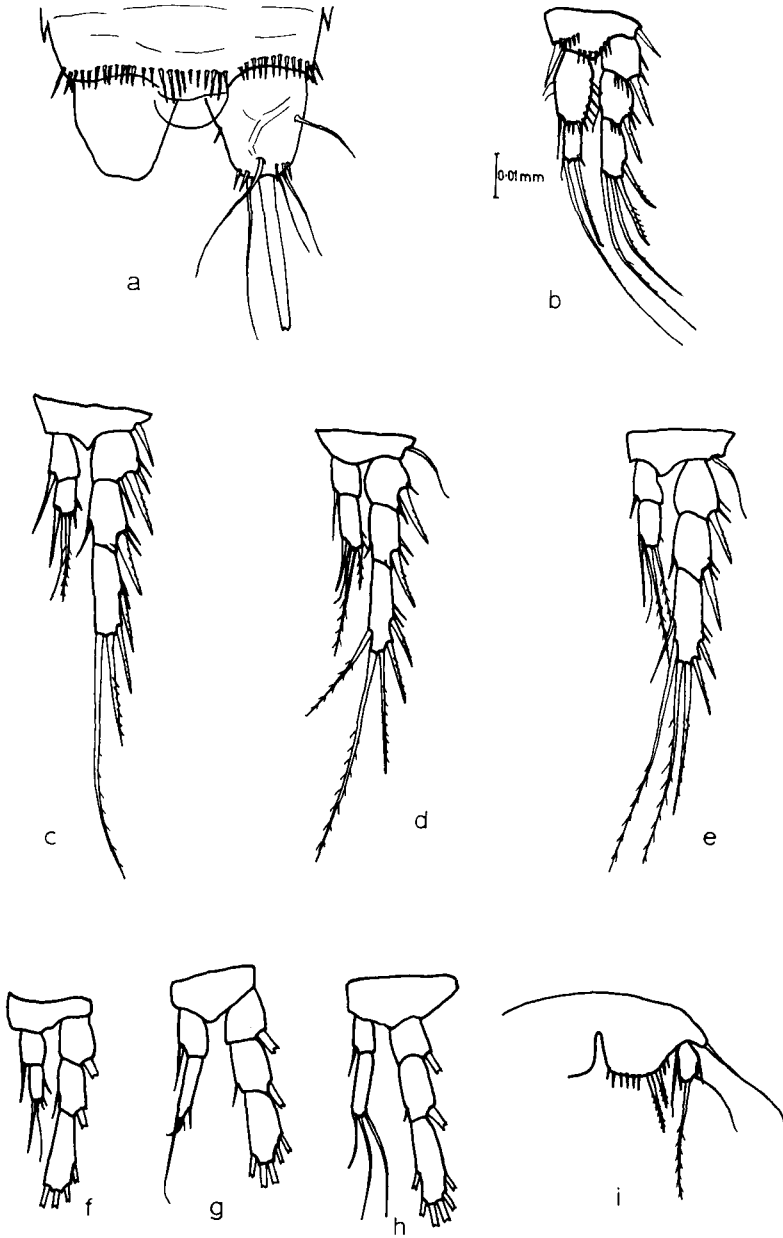


FIG. 11—*Antarcticbiotus exiguus* sp. nov. (a) Leg 1, female, male; (b) caudal ramus, female; (c) leg 2, female; (d) leg 3, female; (e) leg 4, female; (f) leg 2 endopodite, male; (g) leg 3 endopodite, male; (h) leg 4 endopodite, male; (i) leg 5, male.

Exopodites legs 1-4 three segmented. Endopodites of these legs two segmented, that of leg 1 only slightly shorter than the exopodite, those of legs 2-4 reaching to about the midpoint of segment 2 of the exopodites. Setae/spine formulae of these legs as follows:

Leg 1		Leg 2		Leg 3		Leg 4	
exp.	enp.	exp.	enp.	exp.	enp.	exp.	enp.
0.1.022	1.120	0.1.022	1.120	0.1.122	1.130	0.1.222	1.130

Leg 5 basal expansion with the apex at the same level as that of the exopodite segment, bearing six setae increasing in size from the innermost to the fifth—the sixth being of equal height to the fourth; innermost two smooth, next two plumose and the outer two spinose. Exopodite segment with four setae, the apical the longest, the outer, subapical one smooth and inclined at an angle to the segment (Fig. 2f).

ADULT MALE: Body smaller than the female, 0.28 mm in length excluding the caudal setae. Armature of body segments similar to the female, except for the genital segment, which has the row of spines across the entire posterior ventral margin, and the variability in length of the spines on the other margins. Antennule markedly geniculate. Leg 1 and exopodites legs 2-4 as in female. Leg 2 endopodite segment 2 with two apical setae of equal length, the outermost very delicate; three spinules present on the outer margin of the segment; leg 3 endopodite segment 2 elongate and narrow, with an inner terminal seta, about as long as the segment, and a short, incurved terminal spine with two subapical spinules; endopodite segment 2 of leg 4 with three terminal setae, a short, innermost one, about half the length of the other two. Leg 5 basal expansion bears two setae, the inner twice the length of the outer, and five small spinules on the inner margin, two on the outer; exopodite segment with five setae, the apical the longest, the outer subapical inclined at an angle to the segment.

TYPE LOCALITY: Type specimens were taken from moss in a sphagnum swamp at Ardmore, 20 miles south of Auckland (grid reference: 464391 NZMS 1 sheet N46).

DISTRIBUTION: Sphagnum swamp, Ardmore, 13.11.66; terrestrial moss, Hunua ranges, 31.3.68; terrestrial moss, Mamaku range, Rotorua, 14.9.69.

REMARKS: This is the smallest of the six New Zealand species of *Antarctobiotus*, a fact reflected in the specific name (*exiguus*). Like the preceding species, *A. australis*, it is not a common animal; it shows a liking for damp moss in swamps or on land rather than for moss alongside running water as do most of the other species.

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