

FRESHWATER HARPACTICOID COPEPODS OF NEW ZEALAND

1. *ATTHEYELLA* AND *ELAPHOIDELLA* (CANTHOCAMPTIDAE)

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(Received for publication 1 July 1971)

ABSTRACT

Seven species of *Attheyella* and two of *Elaphoidella* are discussed. The original descriptions of *A. brehmi* (Chappuis, 1929) and *A. maorica* (Brehm, 1928) are revised and five new species described: two from each of the subgenera *Delachauxiella* and *Chappuisiella* and a semi-terrestrial species of *Elaphoidella*.

INTRODUCTION

This paper is the first in a series describing the New Zealand freshwater harpacticoids, a group which have been little studied locally. Papers have been published by Brehm (1928, 1929), Harding (1958), and Barclay (1969). A key to all the known genera and species will be given at the end of the series.

This paper deals with the species of the closely related genera *Attheyella* and *Elaphoidella* of the family Canthocamptidae, and includes five new species. Almost all the New Zealand freshwater species belong to the Canthocamptidae, the exceptions being mainly brackish-water forms.

Collections have been made from a variety of habitats including splashed or damp moss at the edges of streams or waterfalls, sphagnum moss in swamps, and forest moss which remains damp for most of the year. A few species frequent the littoral areas of ponds and lakes and some are found interstitially in the sand on lake edges (Barclay 1969). Distribution records not otherwise acknowledged in the text are of the author's collections.

Animals were preserved in 60% alcohol and dissections were carried out in polyvinyl lactophenol, with chlorazol black as a staining agent. The dissected material was examined under phase contrast and all diagrams were made with the aid of a camera lucida. Body measurements were taken before specimens were transferred to the dissecting medium, to try to minimise shrinkage error. Type specimens, are lodged in the Dominion Museum, Wellington, and unless otherwise stated comprise a holotype female and an allotype male (both dissected and

mounted), together with paratype females and males (entire specimens preserved in alcohol). Generic determinations, both for this and future papers, were carried out with the aid of the keys in Chappuis (1929), Lang (1948), Borutskii (1952) and Dussart (1967).

DESCRIPTIONS

Family CANTHOCAMPTIDAE SARS, 1906

Genus *Attheyella* Brady, 1880

The generic diagnosis given by Lang does not require amendment. This genus is found in a variety of habitats throughout the world and several subgenera are recognised: *Delachauxiella* Brehm 1927, *Chappuisiella* Brehm 1927, *Mrazekiella* (= *Brehmiella*) Brehm 1949, *Ryloviella* Borutskii 1931, *Canthosella* Chappuis 1931 and *Attheyella* s.str. Chappuis 1928. Only *Delachauxiella* and *Chappuisiella* are found in New Zealand and these are South American and Australasian in their distribution.

KEY TO *Attheyella* SPECIES IN NEW ZEALAND

FEMALES

- 1 Exopodite leg 5 with a total of 5 setae. Anal operculum small and curved (subgenus *Chappuisiella*). 4
 Exopodite leg 5 with total of 4 setae. Anal operculum generally large and triangular (subgenus *Delachauxiella*). 2
- 2 Longest seta on basal expansion of leg 5 second from inner margin. *A. (Delachauxiella) brehmi* Chappuis 1929
 Longest seta on basal expansion of leg 5 third from inner margin. 3
- 3 Anal operculum small, arched and finely toothed. *A. (Delachauxiella) stillicidarum* sp. nov.
 Anal operculum large, triangular and strongly toothed. *A. (Delachauxiella) humidarum* sp. nov.
- 4 Terminal segment exopodite leg 4 with a total of six spines and setae *A. (Chappuisiella) fluviatilis* sp. nov.
 Terminal segment exopodite leg 4 with a total of seven spines and setae. 5
- 5 Second from outermost seta on basal expansion of leg 5 very short, scarcely reaching beyond the tip of the exopodite. Caudal ramus with a pronounced apical projection *A. (Chappuisiella) rotoruensis* sp. nov.
 Second from outermost seta on basal expansion of leg 5 short, but extending well beyond apex of exopodite. Apical projection on caudal ramus not pronounced *A. (Chappuisiella) maorica* (Brehm 1928)

MALES

- 1 Exopodite leg 5 with total of 3 setae. Exopodite leg 3 with normal spines on the outer margin. Anal operculum generally large and triangular (subgenus *Delachauxiella*). 2

- Exopodite leg 5 with total of 5 setae. Exopodite leg 3 with outer spines strongly developed. Anal operculum small and curved (subgenus **Chappuisiella**). 4
- 2 Anal operculum small, rounded and finely toothed. **A. (Delachauxiella) stillicidarum** sp. nov.
Anal operculum large, triangular and strongly toothed. 3
- 3 Central seta on exopodite of leg 5 approximately equal in length to the outermost seta. **A. (Delachauxiella) humidarum** sp. nov.
Central seta on exopodite leg 5 longer than the outermost one. **A. (Delachauxiella) brehmi** Chappuis 1929
- 4 Terminal segment exopodite leg 4 with a total of six spines and setae. **A. (Chappuisiella) fluviatilis** sp. nov.
Terminal segment exopodite leg 4 with a total of seven spines and setae. 5
- 5 Terminal segment endopodite leg 4 with two inner setae. Segments 1 and 2 of exopodite leg 3 with strongly developed spines especially the one on segment 2 which extends almost to the apex of segment 3. **A. (Chappuisiella) maorica** (Brehm 1928)
Terminal segment endopodite leg 4 with one inner seta. Segments 1 and 2 of exopodite leg 3 with spines equally strongly developed, that of segment 2 extending to insertion of the lower outer spine of segment 3. **A. (Chappuisiella) rotoruensis** sp. nov.

A. (Delachauxiella) bennetti (Brehm 1928) is not included in the above keys as the original description was not entirely adequate and the species has not been found since.

Subgenus **Delachauxiella** Brehm, 1927

Attheyella (Delachauxiella) brehmi Chappuis, 1929
= *Delachauxiella insignis* Brehm, 1928

(Fig. 1)

ADULT FEMALE: Body length usually 0.37–0.40 mm excluding caudal setae. Cephalothoracic segments bear a series of squared projections on their posterior dorsal margins; these margins on the anterior abdominal segments have a few irregular projections. Posterior ventral margins of abdominal segments with long spines. Anal operculum large, extending to the tip of the caudal rami; triangular, edged by approximately 40 small teeth, the two at the apex stouter and often directed inwards. Caudal rami short, about as broad as long, with rounded sides. Antennule eight segmented, sensory cylinder extending just beyond terminal segment. Antennal exopodite one segmented, with four setae. Mandibular palp two segmented. Endopodite leg 1 extends beyond the exopodite by a little more than the length of its own terminal segment, this latter being only slightly longer than the middle segment. Terminal segment exopodites legs 2–4 with a total of 6,7,7 setae and spines respectively. Endopodites legs 2–4 two segmented, second segments with a total of 5,6,5 setae and spines respectively. Basal expansion of leg 5 bearing six plumose setae, the longest being the second from the inner margin, the shortest the fifth, this latter reaching half the length of the sixth. Exopodite segment spined along the inner margin; the elongate inner seta, unlike the other three, is not plumose.

ADULT MALE: Body smaller than the female, 0.30–0.35 mm in length. Caudal rami small and almost square. Anal operculum with fewer, larger teeth than the female. Antennules geniculate. Leg 1 as in female. Endopodite leg 2 extending to end of second segment of exopodite; terminal segment spinose on its outer

margin, with two terminal setae, the inner slightly shorter and more plumose than the outer. Leg 3 endopodite typical of the Canthocamptidae, the process (apophysis) on segment 2 smooth, unbarbed and extending beyond the terminal seta. Endopodite leg 4 reduced, basal segment without inner seta, terminal segment with a straight, plain inner margin and a curved, spinose outer margin; three terminal setae, the middle the longest. Basal expansion leg 5 with two setae, exopodite segment with three, decreasing in length from the inner margin.

DISTRIBUTION: Mossy tarn, Mt. Rolleston, Arthur's Pass 1927 (E. W. Bennett—type locality); sphagnum swamp, Ardmore 14.5.67; restiad peat, Waikato, -.5.68 (M. Luxton); alpine tarn, Mt. Ruapehu, -.11.64 (J. G. Pendergrast, D. R. Cowley); wet, mossy bank, Rahu Saddle, Lewis Pass, 7.11.68; wet bank by Maruia Falls, Westland, 7.11.68; Margaret's Tarn, Mt. Rolleston, Arthur's Pass, 27.1.68; sphagnum, alpine tarns, Arthur's Pass, 27.1.68.

This species was first described by Brehm (1928) from specimens collected from a small tarn in a moss-bog on Mt. Rolleston, near Arthur's Pass. My own collections from this area were taken from Margaret's Tarn on the same mountain, which could well be the type locality. Brehm stated that this species was far outnumbered by *A. (Delachauxiella) bennetti*, a species which I have never found. The annal operculum of specimens referred by me to *A. (Delachauxiella) brehmi* are similar to *A. (D.) bennetti* in that the apical two spines are large and often directed inwards. However, in all other structural details they conform to *A. (D.) brehmi*, the different leg 5 of the female being the most distinctive feature. Brehm gives the length of the female, excluding caudal setae, as 0.7 mm, approximately twice the size of specimens in my collection. The use of different preservatives and mounting methods could account for a small part only of the discrepancy.

This is a moss-inhabiting species, typical of sphagnum swamps, and has an altitudinal range of from sea level to at least 950 m above sea level.

***Attheyella (Delachauxiella) bennetti* (Brehm, 1928)**

= *Delachauxiella bennettii* Brehm, 1928

ADULT FEMALE (after Brehm 1929): Body length 0.7 mm excluding caudal setae. Posterior dorsal margins of thoracic segments finely dentate. Last abdominal segment with continuous margin of spinelets on the ventral surface, the two preceding segments with this row interrupted in the middle. Anal operculum small and triangular, armed with five to seven teeth, with usually a double tooth at the apex. Caudal rami slightly longer than broad, each bearing two well developed setae of which the outer is approximately half the length of the inner. Antennule eight segmented, sensory cylinder extending beyond the terminal segment. Legs 1–4 similar to *A. (D.) brehmi*. Basal expansion of leg 5 broadly produced, with six almost equally long and sparsely haired setae.

ADULT MALE: More slender than the female, with fewer lateral teeth (usually only three) on the anal plate. Caudal rami shorter and almost square. Leg 2 endopodite has the terminal segment with one inner and two terminal setae. Apophysis of endopodite of leg 3 smooth, without barb. Terminal segment of exopodite of leg 4 with total of seven spines and setae. Exopodite segment of leg 5 with three setae of which the central is the smallest; this is only slightly smaller than the outermost.

DISTRIBUTION: Mossy tarn, Mt. Rolleston, 1927 (E. W. Bennett—type locality).

Recent collections, even in the Mt. Rolleston, Arthur's Pass area, have failed to produce this species.

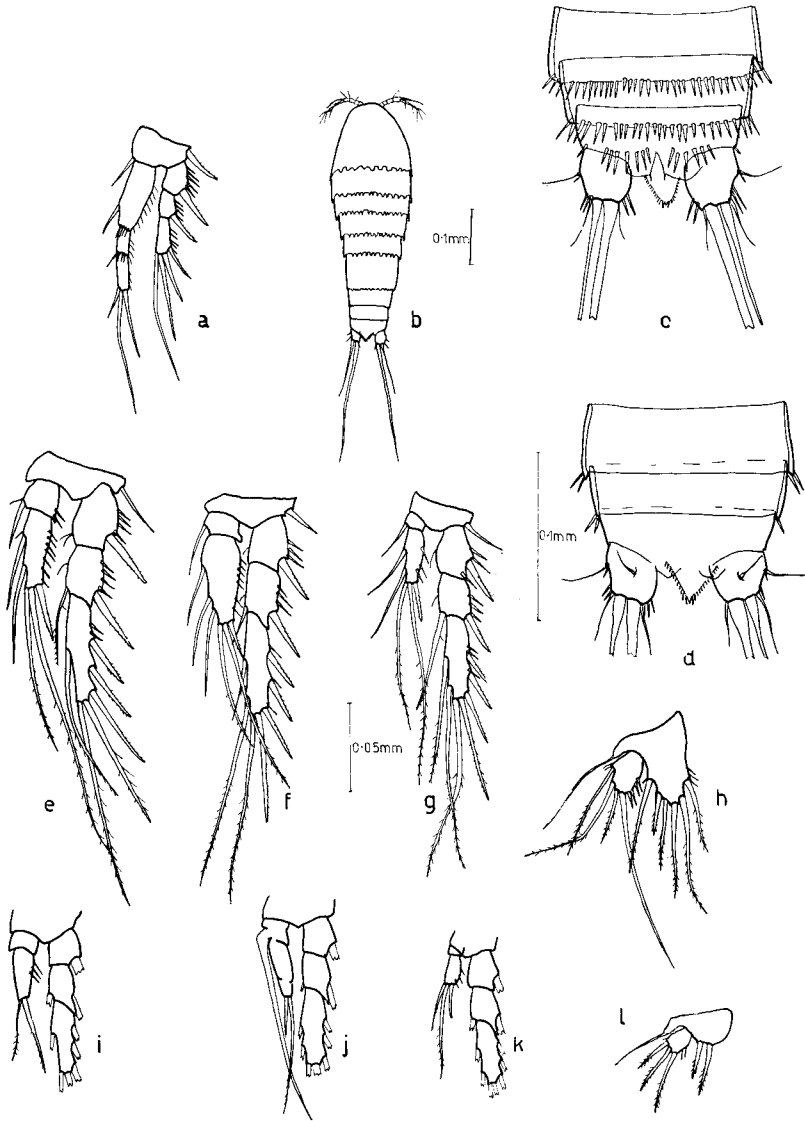


FIG. 1.—*Attheyella (Delachauxiella) brehmi* (a) Leg 1 female and male; (b) dorsal view, female; (c) posterior abdomen, female, ventral view; (d) posterior abdomen, female, dorsal view; (e)–(h) legs 2–5, female; (i)–(k) endopodites legs 2–4, male (l) leg 5, male. Scale for (a), (e)–(l) shown between (f) and (g); scale for (c) as for (d).

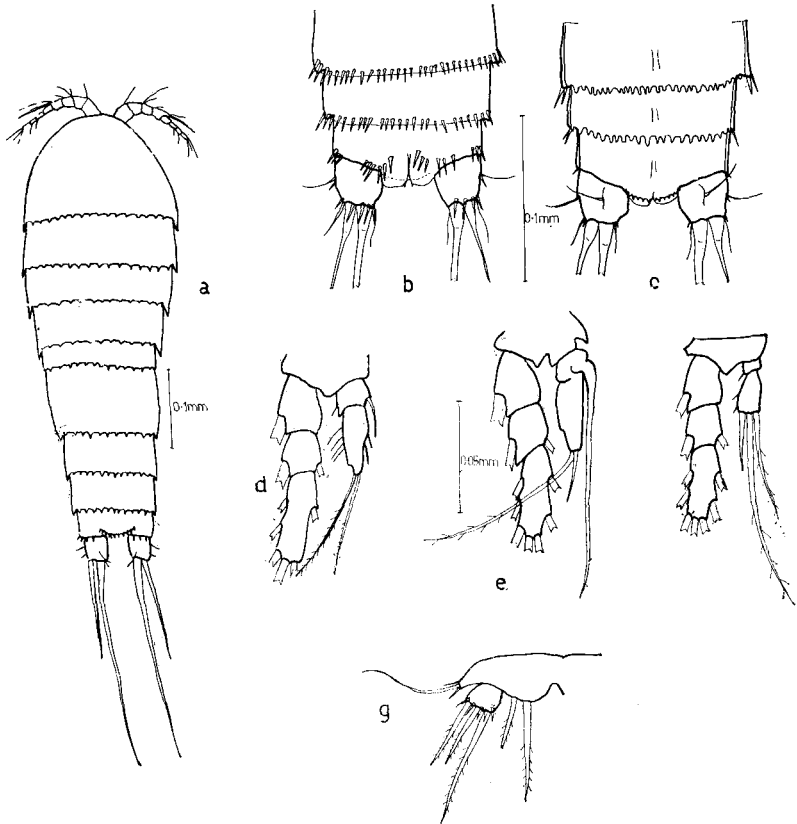


FIG. 2—*Attheyella* (*Delachauxiella*) *stillicidarum* sp. nov. (a) Dorsal view, female; (b) posterior abdomen, female, ventral view; (c) posterior abdomen, female, dorsal view; (d)–(f) endopodites legs 2–4, male; (g) leg 5, male. Scale for (d)–(g) shown beside (e).

***Attheyella* (*Delachauxiella*) *stillicidarum* sp. nov. (Figs 2–4)**

ADULT FEMALE: Body length 0.45–0.50 mm excluding caudal setae. Posterior dorsal margins of thoracic and abdominal segments with lightly serrated margins; posterior ventral margins of abdominal segments spined. Anal operculum small, rounded and finely toothed, not extending past last abdominal segment. Caudal rami short, stout, about as broad as long; outer seta about one-third the length of the median apical one. Antennule eight segmented, sensory cylinder extending beyond terminal segment. Antennal exopodite one segmented, bearing four setae. Mouthparts (fig. 3) not remarkable. Leg 1 endopodite and exopodite three segmented; endopodite segment 1 extends almost to the end of exopodite segment 3, terminal segment approximately twice as long as subterminal. Exopodites legs 2–4 three segmented, endopodites two segmented. Terminal segment endopodite legs 2–4 bearing total of 4,6,5 setae and spines respectively; terminal segments of exopodites of these legs with total of 6,7,7 setae and spines

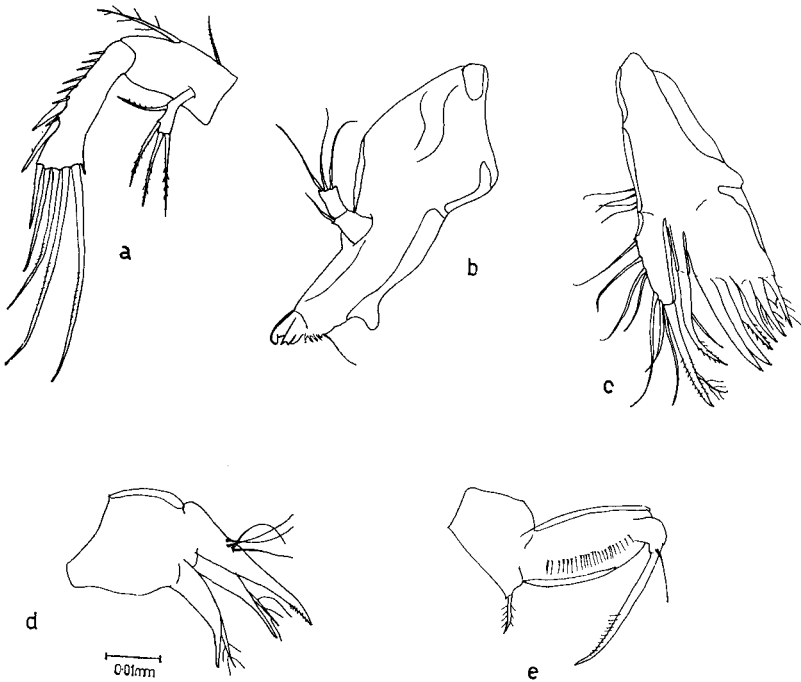


FIG. 3.—*Attheyella* (*Delachauxiella*) *stillicidarum* sp. nov. (a) Antenna; (b) mandible; (c) maxillule; (d) maxilla; (e) maxilliped. All to same scale.

respectively. Leg 5 basal expansion with six setae of which the third from the inner margin is the longest; the fifth, the shortest, is only slightly shorter than the sixth; exopodite segment bears the usual four setae, all plumose, the second from the inner margin the shortest, about half the length of the first.

ADULT MALE: Body slightly smaller and more compact than the female, about 0.35–0.40 mm in length. Caudal rami small and rounded, Antennules geniculate. Mouthparts and leg 1 as in female. Terminal segment endopodite leg 2 narrowed at the tip, with two setae, the inner slightly shorter than the outer; the outer margin of the segment is notched near the apex. Endopodite leg 3 modified as a copulatory organ, apophysis equalling twice the length of the entire endopodite; two terminal setae, the inner short, the outer extending just beyond the tip of the apophysis. Endopodite leg 4 reduced, inner seta on the basal segment lost, terminal segment with one outer spine and two apical setae. Leg 5 basal expansion with two stout setae, the inner the longest; exopodite segment bearing three setae, the inner the longest, the middle one the shortest.

DISTRIBUTION: Dripping mossy bank, Nihotupu Reservoir, Waitakere Ranges, Auckland, 3.6.68 (type locality); moss on falls face, Cascades, Waitakere Ranges, -5.66 (J. A. McLean); moss on Glen Ness Falls, Piha, Auckland, -5.66 (R. McCombie); stream moss, Wairoa Gorge, Clevedon, 20.11.66, 29.3.68; weedy tributary, Whangaehu River, 19.1.65 (D. R. Cowley); Jack's Stream, Chateau Tongariro, 19.1.65 (D. R. Cowley); liverwort and moss, Reid's Creek, Ohakune, 27.11.68 (D. R. Cowley); stream moss, Ohika, 8.2.65 (D. R. Cowley); weedy stream, Ikumatua, 25.6.66 (I. McLellan); dripping mossy bank, Mt. Hercules, Westland, 10.11.68; moss in a small stream near Lake Matheson, Westland, 11.11.68; moss, Roaring Meg Stream, Cromwell, -12.67 (M. A. Chapman).

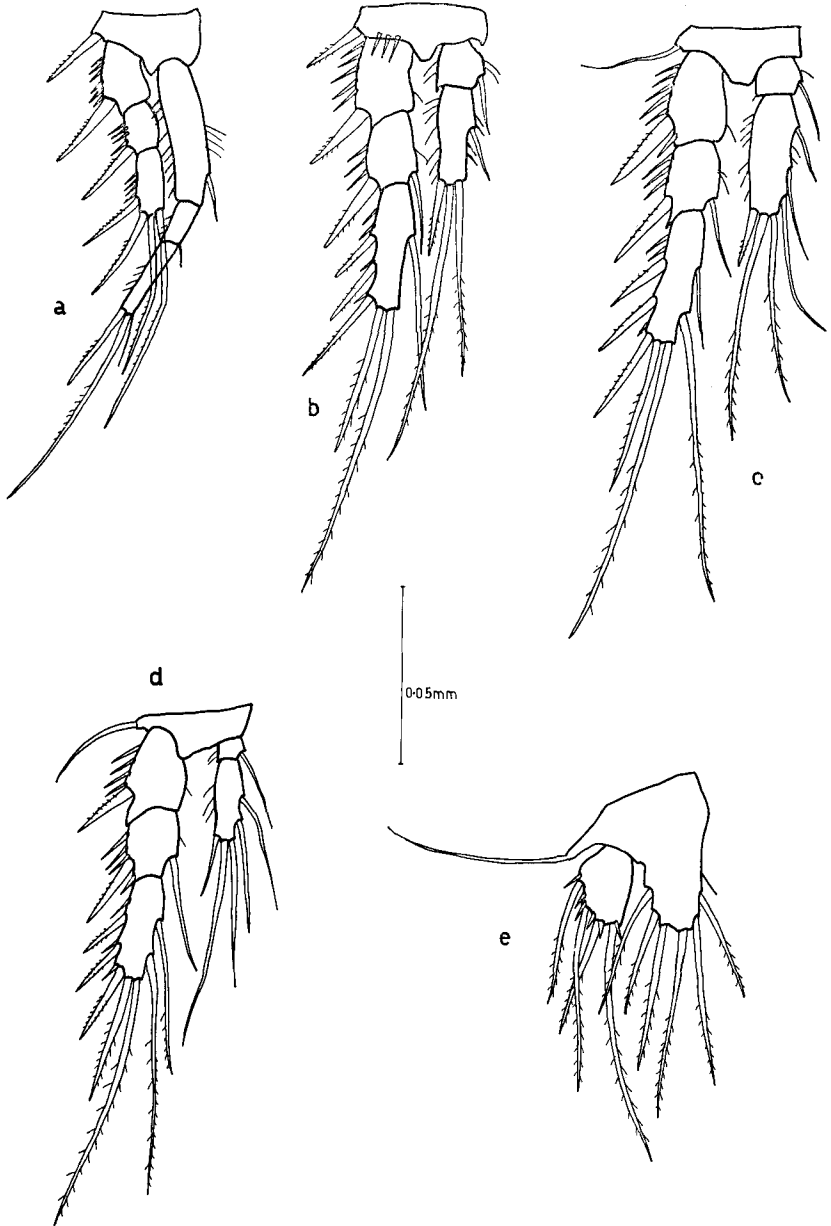


FIG. 4—*Attheyella* (*Delachauxiella*) *stillicidarum* sp. nov. (a)–(e) Legs 1–5, female. All to same scale.

TYPE LOCALITY: The type specimens were taken from wet moss on a permanently dripping bank alongside the Nihotupu Reservoir in the Waitakere Ranges, near Auckland (grid reference: 090484 NZMS 1 sheet N41), from approximately 215 m above sea level.

This species is relatively common, with a marked preference for either permanently dripping mossy banks or mossy areas in the splash zone of rocky-based streams. Moving water appears to be an essential condition for this animal and for this reason I have given it the specific name *stillicidarum*—of dripping waters.

Attheyella (Delachauxiella) humidarum sp. nov. (Figs 5, 6)

ADULT FEMALE: Average body length 0.4 mm excluding caudal setae. Posterior dorsal margins of thoracic and abdominal segments slightly notched; ventral margins of abdominal segments spined at the edges only. Anal operculum large, extending to the tips of the caudal rami, triangular, with numerous evenly-sized teeth. Caudal rami short and rounded, outer apical seta just over one-third the length of the median apical one, these both with stout bases. Antennules, antennae and mouthparts as for the previous species. Exopodites legs 1–4 three segmented. Leg 1 endopodite three segmented, segment 1 extending to half the length of exopodite segment 3; segment 2 only slightly shorter than segment 3. Endopodites legs 2–4 two segmented, terminal segments bearing a total of 4,6,5 spines and setae respectively. Terminal segments of exopodites with total of 6,7,7 spines and setae. Basal expansion of leg 5 with six plumose setae of which the longest is the third from the inner margin, and the shortest the fifth, this being only one-third the length of the sixth; segmental exopodite with four setae, the inner longest one smooth, the rest plumose.

ADULT MALE: Body smaller than the female, averaging 0.35 mm in length. Caudal rami slightly shorter, anal operculum with larger teeth at the apex. Antennules geniculate. Leg 1 as in female. Endopodites legs 2–4 essentially the same as in *A. (D.) stillicidarum*. Basal expansion leg 5 with two stout setae; exopodite segment with three, the innermost the longest, the middle only slightly longer than the outer; these latter setae attain approximately two-thirds the length of the innermost one.

DISTRIBUTION: Dripping mossy bank alongside Nihotupu Reservoir, Waitakere Ranges, Auckland, 24.9.67 (type locality); damp bush moss, Mt. Moehau, Coromandel Peninsula, -1.60 (J. G. Pendergrast); damp bush moss, Mamaku hills, Rotorua, 14.9.69.

TYPE LOCALITY: As with the preceding species, the type specimens were taken from samples of wet moss removed from a dripping bank alongside the Nihotupu Reservoir in the Waitakere Ranges, 215 m above sea level.

This appears to be a species of restricted distribution and has been recorded from only three localities. It can be distinguished from *A. (D.) stillicidarum*, with which it has been found, by the structure of the anal operculum, the exopodite of leg 1 and the female fifth leg, and from *A. (D.) brehmi* by the structure of the female leg 5.

The specific name refers to the fact that the species is found in moist or damp places.

DOUBTFUL SPECIES

Canthocamptus misogynus Brehm, 1928

This species was described by Brehm from a single male. From his diagrams it definitely appears to belong to the subgenus *Delachauxiella*,

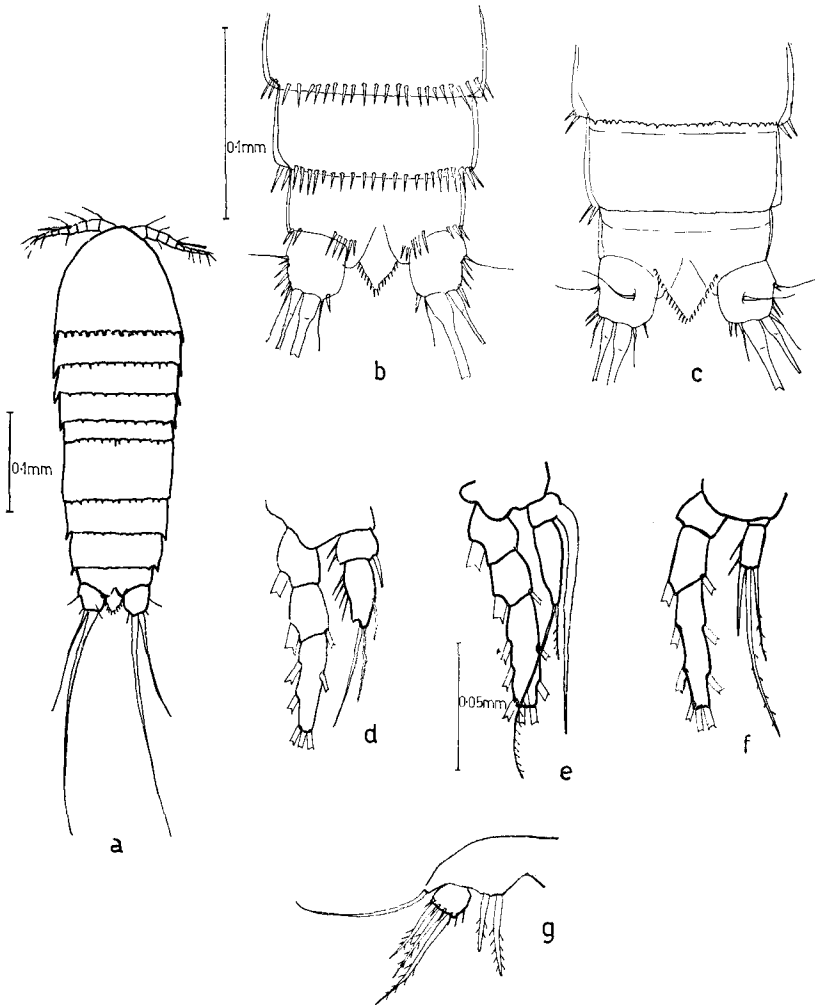


FIG. 5—*Attheyella* (*Delachauxiella*) *stillicidarum* sp. nov. (a) Dorsal view, female; (b) posterior abdomen, female, ventral view; (c) posterior abdomen, female dorsal view; (d)–(f) endopodites legs 2–4, male; (g) leg 5, male. Scale for (c) as for (b); Scale for (d)–(g) shown beside (e).

but extensive collecting in the Mt. Rolleston area has failed to reveal the animal. In that the anal operculum is rounded, the species resembles *A. (D.) stillicidarum*, although some leg setation and its habitat are different; *A. (D.) stillicidarum* has been found only in slightly flowing water.

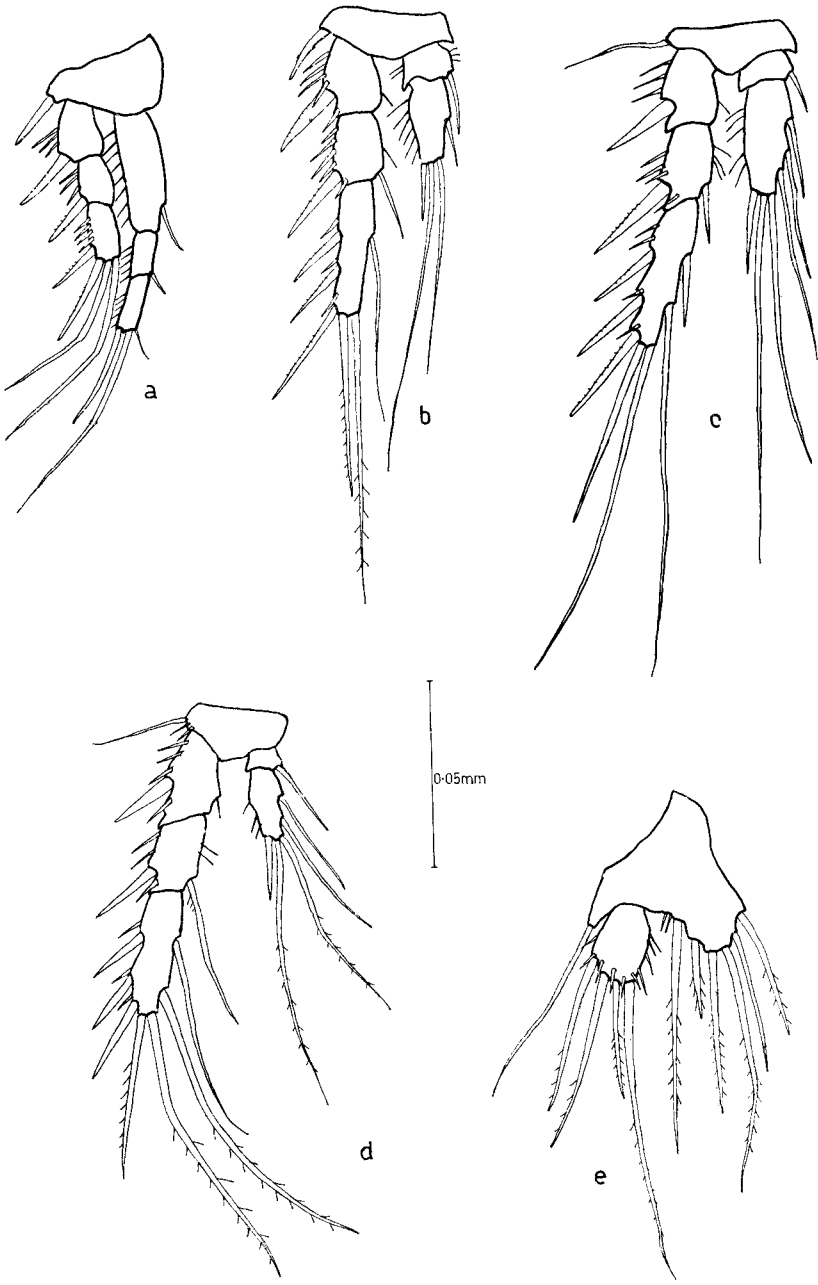


FIG. 6—*Attheyella* (*Delachauxiella*) *humidarum* sp. nov. (a)–(e) Legs 1–5, female. All to same scale.

Subgenus **Chappuisiella** Brehm, 1927

The subgeneric diagnosis given by Lang (1948) does not require amendment. The subgenus occurs in South America, Indo-Malaya (Sumatra, Java), Australia and New Zealand.

Atthyella (Chappuisiella) maorica (Brehm, 1928) (Fig. 7)
= *Canthocamptus maoricus* Brehm, 1928

ADULT FEMALE: Body length 0.60–0.65 mm excluding caudal setae. Posterior dorsal margins of thoracic segments smooth; slight notches on posterior margins of abdominal segments; lateral spines on ventral margins of abdominal segments, these extending around the sides of the body for a short distance. Anal operculum rounded, bordered by 25–30 fine spinules. Caudal rami about twice as long as broad; flange present, running from the swollen base of the median apical seta to the outermost anterior corner of the ramus, just above the insertion of the anterior lateral seta; inner border of the ramus smooth. Antennule eight segmented, sensory cylinder not extending beyond terminal segment. Antennal exopodite one segmented with four setae. Leg 1 exopodite and endopodite three segmented, endopodite extending beyond exopodite by almost the complete length of its terminal segment. Endopodites legs 2–4 two segmented, terminal segments bearing total of 5,6,5 spines and setae respectively. Exopodites legs 2–4 three segmented, terminal segments with total of 6,7,7 spines and setae respectively. Basal expansion leg 5 with six setae, the second from the outermost the smallest, almost half the size of the outermost: exopodite segment with five plumose setae of which the second from the inner margin is the longest; long marginal hairs are present on the inner surface.

ADULT MALE: Smaller than the female, 0.50–0.55 mm. Posterior dorsal margins of thoracic segments smooth, those of abdominal segments slightly notched, as in female. Ventral margins of the posterior abdominal segments with a continuous row of heavy spines. Anal operculum as in female. Caudal rami without flange of female and inner margins hairy. Antennules geniculate. Leg 1 as in female. Endopodites legs 2–4 modified: terminal segment of leg 2 with four setae; leg 3 modified as a copulatory organ, apophysis extending over twice the length of the entire endopodite; terminal segment leg 4 with total of five spines and setae. Outer spines of basal two segments of leg 3 exopodite exceptionally stout, that of segment 2 extending almost to tip of segment 3. Apical spine of exopodite segment 3 of leg 4 stout, with approximately 10–12 barbs. Basal expansion leg 5 with two setae, exopodite segment with five, the second and third from the inner margin the longest, of approximately equal length, the first, fourth and fifth about half the length of these.

DISTRIBUTION: Tarn on Mt. Rolleston, Arthur's Pass, 1927 (E. W. Bennett—type locality); sphagnum moss, Arthur's Pass, 27.1.68.

This species was erected by Brehm on the basis of a single male. Males collected from the same locality agreed fairly well with his descriptions, except in the structure of the caudal rami: Brehm's individual appears to have had slightly longer rami with bare inner margins. However, it seems reasonable to assume that the later specimens are examples of *A. (C.) maorica*.

The species is not common—as far as is known it is restricted to the mossy tarns in the Arthur's Pass area of the South Island.

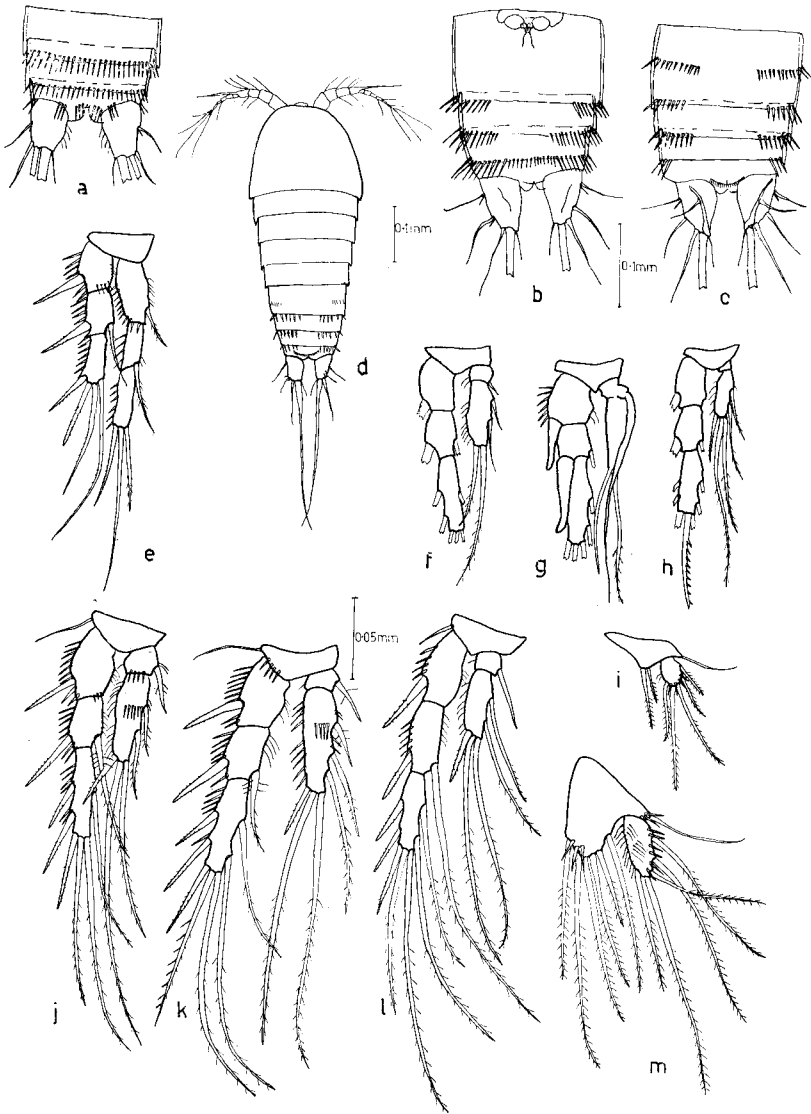


FIG. 7.—*Attheyella* (*Chappuisiella*) *maorica*. (a) Posterior abdomen, male, ventral view; (b) posterior abdomen, female, ventral view; (c) posterior abdomen, female, dorsal view; (d) dorsal view, female; (e) leg 1, female, male; (f)–(h) endopodites legs 2–4, male; (i) leg 5, male; (j)–(m) legs 2–5, female. Scale for (a) as for (b) and (c); scale for (e)–(m) shown between (k) and (l).

Attheyella (Chappuisiella) fluviatilis sp. nov.

(Figs 8, 9)

ADULT FEMALE: Slightly smaller than *A. (C.) maorica*, 0.50–0.52 mm in length excluding the caudal setae. Posterior dorsal margins of thoracic segments smooth, those of abdominal segments smooth centrally, with several large spines on the outer edges. Posterior ventral margins of abdominal segments spinose, larger spines laterally, small ones centrally. Anal operculum small, rounded, with fine hairs on the margin. Caudal rami short, almost as broad as long, with a dorsal protuberance bearing the dorsal seta; outer apical seta with an expanded base. Antennule eight segmented, sensory cylinder extending just beyond the terminal segment. Exopodite segment of the antenna with four setae. Mouthparts normal. Leg 1 exopodite and endopodite three segmented, endopodite segment 2 not quite reaching tip of exopodite segment 3. Endopodite legs 2–4 two segmented, terminal segments bearing a total of 5,6,6 spines and setae respectively. Exopodites legs 2–4 three segmented, bearing total of 6,7,6 spines and setae respectively. Basal expansion of leg 5 with six plumose setae, the second from the outer being only slightly shorter than the outermost one; exopodite segment with five setae, the innermost the shortest.

ADULT MALE: Body shorter and more compact than the female, 0.45 mm in length. Armature of body segments similar to the female except that the ventral abdominal segments have a regular posterior row of spines along their margins. Caudal rami of similar shape, with hairy inner margins. Antennules geniculate. Endopodites legs 2–4 modified: leg 2 terminal segment with four setae and a spinose outer margin; leg 3 apophysis reaching only two-thirds the length of the stout terminal seta; leg 4 basal segment without inner spine, terminal segment with five setae, two being present on the inner margin, the more basal about twice the length of the other. Exopodite segment 2 of leg 3 with a strongly developed outer spine, extending two-thirds the length of the terminal segment; segment 3 with terminal spine strongly developed and armed with three stout barbs. Leg 5 typical of the subgenus, with two setae on the basal expansion, the inner twice the length of the outer; endopodite segment with five setae of which the second from the inner margin is by far the longest; the outer margin of the segment is spinose.

DISTRIBUTION: Moss alongside stream, Wairoa Gorge, Clevedon, 20.11.66 (type locality); moss beside Glen Ness Falls, Piha -.5.66 (R. McCombie); moss on wet bank, Nihotupu Reservoir, Waitakere Ranges, Auckland, 24.9.67, 3.6.67; moss beside falls, Lake Rotowhero, Rotorua, 20.4.67; moss above Huka Falls, Taupo, 19.1.68; liverwort and moss, Reid's Creek, Ohakune, 27.11.68 (D. R. Cowley); sand, Big Hole, Five Forks, Oamaru, 30.11.66 (C. McLay); creek off road to Arthur's Point, Oamaru, 29.11.66 (C. McLay); moss alongside stream, Avalanche Track, Arthur's Pass, 27.1.68; moss, Roaring Meg stream, Cromwell, -.12.67 (M. A. Chapman).

TYPE LOCALITY: The type specimens came from moss on splashed rocks alongside the Wairoa River in the Clevedon Valley, twenty miles south of Auckland (grid reference: 585391 NZMS 1 sheet N43).

This appears to be a predominantly moss-inhabiting species of the splash zone of streams (hence the specific name '*fluviatilis*'—stream inhabiting), and is distributed throughout the country. It can be distinguished from *A. (C.) maorica* most easily by the number of spines on segment 3 of the exopodite of leg 4: in *A. (C.) maorica* a total of seven spines and setae are present on this segment, but in *A. (C.) fluviatilis* there are only six, one outer spine being absent. Other distinguishing features are the proportionately shorter leg 2 endopodite, and the greater length of the smallest seta on the basal expansion of leg 5 of the female of *A. (C.) fluviatilis*.

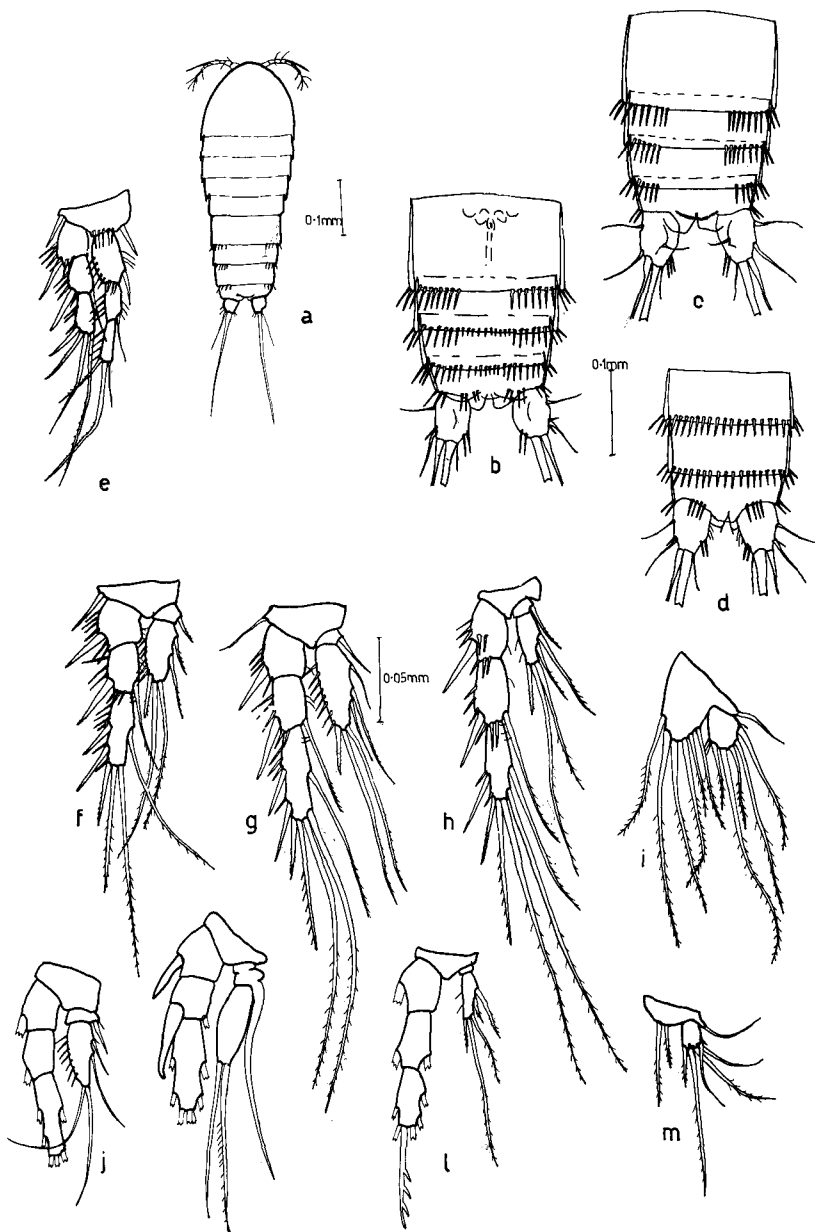


FIG. 8—*Attheyella* (*Chappuisiella*) *fluviatilis* sp. nov. (a) Dorsal view, female; (b) abdomen, female ventral view; (c) abdomen, female, dorsal view; (d) posterior abdomen, male, ventral view; (e)–(i) legs 1–5, female; (j)–(l) endopodites, legs 2–4, male; (m) leg 5, males. Scale for (e)–(m) shown beside (g).

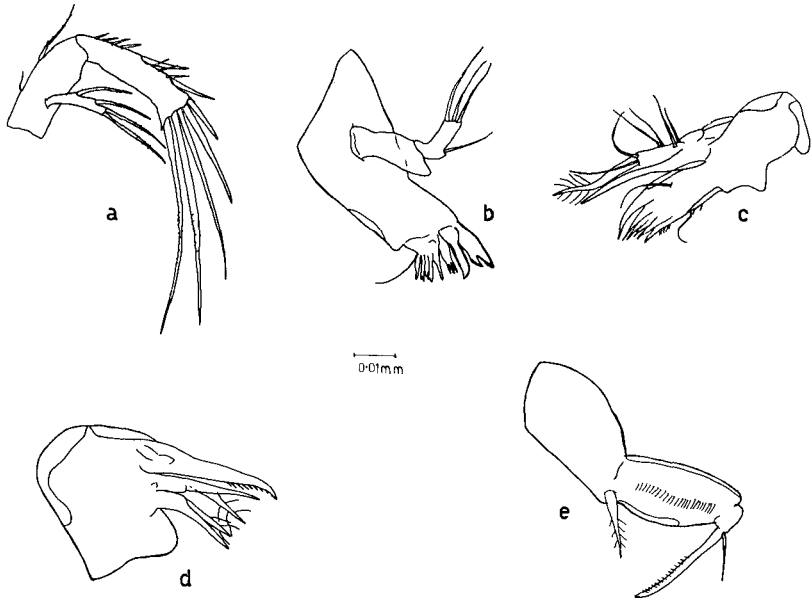


FIG. 9—*Atttheyella (Chappuisiella) fluviatilis* sp. nov. (a) Antenna; (b) mandible; (c) maxillule; (d) maxilla; (e) maxilliped. All to same scale.

***Atttheyella (Chappuisiella) rotoruensis* sp. nov.**

(Fig. 10)

ADULT FEMALE: Body length, excluding caudal setae, usually 0.50–0.55 mm. Posterior dorsal margins of thoracic segments with a few slight serrations, those of abdominal segments with very slight serrations and several strong, lateral spines. Ventral margins of abdominal segments similar to the dorsal except the last segment which bears spines along its entire margin. Anal operculum small, rounded, with fine hairs along the margin. Caudal rami short, longer along the inner margin than the outer, with a projection over the base of the median apical seta. Antennule eight segmented, sensory cylinder extending just beyond the terminal segment. Leg 1 endopodite and exopodite three segmented, endopodite segment 2 reaching to end of exopodite segment 3. Endopodites legs 2–4 two segmented, second segment with a total of 5,6,5 spines and setae respectively. Exopodites legs 2–4 three segmented, bearing total of 6,7,7 spines and setae respectively. Basal expansion of leg 5 with six plumose setae, the second from the outermost being very short, about one-third the length of the outermost; exopodite segment with five setae, the inner margin furnished with long, fine spinules.

ADULT MALE: Shorter in length than the female, about 0.48 mm long. Armature of body segments differs also: posterior ventral margins are spined along their entire lengths. Caudal rami without the projection present in the female, inner margins lightly hairy. Antennules geniculate. Endopodites legs 2–4 modified: segment 2 of leg 2 with a total of four spines and setae, two on the inner margin, two terminal; leg 3 endopodite with apophysis not quite extending as far as the tip of the terminal seta; endopodite leg 4 terminal segment bearing four setae. Outer spines exopodite segments 1 and 2 of leg 2 stout, that of segment 2 extending just beyond insertion of anterior outer spine of segment 3. Terminal spine of

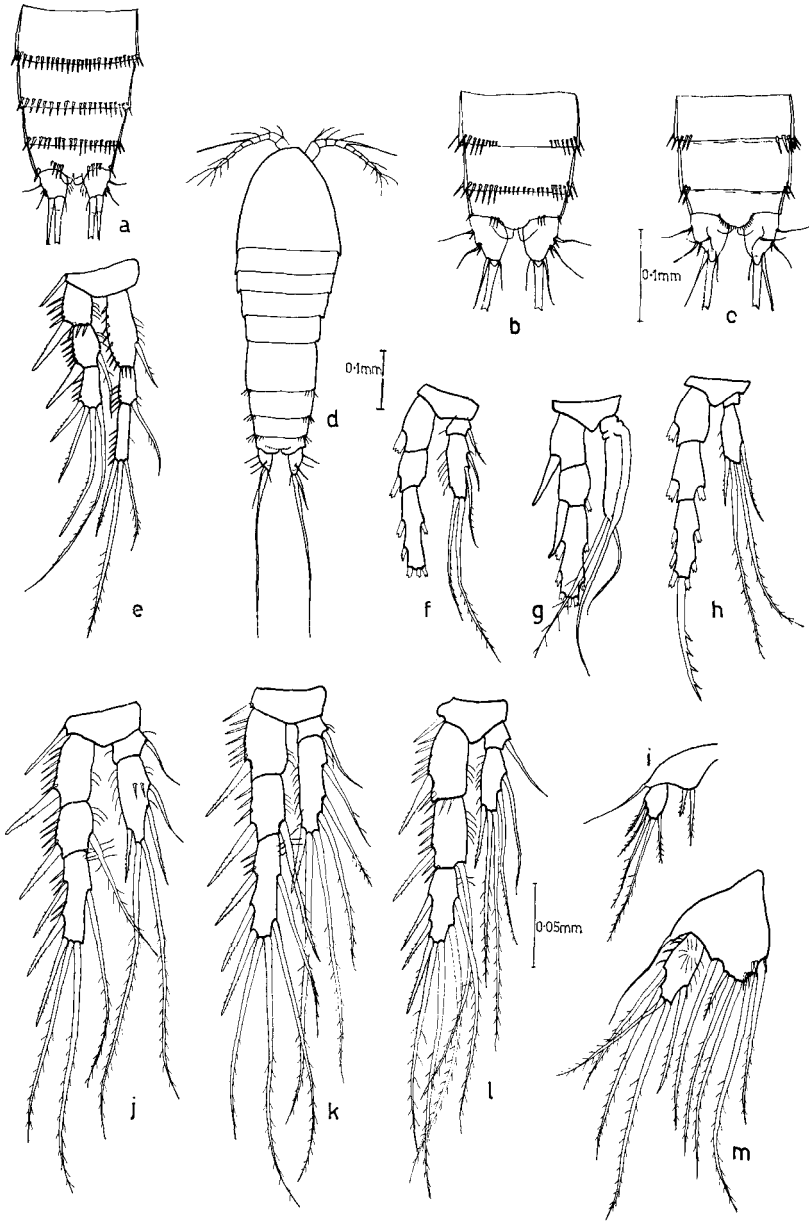


FIG. 10—*Attheyella* (*Chappuisiella*) *rotoruensis* sp. nov. (a) Posterior abdomen, male, ventral view; (b) posterior abdomen, female, ventral view; (c) posterior abdomen, female, dorsal view; (d) dorsal view, female; (e) leg 1, female, male; (f)–(h) endopodites legs 2–4, male; (i) leg 5, male; (j)–(m) legs 2–5, female. Scale for (a) as for (b) and (c); scale for (e)–(m) shown beside (l).

exopodite segment 3 of leg 4 stout, with from four to six strong barbs. Leg 5 basal expansion with two setae, exopodite segment with five, the second from the innermost the longest.

DISTRIBUTION: Plankton hauls, Lake Rotoiti, Rotorua, 3.1.68, 13.2.68, 5.5.68, 5.12.68 (G. R. Fish, M. A. Chapman); plankton hauls, Lake Rotorua, 9.5.67, 5.12.67, 20.8.68, (G. R. Fish, M. A. Chapman).

TYPE LOCALITY: The type specimens were taken in a plankton haul in Lake Rotoiti, Rotorua, from a depth of 42 m (grid reference: 845185 NZMS 1 sheet N76).

This species has only been recorded from the two Rotorua lakes (in which an extensive sampling programme has been carried out) and is probably not confined to them. As it has only been found on infrequent occasions, and since the species has not been present in littoral samples, it is probably a benthic form.

Attheyella (*Chappuisiella*) *rotoruensis* can be distinguished from the closely related *A. (C.) maorica* by the structure of the exopodite of leg 3 and the endopodite of leg 4 of the male: the outer spine on segment 2 of the exopodite of leg 3 is only half the length of its equivalent in *A. (C.) maorica* and the terminal segment of the endopodite of leg 4 bears four setae as opposed to the five of the latter species. The females are best distinguished by the presence of the strong projection on the caudal ramus and by the extremely short smallest seta on the basal expansion of leg 5 of *A. (C.) rotoruensis*.

Genus *Elaphoidella* Chappuis, 1929

For a generic description see Lang (1948). This is a world wide genus with many species. It is closely related to *Attheyella*, particularly to the subgenus *Chappuisiella*, however the differing structure of the fifth leg is generally considered to be sufficient to give it generic, rather than subgeneric status.

***Elaphoidella bidens* (Schmeil, 1894)**

(Fig. 11)

= *Attheyella coronata* Sars, 1904

ADULT FEMALE: Body length 0.45–0.50 mm, excluding caudal setae. Posterior dorsal margins of segments serrate, ventral margins of abdominal segments spinose. Anal operculum small, rounded with about a dozen teeth. Caudal rami rectangular, almost twice as long as broad, with several hairs on the inner margins; dorsal surface has a longitudinal chitinous comb, bearing the dorsal seta. Antennules eight segmented, sensory cylinder extending just beyond the terminal segment. Antennal exopodite of one segment, with four setae. Exopodites legs 1–4 three segmented, terminal segments bearing total of 4,5,6,6 spines and setae respectively. Endopodite leg 1 three segmented, extending beyond exopodite by about two-thirds the length of the terminal segment; basal segment equal in length to the basal two segments of the exopodite. Legs 2–4 endopodites two segmented, basal segments of legs 2 and 3 with an inner spine, this latter not present on leg 4; terminal segments with a total of 5,6,4 spines and setae respectively. Basal expansion of leg 5 with four plumose setae, the outermost the shortest; exopodite segment oval, spinose on the inner and outer margins and bearing five setae.

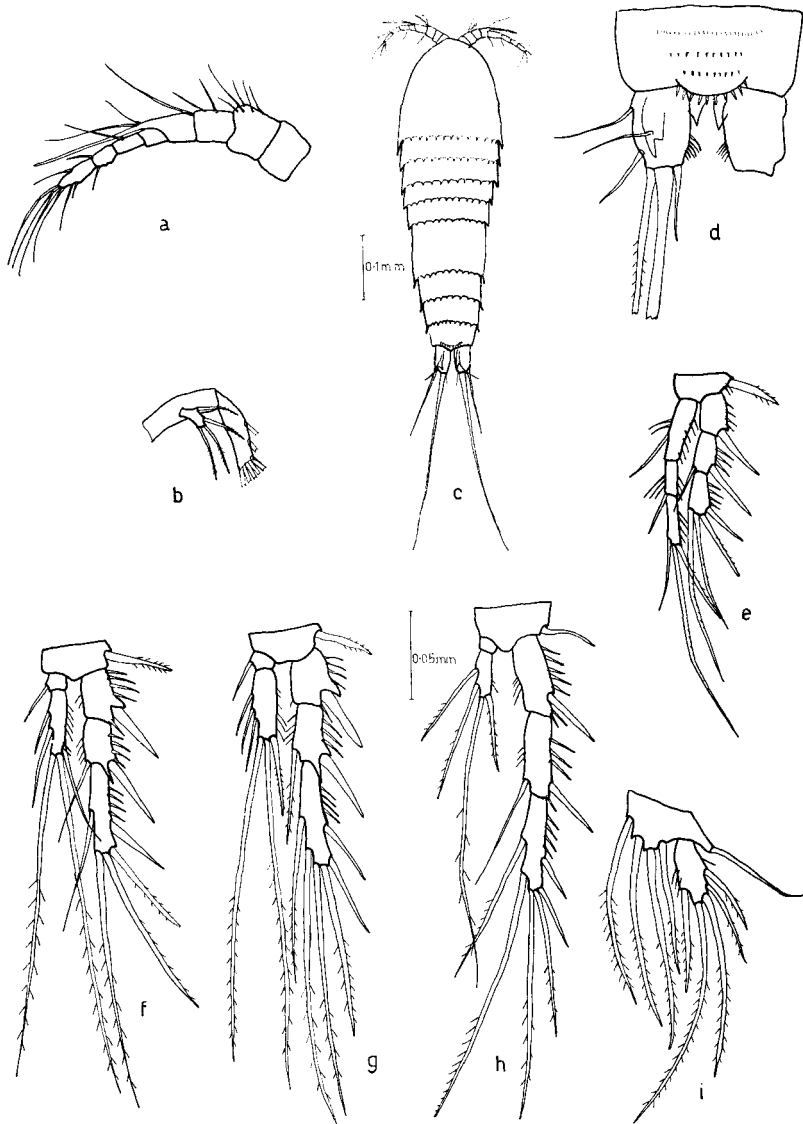


FIG. 11—*Elaphoidella bidens*, female. (a) Antennule; (b) antennal exopodite; (c) dorsal view; (d) caudal ramus; (e)–(i) legs 1–5. Scale for (a), (b), (d)–(i) shown between (g) and (h).

DISTRIBUTION: Cosmopolitan; recorded from Europe, Asia, North and South America and many Pacific Island groups. In New Zealand; edge of Lake Tomarata, Leigh, 11.5.66; edge of Lake Rototoa, South Kaipara, 10.3.69, (M. A. Chapman); Auxiliary Nihotupu Reservoir, Waitakere Ranges, Auckland, 3.4.68, (J. Green); Western Springs, Auckland, 5.9.63; farm pond, Whitford, 4.3.63; farm pond, Papatoetoe, 19.9.65; edge of Lake Waikare, Te Kauwhata, 18.8.68. Lake Kimihia, Huntly, 16.6.68; Lake Rotorua, Hamilton, 3.5.68, (M. A. Chapman); Lake Karapiro, Cambridge, 16.1.69, (M. A. Chapman); swamp beside Lake Okareka, Rotorua, 20.4.67; Lake Tutaeinanga, Rotorua, 3.4.70; Lake Rotokakahi, Rotorua, -4.70 (V. H. Jolly); Lake Okaro, Rotorua, 16.3.71 (V. H. Jolly); Ohakuri dam; Waikato River, 11.5.67, (F. Hill).

This common animal has a distinct preference for the littoral areas of larger bodies of water, a habitat rarely occupied by other New Zealand harpacticoid species. Its absence from South Island samples is probably not significant, because of less extensive collecting in the more usual habitats. Males have not yet been found in this country. Parthenogenesis has been described by Roy (1931) and, although males have been discovered (Chappuis 1931), they are apparently extremely rare in their occurrence.

***Elaphoidella silvestris* sp. nov.**

(Figs 12–14)

ADULT FEMALE: Body length 0.52–0.55 mm, excluding caudal setae. Dorsal posterior margins of thoracic and abdominal segments dentate; ventral posterior margin of genital segment smooth, of the following segment smooth except for a group of four spinules on the lateral margins; the subterminal segment has spinules arranged in small groups and the anal segment is spinose around the bases of the caudal rami. Anal operculum more or less triangular, with a rounded apex, and extends half the length of the caudal rami. Rami rounded, more so on the outer margins, a little longer than broad; chitinous comb, bearing the dorsal seta, is well developed with a terminal tooth; two lateral setae, the posterior twice as long as the anterior; inner margins of rami with a row of small spines on the anterior half, these decreasing in size posteriorly. Antennule short, first four segments strongly developed, terminal four small and compact. Antennal exopodite one segmented, bearing four setae. Leg 1 exopodite and endopodite three segmented, endopodite only slightly longer than exopodite. Exopodites legs 2–4 three segmented, terminal segments with a total of 5,6,6 spines and setae respectively. Legs 2–4 endopodites two segmented, terminal segments with a total of 4,5,3 spines and setae respectively; leg 2 basal segment with an inner protuberance and no inner seta, segment 2 narrow and elongate; terminal segment leg 4 with three setae, more or less terminal in position. Basal expansion of leg 5 with four long, plumose setae, of approximately equal length; exopodite segment with four unadorned setae, the second shorter than the rest, about half the length of the innermost one; one spine is present on the inner margin of the segment.

ADULT MALE: Smaller than the female, 0.5 mm in length. Posterior dorsal margins of segments serrate, ventral margins of abdominal segments sparsely spined. Anal operculum as in female. Outer margins of caudal rami angular, tapering from the anterior lateral seta to the apical setae; the more posterior lateral seta long and stout, directed ventrally at an angle of almost 90° to the axis of the ramus; no spines on the inner margin. Antennule strongly geniculate, fourth segment greatly enlarged. Endopodites legs 2–4 modified: leg 2 elongate, terminal segment extending to two-thirds the length of the terminal segment of the exopodite and bearing four setae; leg 3 modified as a copulatory organ, the apophysis extending just beyond terminal segment of the exopodite and barbed at the tip; leg 4 basal segment without an inner seta. Exopodite leg 3 with a peculiar spine-like projection on the outer posterior margin of segment 2. Basal expansion of leg 5 without setae, segmental exopodite with three, decreasing in length from the innermost one out.

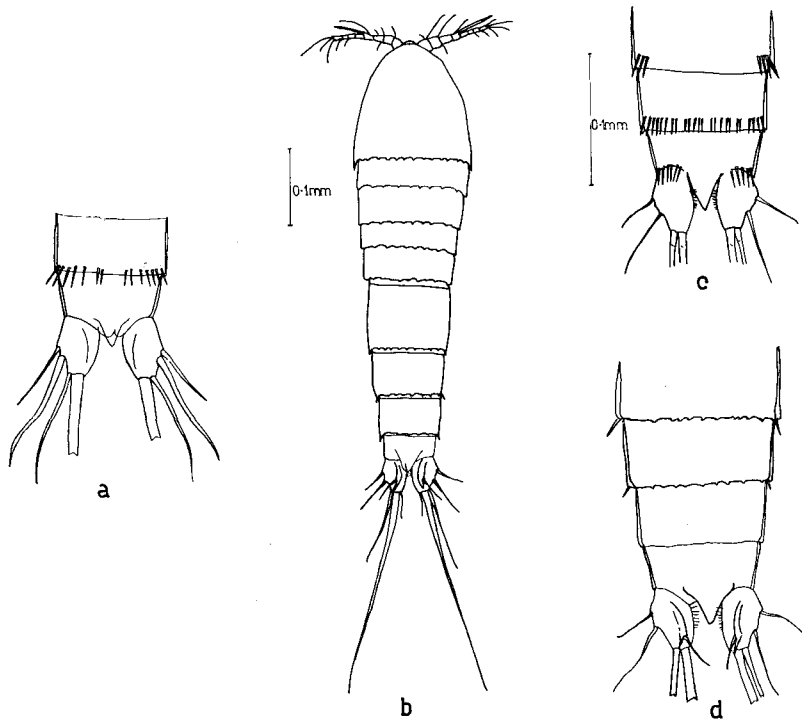


FIG. 12—*Elaphoidella silvestris* sp. nov. (a) Posterior abdomen, male, ventral view; (b) dorsal view, female; (c) posterior abdomen, female, ventral view; (d) posterior abdomen, female, dorsal view. Scale for (a) and (d) as for (c).

DISTRIBUTION: Forest moss, Mamaku Hills, Rotorua, 18.7.68, (J. G. Pendergrast—type locality), 14.9.68; wet, mossy bank, Nihotupu Reservoir, Waitakere Ranges, 3.6.68; forest moss, Shenandoah Saddle, Lewis Pass, 7.11.68; wet bank, Mt. Hercules, Westland, 10.11.68; forest moss, Franz Joseph Glacier, 10.11.68.

TYPE LOCALITY: Type specimens were taken from a sample of damp moss removed from the trunks of fallen trees in the forest on the Mamaku Hills, just off State Highway 5, approximately 566 m above sea level (grid reference: 415200 NZMS 1 sheet N66)

This species is found amongst damp moss close to, or on the forest floor. However, it appears to be limited to the damper conditions that prevail in the higher altitude bush areas of the North Island and the typical dripping-wet forest of the West Coast of the South Island.

The specific name relates to the peculiar terrestrial forest habitat of the species.

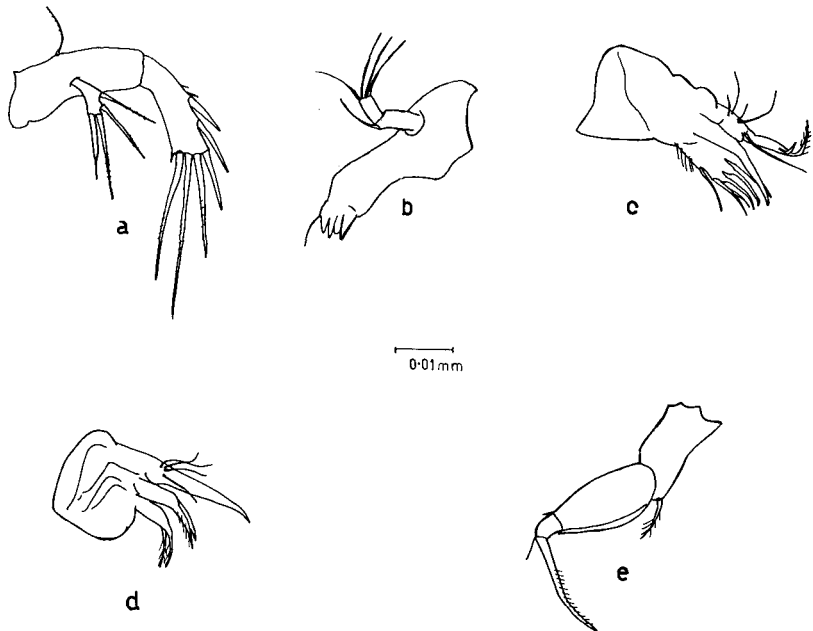


FIG. 13—*Elaphoidella silvestris* sp. nov. (a) Antenna; (b) mandible; (c) maxillule; (d) maxilla; (e) maxilliped. All to same scale.

DISCUSSION

The New Zealand specimens of *Attheyella* are obviously very closely related, the species of each subgenus differing from one another in only the smallest details, and species divergence can therefore be assumed to be fairly recent in origin. From their geographical distribution it is evident that the two subgenera *Delachauxiella* and *Chappuisiella* originated in the vicinity of the Antarctic when this region had connections with both South America and Australasia. Of the known Australian mainland examples, the only species with an adequate description available, *A. (C.) australica* Sars, 1908 (specimens of which were sent to me for examination from Lake Purrumbete by Mr B. V. Timms), is closely related to the New Zealand examples of *Chappuisiella*, particularly *A. (C.) maorica*. Two Tasmanian species of *Delachauxiella*, *A. (D.) salvatoris* and *A. (D.) incerta* (Brehm, 1953), also appear close to New Zealand forms but the descriptions are not sufficiently adequate for close comparisons to be made. One common factor shared by the Australian species and our New Zealand ones is that the second from outermost seta on the basal expansion of the female leg 5 is the shortest, while in the South American examples it is the outermost seta. However,

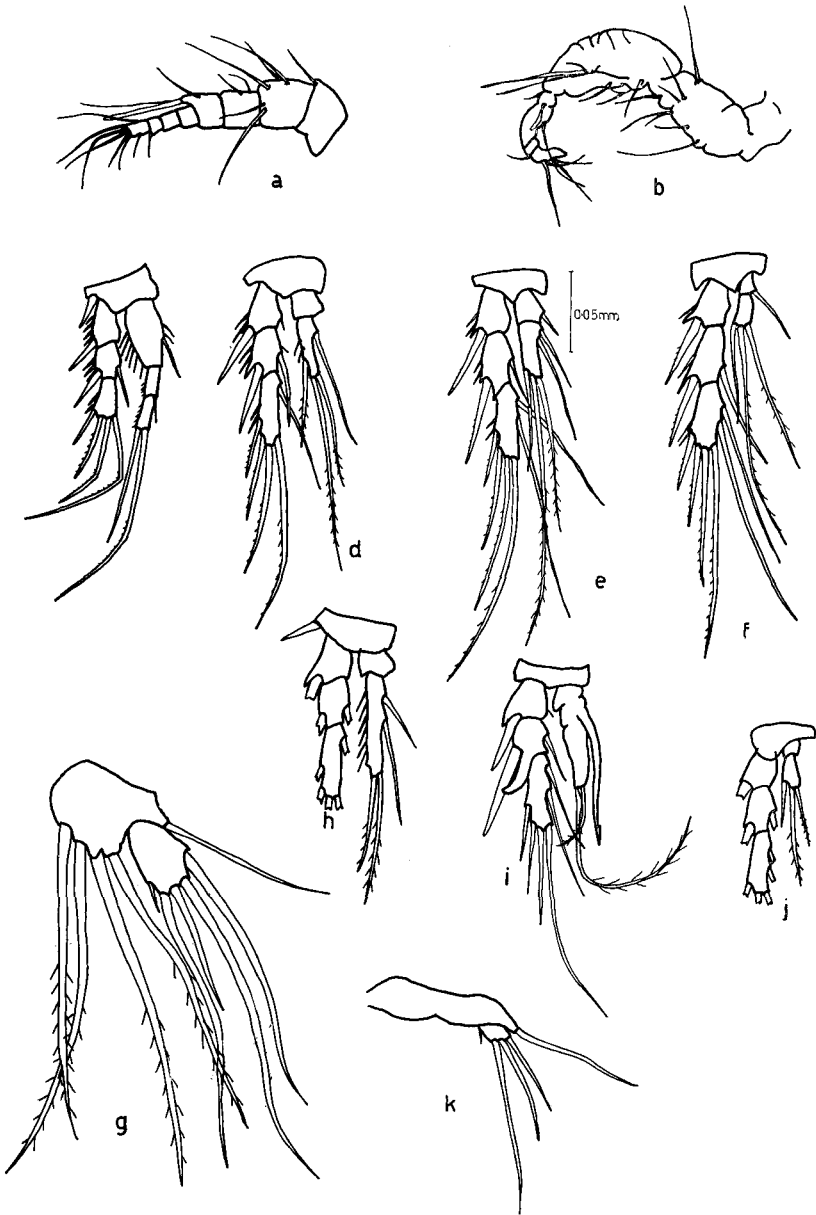


FIG. 14—*Elaphoidella silvestris* sp. nov. (a) Antennule, female; (b) antennule, male; (c)–(g) legs 1–5, female; (h)–(k) legs 1–5, male. All to same scale.

two western Tasmanian examples of the genus, *A. (D.) tasmaniae* and *A. (C.) hirsuta* (Chappuis, 1951), appear to have evolved along similar lines to the South American species, which is not so surprising considering the closely paralleled climatic histories of these two areas (Darlington 1965, pp. 15-9).

The genus *Elaphoidella* has a relationship to *Attheyella* close enough to indicate a common ancestor for the two genera. With its almost total parthenogenetic reproduction and relative ease of distribution, it is not surprising that *E. bidens* shows a world-wide distribution, unlike most species of the genus which are usually endemic to their particular areas.

ACKNOWLEDGMENTS

I would like to thank those of my colleagues who contributed specimens to my collection, especially Mr D. R. Cowley, Dr C. McLay, and Dr M. A. Chapman. I am particularly indebted to the latter for her helpful criticism of the manuscript and testing of sections of the keys. Collections of animals were made with the aid of a travel grant from the University Grants Committee.

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