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THE PHILOTARSIDAE (PSOCOPTERA) OF NEW ZEALAND AND ISLANDS OF THE NEW ZEALAND PLATEAU

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Abstract: The philotarsid (Psocoptera) fauna of New Zealand, and Campbell, Auckland, Antipodes, Snares and Macquarie islands is reviewed. Ten species are newly described, and placed in the genera *Zelandopsocus* (2), *Austropsocus* (6), and *Aaroniella* (2). The genus *Bryopsocus* is erected for 2 species previously placed in *Austropsocus* and *Zelandopsocus*. A key to the 20 species of philotarsids of the area is provided, 2 new synonyms are created, and many new distributional records listed. Relationships with the philotarsid faunas of New Caledonia and Australia are discussed.

Smithers (1969) lists 9 species of the family Philotarsidae as occurring on New Zealand and its inshore islands: 2 species of *Haplophallus [H. maculatus* (Tillyard) and *H. guttatus* (Tillyard)], 1 of *Aaroniella (Aa. rawlingsi* Smithers), 2 of *Zelandopsocus (Z. formosellus* Tillyard and *Z. angulatus* Smithers) and 4 of *Austropsocus* (*A. delli* Smithers, *A. salmoni* Smithers, *A hollowayae* Smithers and *A. townsendi* Smithers). The type-species of *Austropsocus* Smithers (*A. insularis*) was described from Macquarie Island (Smithers 1962), and later recorded from Campbell Island (Smithers 1964).

In the course of a program of investigation of the psocopteran fauna of the 'Melanesian Arc', one of us (SKW) has collected extensively in New Zealand (see map A) since the publication of Smithers' 1969 monograph, and we have also examined material in the collection of the Department of Scientific and Industrial Research (D. S. I. R.), New Zealand.

As a result, a further 10 species of the family have been discovered in the New Zealand area, and we have also been able to examine the New Zealand philotarsid fauna in relation to that of New Caledonia, which is now well known (Thornton & Smithers 1974), and of Australia, which is less well known.

In this paper the 10 newly discovered species are described, and further information is provided on the following species: *Aaroniella rawlingsi* is recorded from Tasmania and Australia; *Haplophallus greyi* (Edwards) is synonymised with *H. guttatus*, which thus is now known to occur in both New Zealand and Tasmania; males of *Austropsocus townsendi* and the female of *Zelandopsocus angulatus* are described, and the two species are placed in a new genus, *Bryopsocus; A. hollowayae* is synonymised with *Caecilius apicipunctatus* Tillyard, and the male is redescribed. The New Zealand species of philotarsids are examined and discussed in relation to those known from other parts of the world, and in particular to those from New Caledonia and Australia.

As a result of our studies on this fauna, the limits of the genera *Aaroniella* Mockford, *Haplophallus* Thornton, *Zelandopsocus* Tillyard and *Austropsocus* Smithers have become less precise; reasons are given for assigning taxonomically marginal species to particular genera at this stage.

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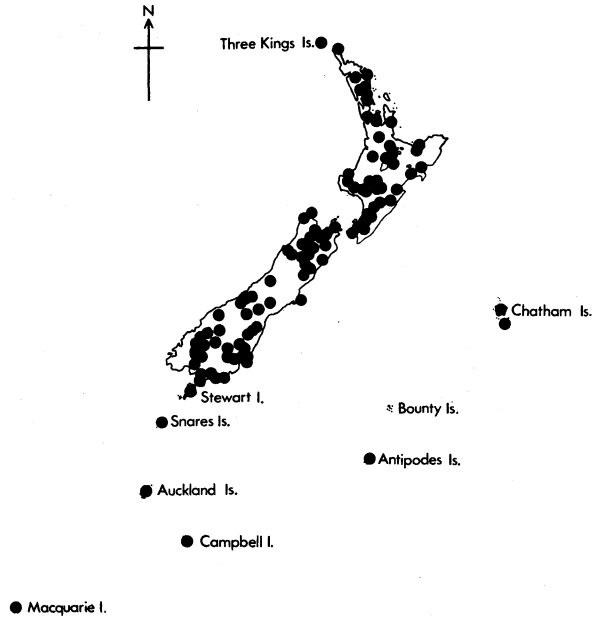


MAP A. Sites at which philotarsids recorded in this paper were collected.

Unless otherwise stated, the collector of specimens cited is Dr S. K. Wong. The place of deposition of types and paratype material is indicated thus: NZDSIR (Department of Scientific and Industrial Research, New Zealand, Entomology Section); BPBM (Bishop Museum, Honolulu); AM (Australian Museum, Sydney). Other material will remain in the collection of IWBT, unless otherwise stated.

Note: Abbreviations for characters (given in parentheses under *Aaroniella parda* are used in all subsequent descriptions.

KEY TO THE PHILOTARSIDAE OF THE NEW ZEALAND AREA

1. Hind wing veins bare 2
   Hind wing with setae on at least vein *m* 18
2. Claw with small preapical tooth; ♂ hypandrium with a pair of widely spaced, low setose lobes; outer valve of ♀ gonapophyses large, circular ..... **Bryopsocus** 3
   Claw without preapical tooth; ♂ hypandrium with 3 or more bare lobes; outer valve of ♀ gonapophyses more or less hatchet-shaped ..... **Zelandopsocus, Austropsocus** 4
3. Fore wing membrane bare; both sexes macropterous ..... **Bryopsocus angulatus**
   Fore wing membrane with scattered setae at least apically; ♀ brachypterous, ♂ brachypterous or macropterous ..... **Bryopsocus townsendi**
4. In fore wing, vein cu_2 obviously setose, even in brachypterous forms 5
   In fore wing, vein cu_2 obviously bare, or wings extremely small, bearing very stout long setae, and vein cu_2 not distinguishable 8
5. Fore wings brown, veins pale 6
   Fore wings concolorous or with distinct brown patches 7
6. Legs reddish brown, labrum pale ..... **Austropsocus delli**
   Legs pale buff, labrum with median brown marks ..... **Austropsocus chathamensis**
7. Fore wings distinctly patterned with brown marks ..... **Austropsocus salmoni**
   Fore wings uniformly pale brown ..... **Austropsocus insularis**
8. Brachypterous 9
   Macropterous 12

9. Fore wing oval with very long stout setae, veins not distinguishable ..... **Austropsocus ramsayi**
Fore wing oval or circular and at least some veins clearly distinguishable 10
10. Fore wing oval, 2× as long as broad 11
Fore wing circular, as broad as long ..... **Austropsocus nimbosus**
11. Fore wing brown, paler along veins, pterostigma not recognizable ..... **Zelandopsocus tectus**
Fore wing marked with brown clouds, membrane not paler along veins, pterostigma distorted but recognizable ..... **Austropsocus apicipunctatus**
12. Apices of veins in distal ½ of fore wing distinctly clouded 13
Apices of veins in distal ½ of fore wing not distinctly clouded 15
13. Membrane of fore wing fuscous, with a distinct narrow diagonal hyaline band from base of areola postica towards vertex of pterostigma ..... **Austropsocus apicipunctatus**
Membrane of fore wing without distinct hyaline diagonal band 14
14. Membrane of fore wing almost hyaline; setae sparse, sited on veins ..... **Zelandopsocus kuscheli**
Fore wing with brown clouds, including a rectangular brown area covering areola postica and extending to vein *m*; setae dense, sited on and to each side of veins ..... **Austropsocus australis**
15. Fore wing hyaline; setae set alternately on veins, giving a zig-zag appearance ... **Austropsocus hyalinus**
Fore wing patterned 16
16. Fore wing brown in basal ½, hyaline in apical ½ ..... **Austropsocus fasciatus**
Fore wing pigment not confined to basal ½ 17
17. Fore wing broad apically, richly marked with brown and dark brown, a hyaline band parallel to apical wing margin; setae sited on veins ..... **Zelandopsocus formosellus**
Fore wing rather narrow, no hyaline band parallel to apical wing margin; setae in basal ½ of wing sited on and to each side of veins ..... **Austropsocus nimbosus**
18. Setae on basal fore wing veins sited on dark spots 19
Setae on fore wing veins not sited on dark spots 21
19. In fore wing, vein cu_2 setose ..... **Haplophallus guttatus**
In fore wing, vein cu_2 bare 20
20. Antennal segments dark with pale apices; fore wing not decidedly wider apical to node ..... **Aaroniella rawlingsi**
Antennal segments without distinct paler apices; fore wing decidedly wider apical to node ..... **Aaroniella basipunctata**
21. Antennal segments with distinct pale apices, apical segment attenuated and with single long seta apically; in hind wing, vein cu_1 bare ..... **Aaroniella parda**
Antennal segments without distinct paler apices, apical segment with a pair of apical setae; in hind wing, vein cu_1 setose ..... **Haplophallus maculatus**

SYSTEMATICS

Genus AARONIELLA Mockford, 1951

The 12 described species assigned to *Aaroniella* are from North America (*Aa. maculosa* (Aaron), the type-species), botanical gardens in Europe (*Aa. badonnelli* Danks), the Oriental Region (*Aa. pulchra* Thornton), Madagascar (*Aa. montana* Badonnel and *Aa. madecassa* Badonnel), Micronesia (*Aa. gressitti* and *Aa. trukensis* Thornton, Lee & Chui), Lord Howe Island (*Aa. howensis* Smithers & Thornton), New Zealand (*Aa. rawlingsi* Smithers), Australia (*Aa. pallida* New), Cuba and Jamaica [*Aa. achrysa* (Banks)](Turner 1975), and the Galapagos Archipelago (*Aa. galapagensis* Thornton & Woo). In addition, other known species are regarded as being assignable to the genus: *Philotarsus samoanus* Karny (Samoa), and undescribed species from Florida, Brazil (2), and Colombia. Undescribed species from Japan and the Marquesas Islands are less well known, but are suspected of belonging to *Aaroniella,* as are other known but inadequately described species from the Argentine (*Philotarsus bruchi* Williner and *Philotarsus sticticus* Navas), the Philippine Archipelago (*Caecilius guttulatus* Banks) and Taiwan (*Kolbea serialis* Banks).

Thus some 23 species that are candidates for inclusion in the genus have been collected. Apart from the species collected in European botanical gardens, these are confined to areas bordering the Pacific and Indian Oceans, and Pacific islands. Evidently the genus is absent from the Holarctic and from Africa.

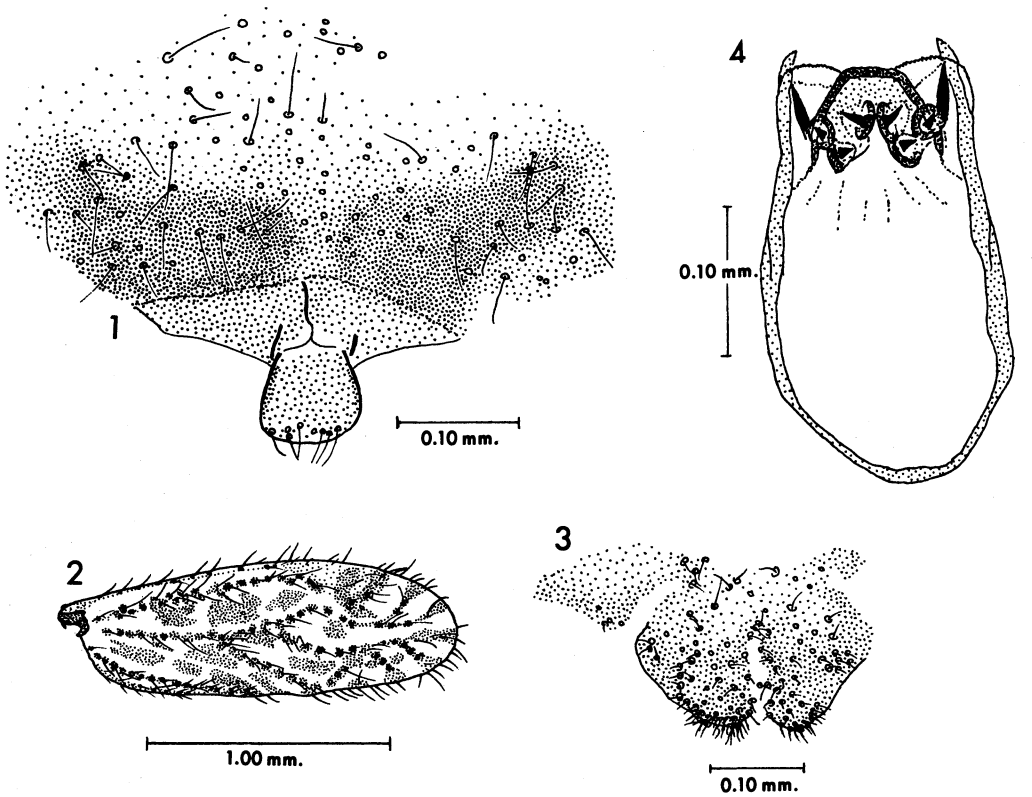


FIG. 1-4. *Aaroniella rawlingsi* Smithers ♀: 1, subgenital plate; 2, fore wing. ♂ : 3, hypandrium; 4, phallosome.

Aaroniella rawlingsi Smithers FIG. 1–4

Aaroniella rawlingsi Smithers, 1969: 324.

Further description:

♀. *Morphology:* In hind wing vein r_1 with 3 setae, r_{4+5} with 1 seta, otherwise veins bare. Claw with preapical tooth. Apical antennal segment attenuated, with a single long apical seta. Subgenital plate (FIG. 1) with distinct apical sclerites. Brachyptery evident in some ♀♀ (e.g., FIG. 2).

♂. *Morphology:* In hind wing, setae on following veins: r_1–7, r_{2+3}–1, r_{4+5}–1, m–5. Claw with preapical tooth, number of ctenidiobothria on hind tarsal segments–11; 0; 0. Hypandrium as in FIG. 3, sclerites (FIG. 4) within penis frame bearing 8 isolated teeth.

Specimens on which the above further description is based: ♂♀, SOUTH ISLAND, Invercargill Reserve, 10.III.1971 (BPBM).

Other specimens examined: NEW ZEALAND (SOUTH ISLAND): Invercargill Reserve, 2 brachypterous ♀♀, 10.III.1971. TASMANIA: East Risdon, ex foliage of *Exocarpus* sp., ♂♂♀♀ 27.IV.1961, V. V. Hickman; Queen's Domain, "in small groups under web on stones among Casuarina," ♂♂♀♀, V. V. Hickman. AUSTRALIA: Victoria, La Trobe University, *Acacia baileyana,* ♂♀♀, VII.1972, T. R. New; Victoria, La Trobe University, suction trap, ♂, 4.IV.1973, T. R. New.

Specimens were also collected from the following localities in New Zealand: NORTH ISLAND: Levin, oak, 2 brachypterous ♀♀, 2.III.1970; Whangarei, Parahaki, 250 m, 2 nymphs, 26.XII.1970; Otaki Forks, 7 brachypterous ♀♀, 1 macropterous ♀, 24.IV.1971. SOUTH

ISLAND: Botanical Hill, Nelson, 1 ♂, 17.V.1970; Te Anau, 300 m, pine, 1 brachypterous ♀, 7.III.1971; The Key, pine, 4 ♂♂, 15 brachypterous ♀♀, 4 macropterous ♀♀, 9.III.1971; Lake Monowai, beech, 6 ♂♂, 11 brachypterous ♀♀ macropterous ♀♀, 9.III.1971; Alexandra, pine, 4 ♂♂, 29 brachypterous ♀♀, 11.III.1971; Lake Tekapo, *Larix decidua*, 24 ♂♂, 40 brachypterous ♀♀, 19 macropterous ♀♀, 12.III.1971, 5 ♂♂, 16 brachypterous ♀♀, 13 macropterous ♀♀, 2.IV.1972; Dunedin, 4 brachypterous ♀♀ 14. III.1971; Dunedin, cedar, pine, 4 ♂♂, 9 brachypterous ♀♀, 10 macropterous ♀♀, 31.III.1972; Naseby, conifers, 4 ♂♂, 12 brachypterous ♀♀, 1 macropterous ♀, 15.III.1971; Hanmer Forest, pine and cypress, 3 n, 7 ♂♂, 30 brachypterous ♀♀, 1 macropterous ♀, 20.III.1971; Waiau, beech, 2 brachypterous ♀♀, 20.III.1971; Kaikoura, 1 brachypterous ♀, 15.III.1972; Pelorus Reserve, tree ferns and other trees, 1 brachypterous ♀, 9.IV.1972; Invercargill, Waihopai Reserve, various trees with lichen, 3 brachypterous ♀♀, 28.III.1972; Bluff, pine, 2 ♂♂, 10 brachypterous ♀♀, 5 macropterous ♀♀, 29.III.1972; Waiau, *Nothofagus cliffortoides*, 1 ♂, 1 brachypterous ♀, 5.IV.1972.

The Tasmanian and Victorian specimens are considered to be conspecific with those from New Zealand; the specimens from Victoria are somewhat more darkly pigmented than the original description of New Zealand specimens indicates.

Aa. rawlingsi differs from the type-species, *Aa. maculosa*, and from *Aa. pulchra*, *Aa. badonelli*, and the undescribed species from Florida, in that the apical sclerite of the subgenital plate is setose, as it is in *Aa. gressitti*, *Aa. trukensis*, *Aa. howensis*, *Aa. pallida*, *Aa. galapagensis*, *Philotarsus samoanus* (we have examined specimens from Samoa which satisfy the description of this species), and 2 of the undescribed species from Colombia and Brazil. The species *Aa. achrysa* from Cuba and Jamaica has a subgenital plate of a structure very similar to that of *Aa. rawlingsi*, but with only a pair of apical setae.

Large, obvious sclerites within the penis frame, differing from those of *Aa. rawlingsi*, are present in *Aa. maculosa*, *Aa. pulchra*, *Aa. galapagensis* and *Aa. achrysa*, but absent from *Aa. gressitti*, *Aa. trukensis*. *Aa. pallida*, *Aa. montana* and *Philotarsus samoanus*.

Aa. rawlingsi is distinguishable from *Aa. madecassa* and *Aa. howensis* by the pattern of pigmentation of the fore wings, and from *Aa. galapagensis* and the 2 species from Colombia and Brazil both by fore wing pattern and the shape of the dorsal valve of the female gonapophyses, which in the latter 3 species is curved and elongated.

Many of the species of *Aaroniella* and *Haplophallus* show the results of mosaic evolution, and when the Melanesian survey of which this paper is a part is completed, a revision of these genera will be necessary.

The 2 species described below have some characters in common with *Aaroniella*, and others that are similar to those of some of the *Haplophallus* groups mentioned on pages 204 and 205. On balance, they are provisionally assigned to *Aaroniella*.

Aaroniella parda Thornton, Wong & Smithers, **n. sp.** FIG. 5–11

♀. *Coloration* (after 3 years in alcohol): Head cream with brown markings. Gena brown with a cream band round antennal socket and anterior margin of orbit, head markings from front as in FIG. 5. Eyes black; ocelli pale with black centripetal margins. Maxillary palps missing. Antenna with scape and pedicel brown, flagellar segments light brown with pale apical sections, that on basal segment shorter than the others, penultimate segment lacking such a pale section. Mesothoracic lobes brown, sutures widely bordered cream, metathoracic lobes pale cream, light brown on lateral edges. Mesothoracic leg with coxa brown, trochanter pale cream, femur brown, tibia and tarsus pale brown. All other legs missing. Fore wing (FIG. 6) spotted and banded with brown, veins brown. Hind wing hyaline, with a diffuse brown transverse band (FIG. 7). Abdominal terga cream, with gray-brown annular granulation. Sterna light gray-brown. *Morphology:* Body length (B) = 2.35 mm. Ratio of interocular distance to eye diameter (I.O.:D) = 4.00. Apical antennal segment attenuated distally, with single apical seta. Length of basal flagellar segment (f_1) = 0.44 mm. Length of 2nd flagellar segment (f_2) = 0.27 mm. f_1:f_2 = 1.63. Length of hind femur (F) not available. Length of hind tibia (T) not available. Length of basal (t_1), 2nd (t_2) and apical (t_3) hind tarsal segment not available. Hind tarsal ratio, rt (t_1:t_2:t_3) not available. Number of ctenidiobothria on basal hind tarsal segment (ct) not available. No ctenidiobothria on tarsus of

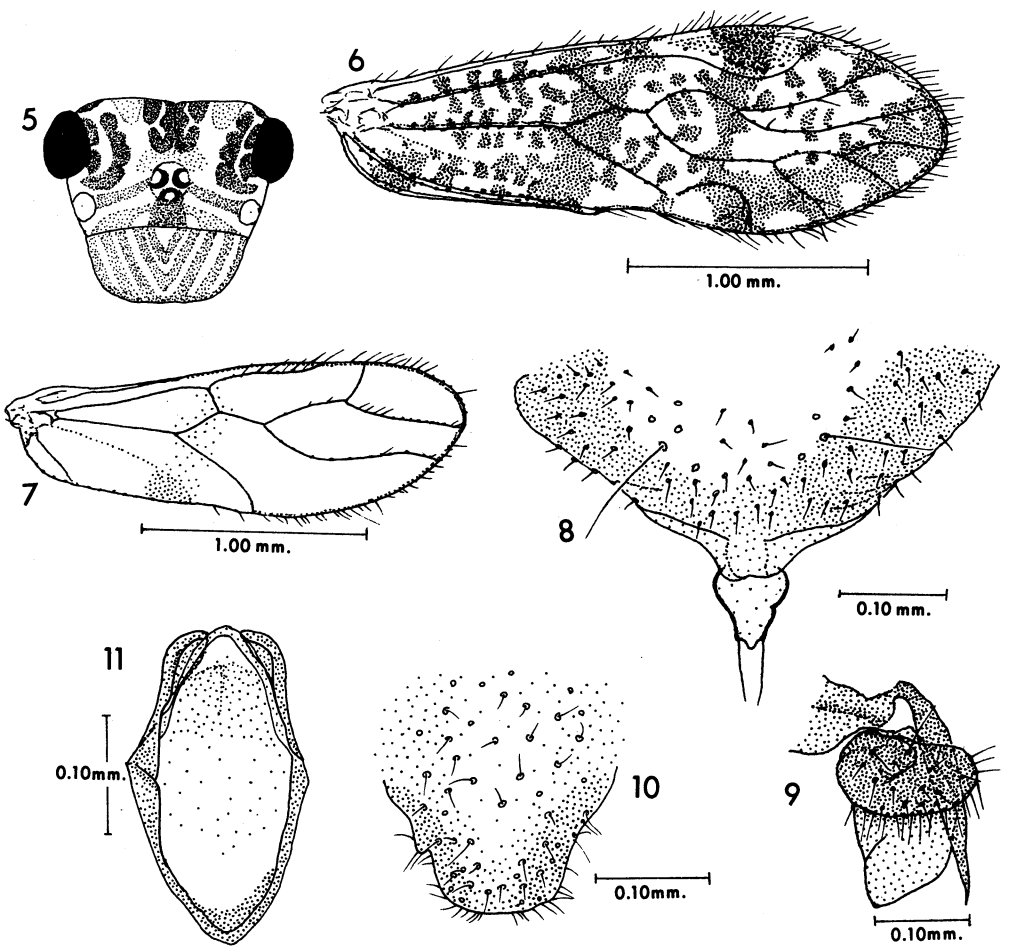


FIG. 5-11. *Aaroniella parda* n. sp. ♀: 5, head viewed from fornt (not to scale); 6, fore wing; 7, hind wing; 8, subgenital plate; 9, gonapophyses. ♂: 10, hypandrium; 11, phallosome.

mesothoracic leg; claw with preapical tooth. Fore wing length (Fw) = 2.88 mm. In fore wing vein *an* setose, setae in 2 ranks; vein cu_2 bare. Hind wing length (Hw) = 2.06 mm. Setae on hind wing veins: r_1–9, *rs*–3, r_{4+5}–14, *m*–10, other veins bare. Epiproct rounded posteriorly, with sclerotized posterior ridge and scattered setae. Paraproct simple, circular field of 19 trichobothria and 2 setae not in rosette sockets. Subgenital plate with 2 distinct sclerites apically, the apical sclerite bearing a pair of setae (FIG. 8). Gonapophyses (FIG. 9): ventral valve fairly wide, styliform; outer valve oval, setose; dorsal valve bluntly rounded apically.

♂. *Coloration* (after 2 years in alcohol): As ♀ but mesothoracic leg (only 1 available) with tibia pale. *Morphology:* B = 2.25 mm. I.O.:D = 3.00. f_1 = 0.56 mm. f_2 = 0.35 mm. f_1:f_2 = 1.58. Hind legs missing; no ctenidiobothria on mesotarsus. Claw with preapical tooth. Fw = 2.71 mm. Fore wing morphology as ♀. Hw = 2.03 mm. Setae on hind wing veins: *r*–5, *rs*–2, r_{4+5}–14, *m*–10, other veins bare. Epiproct simple, paraproct with circular field of 33 trichobothria. Hypandrium (FIG. 10) simple, phallosome (FIG. 11) simple, penis frame ovoid without sclerites.

Holotype ♀, N. Z., THREE KINGS ISLAND: Castaway Camp, XI.1970, G. W. Ramsay (NZDSIR). Allotype ♂, N. Z., NORTH ISLAND: Mangamuka Reserve, 11.II.1971 (NZDSIR), Paratype ♂, N. Z., SOUTH ISLAND: Mangarakau, 2.IX.1968, G. Hitchings (NZDSIR).

On the one hand, this species has the following characters similar to the majority of

species of *Aaroniella* and differing from most species of *Haplophallus:* white apices to antennal segments; antennal apex attenuated, with single apical seta; in hind wing vein cu_1 bare; shape of dorsal valve of female gonapophyses. On the other hand, in the following characters it resembles most species of *Haplophallus* and differs from most *Aaroniella* species: fore wing setae not sited on dark spots; fore wing shape (not narrow and smoothly rounded); outer valve of female gonapophyses rounded. Several of the characters of *Aa. parda* are shared by groups of species in both genera. These are phallosome lacking internal sclerites; hypandrium without lateral incisions, not emarginate posteriorly; subgenital plate tripartite, apical sclerite setose; vein cu_2 in fore wing and vein cu_1 of hind wing bare.

Aa. parda is quite distinctive on wing pattern.

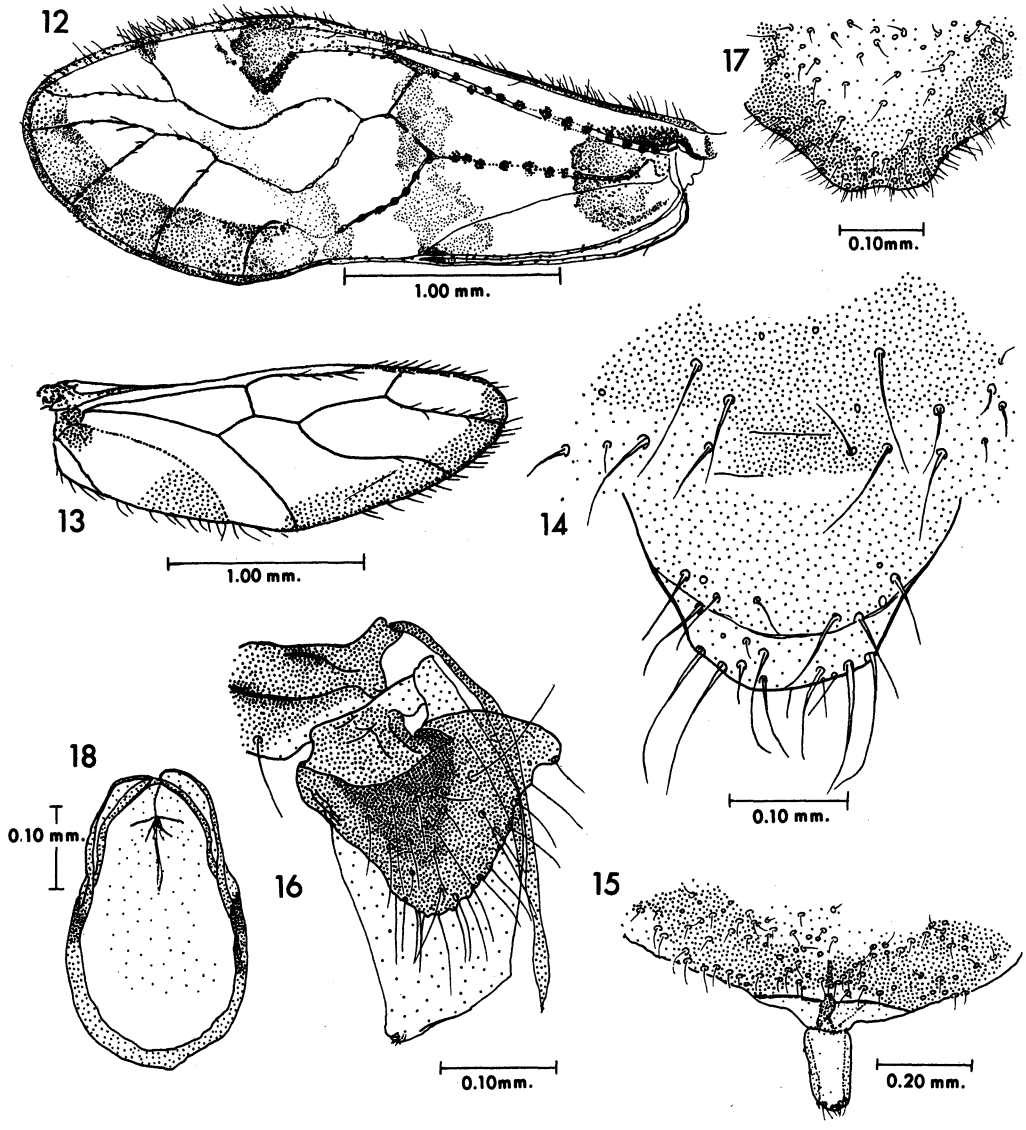


FIG. 12-18. *Aaroniella basipunctata* n. sp. ♀: 12, fore wing; 13, hind wing; 14, epiproct; 15, subgenital plate; 16, gonapophyses. ♂: 17, hypandrium; 18, phallosome.

Aaroniella basipunctata Thornton, Wong & Smithers, n. sp. FIG. 12–18

♀. *Coloration* (after 2 years in alcohol): Vertex cream with light brown markings. Gena cream, brown next to gena-frons suture, and round orbit and antennal socket. Eyes black; ocelli pale, on blackish-brown protuberance. Frons and clypeus ground color creamy white, a distinct, wide, dark brown band medially from ocellar protuberance forward over frons and clypeus, and a brown patch on frons 1/2 way between median pigmented patch and antennal socket. Antenna light brown, flagellar segments not with pale apices. Thoracic lobes dark brown, almost black, sutures lined grayish cream; thoracic pleura blackish brown dorsally, otherwise creamy white with a narrow dark brown stripe passing along pleura longitudinally, dividing side of thorax into 2 wide creamy white bands. Legs: coxa and trochanter dark brown; femur brown proximally, fading to pale buff apically; tibia very pale buff, except brown at extremities; tarsal segments brown. Fore wing (FIG. 12) distinctly patterned, proximal transverse fascia and pigment over pterostigma brown, marginal pigmented band a little lighter; veins *r, m + cu* and cu_1 with setae sited on dark spots. Hind wing (FIG. 13) with distinct light brown marginal band. Abdomen cream with gray-brown granulations. *Morphology:* B = 3.50 mm. I.O.:D = 3.50. Apical antennal segment attenuated, with single apical seta. f_1 = 0.38 mm. f_2 = 0.29 mm. f_1:f_2 = 1.33. F = 0.77 mm. T = 1.16 mm. t_1 = 0.37 mm. t_2 = 0.06 mm. t_3 = 0.08 mm. rt = 6.17:1:1.33. ct = 17. Claw with preapical tooth. Fw = 3.37 mm. Vein cu_2 of fore wing bare, *an* setose. Hw = 2.41 mm. Setae on hind wing veins: r_1–6, r_{4+5}–10, m–2, otherwise veins bare. Wings glossy, also sclerites of head and thorax, thoracic lobes particularly shiny. Epiproct (FIG. 14) with dorsal setose flap; paraproct simple, a circular field of 17 trichobothria and 2 setae not in rosette sockets. Subgenital plate (FIG. 15) apically with 3 distinct sclerites, apical sclerite bearing 7 very fine short setae marginally. Gonapophyses (FIG. 16): ventral valve styliform; outer valve subtriangular but with rounded apex; dorsal valve subrectangular, parallel sided, a very small rugose or finely setose subapical lobe.

♂ *Coloration* (after 2 years in alcohol): As ♀, but median dark band on clypeus more diffuse. *Morphology:* B = 3.60 mm. I.O.:D = 3.20, eyes not much larger than in ♀. f_1 = 0.46 mm. f_2 = 0.34 mm. f_1:f_2 = 1.35. F = 0.64 mm. T = 1.04 mm. t_1 = 0.34 mm. t_2 = 0.04 mm. t_3 = 0.07 mm. rt = 8.50:1:1.75. ct = 19. Fw = 2.74 mm. Hw = 1.93 mm. Hind wing vein setae: $r_1 - 6$, $r_{2+3} - 1$, $r_{4+5} - 10$, $M - 4$, other veins bare. Morphology of head and thorax otherwise as ♀. Epiproct rounded, rugose apically; paraproct with circular field of 22 trichobothria, with 1 supernumerary seta. Hypandrium (FIG. 17) simple, apical border almost straight. Phallosome (FIG. 18) simple, lacking internal sclerites.

Holotype ♀, NORTH ISLAND: Whangarei, Parahaki, 0–250 m, 8.II.1971 (NZDSIR). Allotype ♂, same data (NZDSIR). Paratypes, NORTH ISLAND: Whangarei, Parahaki, 250 m, 2 ♂♂, 1 ♀, 26.XII.1970 (NZDSIR); Helena Bay, 3 ♂♂, 4 ♀♀, 9.II.1971 (BPBM); Kamo, 5 ♂♂, 1 ♀, 12.II.1971 (AM); Levin, 2 ♀♀, 2.III.1972 (AM). SOUTH ISLAND: Invercargill, Waihopai Reserve, beating *Pinus* and other trees, ♂, 10.III.1971; Dunedin, *Pinus*, 4 ♀♀, 31.III.1972; Bluff, *Pinus*, ♀, 29.III.1972.

Like *Aa. parda, Aa. basipunctata* has a mosaic of characters found in *Aaroniella* and *Haplophallus*. In the following it is more *Aaroniella*-like than *Haplophallus*-like: some fore wing setae sited on dark spots; structure of antennal apex; outer valve of female gonapophyses triangular. It is more *Haplophallus*-like than *Aaroniella*-like in: antennal segments lack white apices; fore wing shape; shape of dorsal valve of gonapophyses. As with *Aa. parda*, the lack of phallosome sclerites, and the hypandrium and subgenital plate structure are found in species of both genera.

Genus HAPLOPHALLUS Thornton, 1959

The genus *Haplophallus* includes 16 described species, only 6 of which strictly satisfy the generic diagnosis. These 6 species, henceforth designated the *orientalis* group, are *H. orientalis* Thornton (the type-species, Hong Kong and Ceylon), *H. fenestristigma* (Enderlein) (Seychelles), *H. fuscistigma* Thornton, Lee & Chui, and *H. boninensis* Thornton, Lee & Chui (Micronesia), *H. basilewskyi* (Smithers) (Africa), and *H. maculatus* (Tillyard) (New Zealand).

Three species, *H. trepticus* Thornton & Smithers (New Caledonia, Fiji, Samoa), *H. emmus* Smithers & Thornton (Norfolk Island) and *H. tandus* Smithers & Thornton (Lord Howe Island), agree with the *orientalis* group in antennal structure, ciliation of fore and hind

wing veins, and structure of hypandrium but differ in characters of the female gonapophyses and subgenital plate. The *trepticus* group, of 3 species, may be regarded as an off-shoot of the *orientalis* group.

Nine other species form a fairly well-defined group, designated here the *bundoorensis* group. This group comprises *H. acraeus, H. decorus, H. novitas* and *H. virgatus* all described by Thornton & Smithers (New Caledonia); *H. bundoorensis* New, *H. capitulatus* Smithers, and 2 as yet undescribed species (Australia); and *H. guttatus* (Tillyard)(New Zealand and Tasmania). Members of the *bundoorensis* group have a subgenital plate consisting of 3 distinct apical sclerites and a rectangular dorsal valve that lacks a well defined short spine. The *bundoorensis* group also differs from the *orientalis* and *trepticus* groups in ciliation of the cubital veins of the fore and hind wings.

The genus has not been recorded from the Holarctic, nor from the Neotropical region.

Haplophallus maculatus (Tillyard) FIG. 19

Philotarsus maculatus Tillyard, 1923: 181.

Haplophallus maculatus: Thornton, 1962: 5.-Smithers, 1969: 320

Distribution: Since 1969 we have examined specimens of this common species from the following localities. THREE KINGS ISLAND: Castaway Camp, suction trap and night beating, ♂, 28.XI.1970, G. W. Ramsay, G. Kuschel & J. C. Watt; Tasman Valley, XI.1970, ♀, G. W. Ramsay; S.W. Island, summit ridge, *Coprosma macrocarpa,* 1 n, 1 ♂, XI.1970, G. Kuschel. NORTH ISLAND: Levin, *Pinus radiata,* Juniper, and various shrubs, 3 n, 13 ♂♂, 11 ♀♀, 6.XII.1969, 2 ♀♀, 7.II.1970, 5 ♂♂, 14 ♀♀, 22.XI.1970, 4 n, 5 ♂♂, 2 ♀♀, 2.III.1972; Otaki, ♀, 23.V.1970; Otaki Forks, 3 ♂♂, 7.VI.1970, 1 n, 2 ♂♂, 2 ♀♀, 9.VIII.1970; Hamilton, Rotorua, juniper, 4 ♂♂, 8 ♀♀, 28.XI.1970, 3 n, 7 ♂♂, 16 ♀♀, 24.I.1971; Wanganui, Virginia Lake, 7 ♂♂, 13 ♀♀, 12.XII.1970; Waipu, 1 n, 6 ♂♂, 6 ♀♀, 26.XII.1970; Whangarei, Parahaki, 250 m, 3 ♂♂, 7 ♀♀, 26.XII.1970, 1 n, 2 ♂♂, 9 ♀♀, 12.II.1971; Te Aroha, 3 n, 8 ♂♂, 8 ♀♀, 25.I.1971; Ohakune,700–1000m, 3 n, 25 ♂♂, 23 ♀♀, 31.I.1971; Whangarei, n, ♂, ♀, 7.II.1971; Manginangino Reserve, 2 n, ♂, 4 ♀♀, 9.II.1971; Mangamuka Reserve, 2 ♂♂, 3 ♀♀, 11.II.1971; Taupo, Huka Falls, pine, 4 ♀♀, 4.IV.1971; Spirits Bay, ♂, 17.I.1966, A. K. Walker; Wellsford, ♀, 21.I.1966, A. K. Walker & B. M. May; Opotiki, Hukutaia Domain, 4 n, 3 ♂♂, 7 ♀♀, 28.XII.1971; Wharerata Forest, pine, ♂, 2 ♀♀, 29.XII.1971; 24 km N. E. Palmerston North, Pohangina Valley, ♀, 29.III.1960, C. W. O'Brien. SOUTH ISLAND: Lake Rotoiti, beech, ♀, 1.III.1971; Lake Rotoroa, ♀, 1.III.1971; Nelson, Wakefield, ♂, 9.IX.1965, S. I. Townsend; Nelson, Mangarukau and West Haven, 2 ♀♀, 11.I.1966, A. K. Walker; Farewell Spit, ♀, 12.I.1966, A. K. Walker; Nelson, Mangarahua, n, 6 ♂♂, 9 ♀♀, 2.XI.1968, G. Hitchings; Kaikoura, pine, n, 3 ♀♀, 15.III.1972; Whangamoa Saddle, *Nothofagus fuscus,* ♀, 10.IV.1972; CHATHAM ISLAND: Mangahou Ck., n, 2 ♂♂, 10.II.1967, G. Kuschel; S. E., beating cereals, 6 ♂♂, 6 ♀♀, 10.XI.1970, J. I. Townsend.

H. maculatus is a member of the *orientalis* group of the genus.

Haplophallus guttatus (Tillyard) FIG. 20–23

Philotarsus guttatus Tillyard, 1923: 181, 182. – Thornton, 1962: 242.
Philotarsopsis delicatus Tillyard, 1923: 182.
Haplophallus guttatus: Smithers, 1969: 322.
Philotarsus greyi Edwards, 1950: 116, **n. syn.**
Haplophallus greyi: Smithers, 1963: 60, **n. syn.**

Further description:

♀. *Morphology:* Fore wing veins often slightly distorted apically (FIG. 20). Setae on hind wing veins: r_1 – 8, r_{4+5} – 13, m – 11, cu_1 – 2. ct = 20; 1; 0. Claw with preapical tooth. Subgenital plate

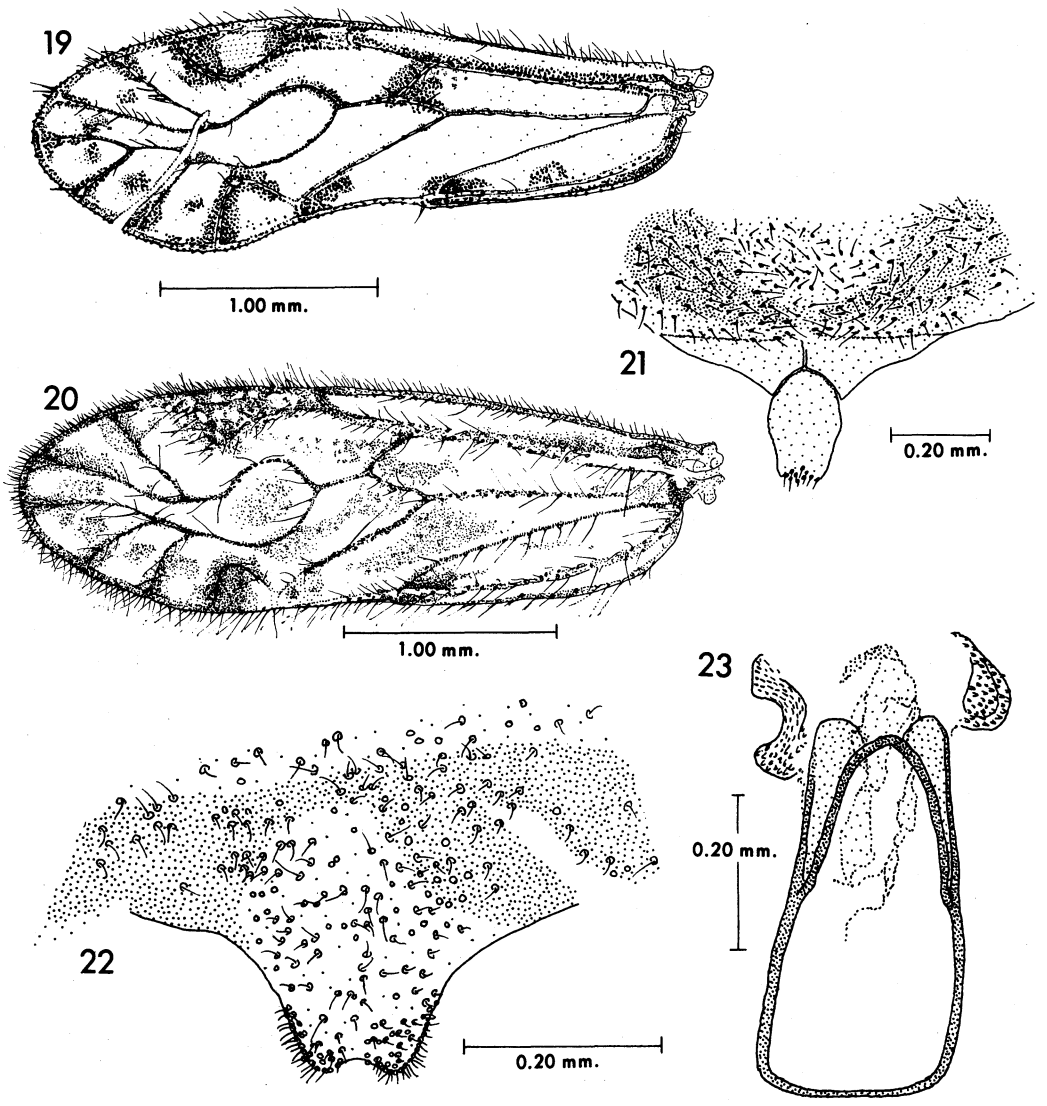


FIG. 19-23. *Haplophallus maculatus* Tillyard ♀: 19, fore wing. *Haplophallus guttatus* Tillyard ♀: 20, fore wing; 21, subgenital plate. ♂: 22, hypandrium; 23, phallosome.

(FIG. 21) apically with 3 distinct sclerites, the apical one bearing about 10 setae posteriorly.

♂ *Morphology:* In hind wing vein cu_1 bare. Hypandrium (FIG. 22). Phallosome (FIG. 23) simple, lacking distinct sclerites, but with rugose radula.

Specimens on which the above further description is based: 4 ♀♀, SOUTH ISLAND, The Key, *Pinus*, 9.III.1971 (NZDSIR); ♂, 6 ♀♀, SOUTH ISLAND, Te Anau, 320 m, *Pinus*, 7.III.1971 (NZDSIR).

Other specimens examined: NORTH ISLAND: Levin, shrubs, ♂, ♀, 6.XII.1969; Otaki Forks, *Cyathea dealbata, Dicksonia squarrosa*, ♀, 17.I.1970; Hastings, Cornwall Park, trees, ♂, 4 ♀♀, 27.XI.1970; Wanganui, Virginia Lake, shrubs, ♂, 3 ♀♀, 12.XII.1970; Waipu, shrubs,

♀, 26.XII.1970; Opotiki, Hukutaia Domain, shrubs, ♀, 28.XII.1971; SOUTH ISLAND: Speargrass Creek, *Nothofagus*, ♂, 39 ♀♀, 1.III.1971; Lake Rotoroa, shrubs and trees, 3 ♀♀, 1.III.1971; Queenstown, 335 m, silver birch, 3 ♀♀, 6.III.1971; same locality, 17 ♀♀, 24.III.1972; Lake Monowai, *Pinus*, 4 ♀♀, 9.III.1971; Naseby, conifers, n, ♂, 3 ♀♀, 15.III.1971; Burke's Pass, *Pinus*, 4 ♂♂, 36 ♀♀, 2.IV.1972; Dunedin, *Pinus* and cedar, 11 ♀♀, 31.III.1972; Manapouri, 300 m, *Nothofagus cliffortoides*, ♂, 4 ♀♀, 7.III.1971, 18.III.1972; Te Anau, 320 m, *Pinus* ♂, 4 ♀♀, 18.III.1972; Bluff, *Pinus*, ♀, 29.III.1972; Lake Monowai, *Nothofagus cliffortoides*, 3 ♀♀, 23.III.1972; Lake Rotoiti, *N. cliffortoides*, ♀, 10.IV.1972; Geraldine Co., 60 km N of Timaru, Peel Forest, ♀, 9.III.1960, C. W. O'Brien.

Smithers (1969) examined specimens from Invercargill, and Conical Hill State Forest (on *Larix decidua*) (SOUTH ISLAND).

We have also examined specimens from Tasmania, and believe there are no grounds for maintaining the specific distinction between *H. greyi* and *H. guttatus*. The name *H. greyi* thus becomes a synonym, and the species' range includes New Zealand and Tasmania.

Haplophallus guttatus resembles *Aaroniella maculosa* in the following: antennal apex attenuated, with a single apical seta; fore wing of the female narrow, smoothly rounded; vein cu_1 in hind wing bare in male (but setose in female); outer valve sub-triangular. It resembles *H. orientalis* in: shape of male fore wing; phallosome without distinct internal sclerites. In the following features it resembles the *bundoorensis* group of *Haplophallus:* vein cu_2 in fore wing setose; structure of subgenital plate; shape of dorsal valve; hypandrial structure.

Assigned to the *bundoorensis* group of *Haplophallus*, the species possesses a mosaic of characters of the genera *Aaroniella* and *Haplophallus*.

Genus ZELANDOPSOCUS Tillyard, 1923

This genus has been discussed recently (Thornton & Smithers 1974) with regard to a species complex in New Caledonia.

An examination of further specimens of the type-species, *Z. formosellus* (see below), reveals that the female epiproct possesses a dorsal setose flap, and the median lobe of the hypandrium is mushroom-shaped. The 27 New Caledonian species thus agree with the type-species in these respects, and the following generic diagnosis additional to that of Smithers (1970) is proposed for *Zelandopsocus* on the basis of the 27 New Caledonian and 3 New Zealand species now assignable to it:

Vein cu_2 in fore wing and all veins in hind wing bare, no preapical tooth on claw, outer valve of female gonapophyses usually hatchet-shaped, dorsal valve of female gonapophyses with subapical spine not extending as far as apex, female epiproct with dorsal setose flap, phallosome sclerites consisting of a curved ribbon and a pair of spinous sacs, hypandrium with 3 to 7 lobes, middle one mushroom-shaped.

Zelandopsocus formosellus Tillyard FIG. 24–28

Zelandopsocus formosellus Tillyard, 1923: 184. – Smithers, 1969: 327. – Thornton & Smithers, 1974: 242.

Further description:

♀. *Coloration:* Fore wing (FIG. 24) and hind wing (FIG. 25) patterned. *Morphology:* Epiproct (FIG. 26) with dorsal setose flap.

♂ *Coloration:* Hind wing as ♀. *Morphology:* Epiproct simple. Hypandrium (FIG. 27) 5-lobed, middle lobe mushroom-shaped, outer lobes setose; phallosome (FIG. 28) with ribbon-like sclerite and a pair of spinous sacs.

Specimens on which the above further description is based: SOUTH ISLAND: ♀, Lake Rotoiti, *Nothofagus*, 1.III.1971; ♀, Nelson, 600 m, Spencer's Range, *Hebe parviflora*,

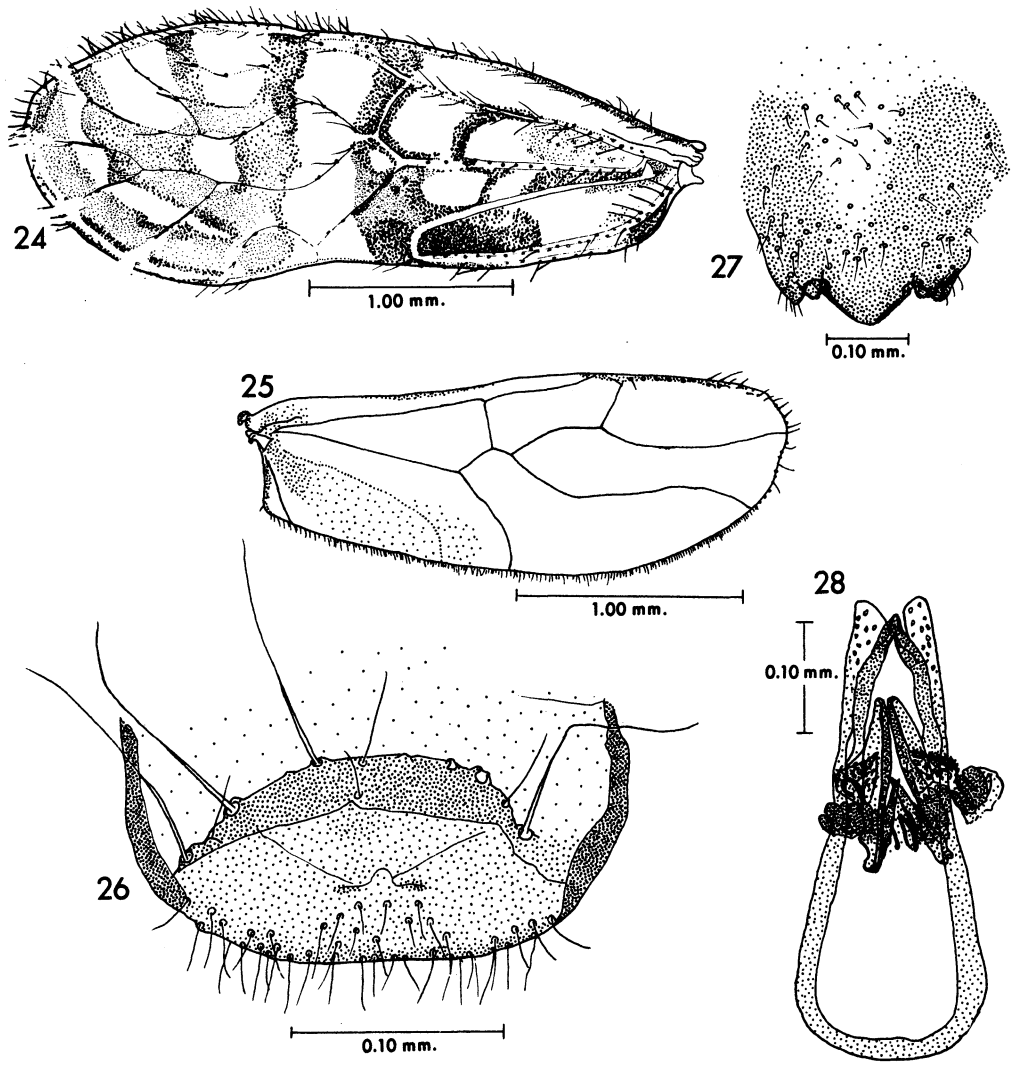


FIG. 24-28. *Zelandopsocus formosellus* Tillyard ♀: 24, fore wing; 25, hind wing; 26, epiproct. ♂: 27, hypandrium; 28, phallosome.

L. P. Marchant (NZDSIR). NORTH ISLAND: ♂, Levin, tree fern, 22.III.1970 (NZDSIR).

Other specimens examined: NORTH ISLAND: Levin, tree fern, ♂, ♀, 12.IV.1970, 2 ♂♂, ♀, 22.VII.1970; Shannon, shrubs and tree fern, ♀, 5.IV.1970; Mt Egmont, Dawson Falls, shrubs, n, 28.VI.1970; Te Horo, shrubs, ♂, 2 ♀♀, 13.IX.1970; Mt Egmont, Stratford Mountain House, 1200 m, cabbage tree, ♂, 4 ♀♀, 10.X.1970; Mt Egmont, Curtis Falls, on Totara, n, 2 ♂♂, ♀, 13.XII.1970; Pukeiti, 500 m, shrubs, 3 ♂♂, 13.XII.1970; Waipu, shrubs, ♀, 26.XII.1970; Manginangino Reserve, shrubs, ♀, 27.XII.1970; Kaingaroa Forest, trees and fern, ♂, ♀, 26.XII.1971; Wharerata Forest, pine, 2 ♂♂, 29.XII.1971. SOUTH ISLAND: Nelson, apple tree (orchard), ♂, 15.V.1970; Pelorus Reserve, ♀, 16.V.1970, ♂, 5 ♀♀, 27.II.1971, n, 2 ♀♀, 9.IV.1972; Nelson, Botanical Hill, pine, ♂, 2 ♀♀, 17.V.1970; Lake Rotoiti, *Nothofagus cliffortoides,* ♂, 2 ♀♀, 1.III.1971, 2 ♂♂, 10.IV.1972; Speargrass Creek, *Nothofagus,* ♂, 2 ♀♀, 1.III.1971; Maruia Saddle, shrubs, ♂, 2.III.1971; Ferguson's Bush, tree fern, n, ♀,

2 ♂♂, 3.III.1971; Lake Moeraki, shrubs, ♀, 4.III.1971; Franz Josef, shrubs, ♂, 4.III.1971; Lake Monowai, *Nothofagus cliffortoides,* ♂, ♀, 9.III.1971, 8 ♂♂, 8 ♀♀, 23.III.1972; Arthur's Pass, 700 m, *Nothofagus cliffortoides,* 5 ♂♂, 3 ♀♀, 17.III.1971; Bell Hill, tree fern and *Nothofagus,* 3 n, 3 ♂♂, 2 ♀♀, 18.III.1971; Arthur's Pass, 700 m, litter, ♀, 24.III.1965, N. A. Walker; Nelson, Torrent Bay, litter, ♂, 7.IV.1965, N. K. Walker; Nelson, Fisherman's I., litter, ♀, 30.VIII.1965, G. W. Ramsay; Marlborough, Oara, Kaikoura, litter, 7 n, ♂, 7 ♀♀, 20.IX.1968, J. C. Watt; Nelson, Tasman Bay, Boundary Bay, ♂, 30.VII.1965, G. W. Ramsay; Nelson, Rough I., litter, 6 n, 5 ♂♂, 2 ♀♀, 3.VIII.1967, J. C. Watt; Golden Down Forest, *Pinus,* 2 ♀♀, 10.IV.1972; Timaru, gardens, ♂, 3.IV.1972; Waimate, oak, 3 ♂♂, ♀, 1.IV.1972; Waihao Downs, juniper, 4 ♂♂, 1.IV.1972; Te Anau Downs, *Nothofagus cliffortoides,* 4 ♂♂, 2 ♀♀, 19.III.1972; Glen Hope, *Nothofagus cliffortoides,* ♂, 10.IV.1972; Whangamoa Saddle, *Nothofagus fuscus,* 5 ♂♂, 5 ♀♀, 10.IV.1972; Burke's Pass, *Pinus,* ♂, 2.IV.1972; Dunedin, *Pinus,* ♀, 31.III.1972; Queenstown, 335 m, trees, ♀, 24.III.1972. STEWART ISLAND: Pegasus, ♀, 23.II.1968, G. Kuschel.

This type-species of *Zelandopsocus* is evidently widely distributed over the North and South Islands, being found up to 1500 m, and also occurs on Stewart Island. It has not been collected from outlying islands of the area.

Zelandopsocus kuscheli Thornton, Wong & Smithers, **n. sp.** FIG. 29–33

♀ *Coloration* (after 3 years in alcohol): Head very pale straw, with following exceptions: vertex markings mesad of orbit and median frons mark just distinguishable, light brown; ocelli gray on centripetal borders, eyes black, basal and 2nd flagellar segments grayish brown at each side of joint between them. Thorax and legs pale straw, except thoracic dorsa and 2 distal tarsal segments light brown. Fore wing (FIG. 29) hyaline, veins pale, apart from short brown sections and a small brown patch within pterostigma distally. Hind wing hyaline. Abdomen pale straw. *Morphology:* B = 2.85 mm. I.O.:D = 3.50. f_1 = 0.80 mm. f_2 = 0.45 mm. f_1:f_2 = 1.75. F = 0.67 mm. T = 1.16 mm. t_1 = 0.40 mm. t_2 = 0.07 mm. t_3 = 0.06 mm. rt = 5.71:1:0.88. ct = 17. Claw without preapical tooth. Fw = 3.22 mm. Vein cu_2 in fore wing bare. Hw = 2.44 mm. Hind wing veins bare. Epiproct with dorsal setose flap; paraproct with circular field of 17 trichobothria. Subgenital plate (FIG. 30) apical lobe with a pair of setae. Gonapophyses (FIG. 31): ventral valve styliform; dorsal valve with long subapical spine, not extending to apex of valve; outer valve oval, setose.

♂ *Coloration:* As ♀. *Morphology:* B = 2.60 mm. I.O.:D = 2.50. f_1 = 0.95 mm. f_2 = 0.60 mm. f_1:f_2 1.58. F = 0.67 mm. T = 1.24 mm. t_1 = 0.44 mm. t_2 = 0.06 mm. t_3 = 0.06 mm. rt = 7.33:1:1.00. ct = 22. Fw = 2.98 mm, vein cu_2 bare. Hw = 2.32 mm, veins bare. Flagellar setae much longer than in ♀, flagellum thicker. Epiproct simple, paraproct with oval field of 20 trichobothria. Hypandrium (FIG. 32) central lobe mushroom-shaped, each side a well-sclerotized angular lobe bearing a setose prominence, a smaller conical lobe anterior to each angular lobe. Phallosome (FIG. 33) with a pair of spinous sac-like sclerites, and a ribbon sclerite.

Holotype ♀, NORTH ISLAND: Levin, shrubs, 28.X.1970 (NZDSIR). Allotype ♂, same data (NZDSIR). Paratypes, NORTH ISLAND: Ohakune, 800–1000 m, 8 ♂♂, 6 ♀♀, 31.I.1971 (BPBM); THREE KINGS ISLAND, Great I, Castaway Camp, XI.1970, G. W. Ramsay (♀), J. McBurney (♂, ♀) and G. Kuschel (♂) (AM).

Other specimens examined: THREE KINGS ISLAND: Summit, 200 m, litter, 43 n, 6 ♂♂, 8 ♀♀, 23.XI.1970, G. Kuschel; Castaway Camp, 85 m, litter, 50+ n, 3 ♂♂, 3 ♀♀, 12,16.XI.1970, G. Kuschel; Castaway Camp, litter, ♂, 2 ♀♀, XI.1970, G. Kuschel; Southwest I., summit ridge, *Coprosma macrocarpa,* ♀, XI.1970, G. Kuschel. NORTH ISLAND: Levin, branches and trunk of tree covered with lichen, ♀, 16.IV.1970; Levin, 10 ♀♀, 2.III.1972; Mt Egmont, Dawson Falls, ♀, 28.VI.1970; Te Horo, ♀, 13.IX.1970; Whangarei, shrubs and tree fern, ♀, 7.II.1971; Helena Bay, ♀, 9.II.1971; Whangarei, Parahaki, 250 m, shrubs, n, 4 ♀♀, 26.XII.1970, 3 ♀♀, 8.II.1971; Opotiki, Hukutaia Domain, 2 ♂♂, 8 ♀♀, 28.XII.1970; Pahia, mangrove, 4 n, 2 ♂♂, 6 ♀♀, 27.XII.1970; Manginangino Reserve, n, 27.XII.1970. SOUTH ISLAND: Whangamoa Saddle, *Nothofagus,* ♂, ♀, 16.V.1970; Nelson, Pelorus Reserve, ♂, ♀, 16.V.1970.

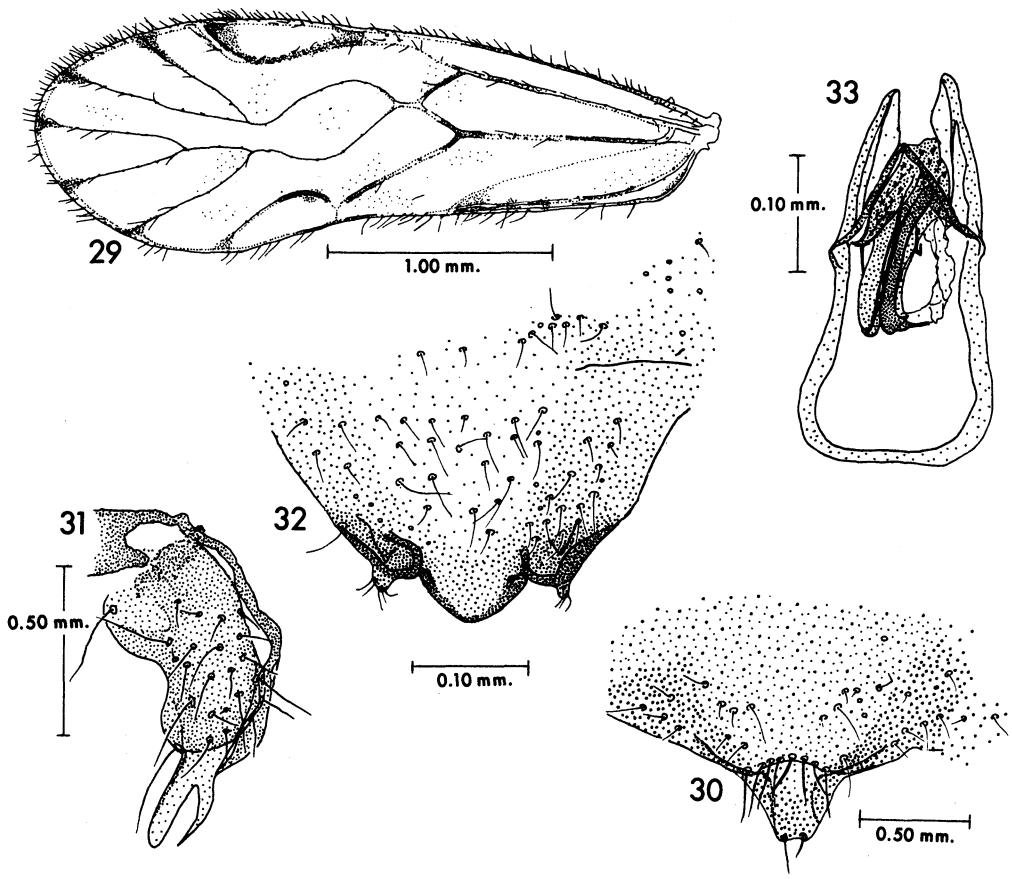


FIG. 29-33. *Zelandopsocus kuscheli* n. sp. ♀: 29, fore wing; 30, subgenital plate; 31, gonapophyses. ♂: 32, hypandrium; 33, phallosome.

Males taken on Three Kings Island appear to lack the small conical lobes on the hypandrium, and have smaller wings.

Z. kuscheli is a typical member of the genus *Zelandopsocus*, apart from having but 2 apical setae on the subgenital plate of the female. The wing pattern is quite distinctive.

Zelandopsocus tectus Thornton, Wong & Smithers, **n. sp.** FIG. 34-36

♀. *Coloration* (after 2-1/2 years in alcohol): Vertex, gena, labrum and anterior part of clypeus brown. Frons, maxillary palps and antennae pale fuscous, pale area of frons extending posteriorly to normal position of ocelli (absent). Thoracic antedorsum, scutella and pleura brown, otherwise light brown. Leg: coxa brown, remainder of leg light brown, t_3 somewhat darker. Fore wing (FIG. 34) brown, pale along veins. Abdomen cream, apically brown, setae black. *Morphology:* B = 2.50 mm. I.O.:D = 3.90. Ocelli absent. f_1 = 0.61 mm. f_2 = 0.42 mm. f_1:f_2 = 1.45. Head sclerites glossy. F = 0.63 mm. T = 1.20 mm. t_1 = 0.32 mm. t_2 = 0.06 mm. t_3 = 0.06 mm. rt = 5.33:1:1.00. ct = 16. Claw without preapical tooth. Fw = 0.73 mm, brachypterous, with vein cu_2 bare. Hw = 0.19 mm, reduced to a minute bare, veinless transparent scale. Epiproct with dorsal setose flap; paraproct with 6–8 trichobothria. Subgenital plate (FIG. 35) with 2 pairs of apical setae, a prominent V of strong setae. Gonapophyses (FIG. 36): ventral valve styliform; outer valve hatchet-shaped; dorsal valve triangular with short recurved subapical spine.

♂. Unknown.

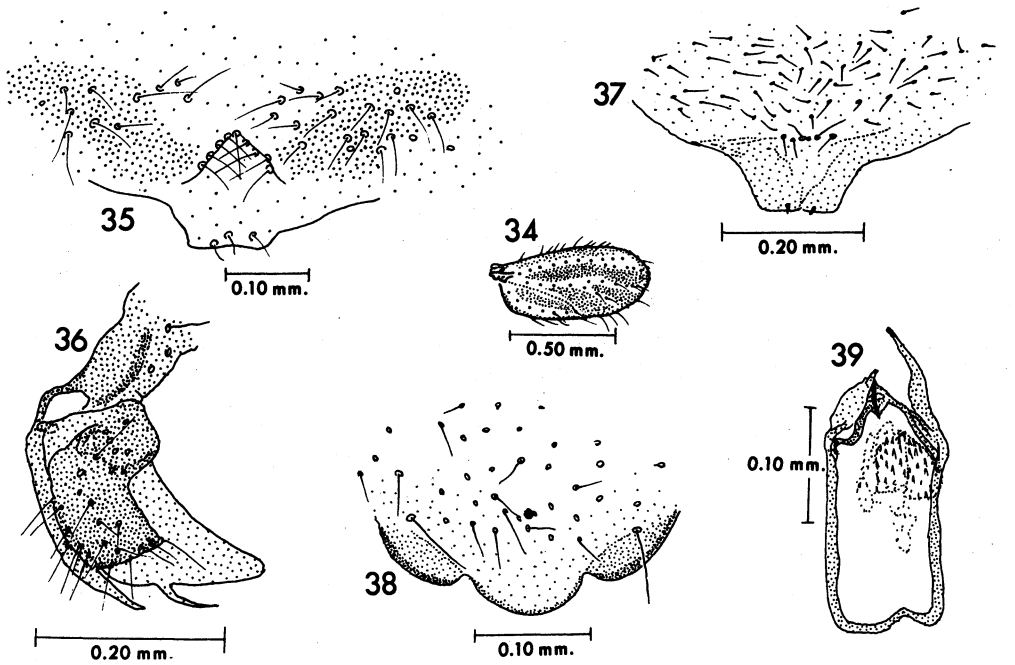


FIG. 34-39. *Zelandopsocus tectus* n. sp. ♀: 34, fore wing; 35, subgenital plate; 36, gonapophyses. *Austropsocus insularis* Smithers ♀: 37, subgenital plate. ♂: 38, hypandrium; 39, phallosome.

Holotype ♀, SOUTH ISLAND: Buller Gorge Reserve, tree fern, 2.III.1971 (NZDSIR). Paratype ♀, SOUTH ISLAND: Ferguson's Bush, tree fern, 3.III.1971 (BPBM).

The paratype differs from the type in that the clypeus is wholly brown. In fore wing pattern this species resembles *Austropsocus delli* which is also brachypterous. It differs in head and leg coloring, and in that vein cu_2 in the fore wing is bare.

On female characters only, this species is provisionally placed in *Zelandopsocus;* it is the only brachypterous species of the genus so far known.

Genus AUSTROPSOCUS Smithers, 1962

Thornton & Smithers (1974) have discussed this genus in their New Caledonian paper. Six new species, 5 from New Zealand and 1 from Chatham Island, are described below and assigned to the genus, 2 of the New Zealand species provisionally. Thus a total of 17 species are now assigned to *Austropsocus,* and 15 of these fall into 3 groups, as follows:

The *insularis* group, of 4 species, from Macquarie, Campbell, Auckland, Antipodes and Snares Islands (*A. insularis,* the type-species of the genus), Chatham Island (*A. chathamensis*), Stewart Island (*A. delli*) and New Zealand (*A. salmoni*), is characterized by the possession of setae on vein cu_2 of the fore wing in all species. In the 2 species of which males are known, the phallosome has spinous sacs within it.

The *apicipunctatus* group comprises 3 New Zealand species: *A. apicipunctatus, A. nimbosus,* and *A. ramsayi.* As in the *productus* group from New Caledonia, species in this group lack the spinous sacs within the male phallosome, but in the *apicipunctatus* group of species the subapical spine of the dorsal valve of the female gonapophyses does not extend to the apex of the valve.

The *productus* group comprises the 7 species from New Caledonia (Thornton & Smithers 1974) and *A. hyalinus* from New Zealand, and is characterised by the subapical spine of the dorsal valve of the female gonapophyses extending beyond the apex of the valve, and an absence of spinous sacs within the phallosome.

A. australis and *A. fasciatus,* provisionally placed in the genus, are both known from 1 sex only, and we have not included them in any of the above groups.

The genus as now known may be distinguished from *Zelandopsocus* by the following characters: middle hypandrium lobe not mushroom-shaped, hypandrium with only 3 lobes (not *A. australis*), female epiproct lacking a dorsal setose flap, apical lobe of female subgenital plate with only 2 setae (not *A. fasciatus*).

Seven of the 8 New Zealand species definitely assignable to *Austropsocus* on this basis are brachypterous in the female. It is perhaps significant that of the 2 that are also known to be brachypterous in the male, 1 occurs only on the outlying islands of Auckland, Antipodes, Macquarie, Campbell and Snares, and the other only on the Chatham Islands. Brachyptery is not a feature of the New Caledonian species of the genus.

The *insularis* group

Austropsocus insularis Smithers

Austropsocus insularis Smithers, 1962: 930. – Thornton and Smithers, 1974: 242.

Further description:

♀. *Morphology:* Subgenital plate (FIG. 37) apical lobe bearing a pair of marginal setae.

♂. *Morphology:* Hypandrium (FIG. 38) with three low, smoothly rounded apical lobes, the middle one not mushroom-shaped, the lateral ones rather sclerotised on the apical margin and each with a stout seta near lateral corner. Phallosome (FIG. 39) with a pair of spinous sacs.

The above further description is based on an examination of paratype material from Macquarie Island.

Distribution: MACQUARIE I., CAMPBELL I., AUCKLAND I., ANTIPODES I., SNARES I. (Smithers 1962, 1974). Not found in New Zealand.

This species is similar in male and female genitalia to *A. chathamensis,* and the species are clearly closely related. Evidently the species are allopatric on the outlying islands of the area, *A. chathamensis* occurring only on the Chatham group.

Austropsocus chathamensis Thornton, Wong & Smithers, **n. sp.** FIG. 40–49

♂ *Coloration* (after 5 years in alcohol): Head generally buff, usual markings on vertex distinguishable. Frons and clypeus pale buff, genae brown. Median epicranial suture and eyes black; ocelli pale. Antennae and maxillary palps pale buff. Labrum pale, with median brown mark. Thorax brown dorsally and on dorsal 1/2 of pleura; lower 1/2 of pleura and whole of legs pale buff. Fore wing (FIG. 40) brown with pale veins and dark brown setae. Abdomen pale buff, with gray-black granulated longitudinal stripe on each side dorsally, ventrally pale buff. *Morphology:* B = 2.35 mm. I.O.:D = 3.80. Ocelli very small. Epicranium above orbit sharply angled (FIG. 46–49). Head sclerites dull. f_1 = 0.65 mm. f_2 = 0.41 mm. f_1:f_2 = 1.59. F = 0.54 mm. T = 0.90 mm. t_1 = 0.32 mm. t_2 = 0.06 mm. t_3 = 0.08 mm. rt = 5.33:1:1.33. ct = 17. Claw without preapical tooth. Fw = 0.38 mm, brachypterous, with long setae. Hind wing absent. Epiproct short, wide, rounded at posterior corner; paraproct with field of 8-9 trichobothria. Hypandrium (FIG. 41) with 3 low, wide, rounded posterior lobes. Phallosome (FIG. 42) with pair of spinous sacs and internal sclerites.

♀. *Coloration:* As ♂. *Morphology:* B = 2.60 mm. I.O.:D = 4.20. Ocelli very small. Head sclerites dull. f_1 = 0.62 mm. f_2 = 0.37 mm. f_1:f_2 = 1.68. F = 0.56 mm. T = 0.90 mm. t_1 = 0.28 mm. t_2 = 0.06 mm. t_3 = 0.08 mm. rt = 4.67:1:1.33. ct = 17. Claw without preapical tooth. Fw = 0.45 mm, brachypterous, with fairly long setae (FIG. 43). Hind wing absent. Epiproct subtriangular, paraprocts with group of 4-6 trichobothria. Subgenital plate (FIG. 44) with apical lobe trapezoid, with 2 (occasionally 3) apical setae. Gonapophyses (FIG. 45) outer valve squarish, ventral valve fairly narrow; dorsal valve with curved,

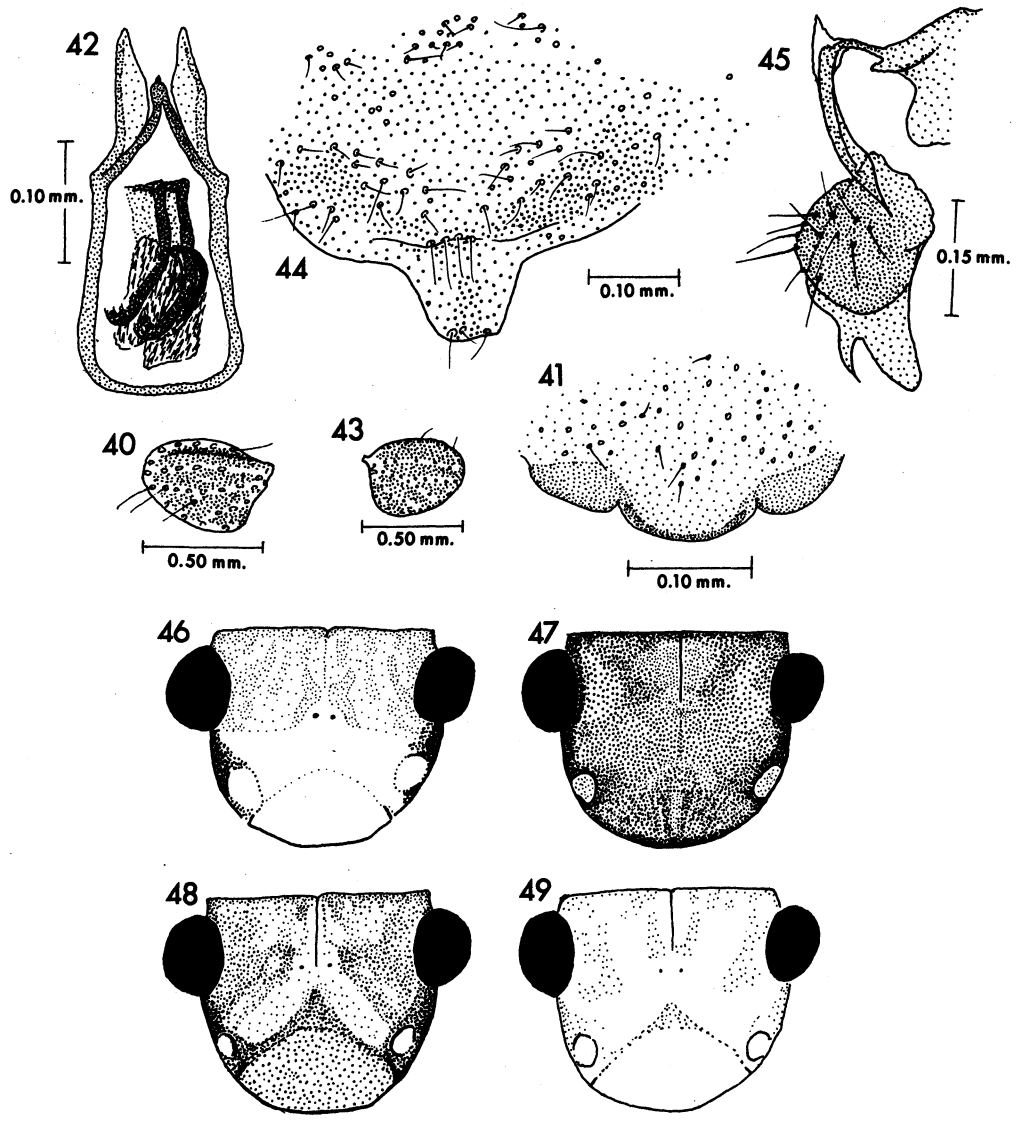


FIG. 40-49. *Austropsocus chathamensis* n. sp. ♂: 40, fore wing; 41, hypandrium; 42, phallosome. ♀: 43, fore wing; 44, subgenital plate; 45, gonapophyses.
46-49, various female head patterns (not to scale, see text).

pointed subapical spine bearing recurved spinelets and not reaching apex of valve.

Holotype ♂, CHATHAM ISLANDS: Pitt I., Glory Bay, forest litter, 1.III.1967, G. Kuschel (NZDSIR). Allotype ♀, same data (NZDSIR). Paratypes, 5 ♂♂, 5 ♀♀, 20 nymphs, same data (BPBM).

Other specimens examined: all from CHATHAM ISLANDS:
(1) With head pattern as type: ♀, Chatham I., Awatotara, 16–19.II.1967, E. W. Valentine; 2 ♀♀, Chatham I., Tuku Tamatea, fern, 20.II.1967, G. W. Ramsay; ♀, Pitt I., Tupuangi, 27.II.1967, G. Kuschel (FIG. 46); 6 ♂♂, 4 ♀♀, 6 n, Chatham I., Tuku R., Awatotara, litter

under karaka, 22.II.1967, A. K. Walker; 1 ♂, 2 ♀♀, 10 n, Chatham I., Waitangi, 5.III.1967, A. K. Walker.

(2) With head dark: ♂, Chatham I., Awatotara, 200 m, moss on tree, 19.II.1967, A. K. Walker; ♀, Chatham I., Awatotara, 150 m, litter in bush, 22.II.1967, G. Kuschel (FIG. 47).

(3) With patterned head: 4 ♀♀, Chatham I., Awatotara, 150 m, beating, 16–19.II.1967, G. Kuschel & G. W. Ramsay; 2 ♀♀, Chatham I., Awatotara, 200 m, fern in bush, 19.II.1967, A. K. Walker (FIG. 48); ♀, Chatham I., Awatotara, 150 m, moss, 22.II.1967, G. Kuschel.

(4) With pale head: ♀, Chatham I., limestone quarry, 11.II.1967, G. Kuschel; 2 ♂♂, 3 ♀♀, 12 n, Chatham I., Awatotara, 150–200 m, filmy ferns and *Dicksonia*, 19, 21.II.1961, A. K. Walker (FIG. 49); ♂, ♀, 4 n, Chatham I., Mt Munning, Kaingaroa, bush litter, 28.II.1967, A. K. Walker.

This species shows considerable variation in head pattern. Some specimens, annotated (1) above (FIG. 46), are in agreement with the type. Others (2) (FIG. 47) have the head brown, with the pattern only discernible with difficulty, others (3) (FIG. 48) have a patterned head somewhat intermediate between type 1 and type 2, and yet others (4) (FIG. 49) have a very pale head with a pattern similar to type 3. The genitalia are the same in specimens of all head pattern types. The type 4 specimens also lack the thoracic pigmentation, whereas specimens of types 1, 2 and 3 agree with the type in this. In all specimens studied, the fore wings are dark, with the broad vein tracts pale.

In genitalia this species is very similar to *A. insularis*, which occurs on Macquarie, Campbell, Auckland, Antipodes and Snares Islands, but is absent from Chatham. It differs consistently in possessing phallosome sclerites, and in having brown wings with pale veins. In specimens with brown pigment on the head and thorax, the coxae and the area of pleura immediately above them are pale buff, contrasting markedly with the brown pigment of the more dorsal area of the pleura; this pigmental contrast is not found in *A. insularis*.

The wings recall those of *A. delli* in their color pattern, although they are much smaller, and have a more reduced venation. *A. delli* has the legs reddish brown; in even the most darkly pigmented specimens of *A. chathamensis* in which the head is dark brown, the legs are always pale buff. Moreover, in *A. chathamensis*, the labrum is pale, with a median brown mark that is lacking in *A. delli*.

Zelandopsocus tectus has a similarly marked wing, and is also brachypterous. However, *Z. tectus* may be distinguished from *A. chathamensis* without dissection by the wholly brown labrum and the wholly brown thoracic pleura and coxae.

Austropsocus delli Smithers

Austropsocus delli Smithers, 1969: 332.

This species is known only from a single female from Stewart Island. The wing pattern is similar to that of *Z. tectus* and *A. chathamensis*, which are also brachypterous. *A. delli* may be distinguished from them by the pale labrum, and reddish brown legs with coxa, femur and tibia the same color.

Austropsocus salmoni Smithers FIG. 50-51

Austropsocus salmoni Smithers, 1969: 334.

The subgenital plate of a female from beech, Lake Rotoiti, 1.III.1971 (FIG. 51) has an apical lobe which is wider and shorter than that drawn from the type.

This species is clearly recognizable by the pattern of the brachypterous fore wings (FIG. 50). It was described from specimens from the NORTH ISLAND, Karori Hills, Wellington. Further records of this species are SOUTH ISLAND: 3 ♀♀, Lake Rotoiti, *Nothofagus*,

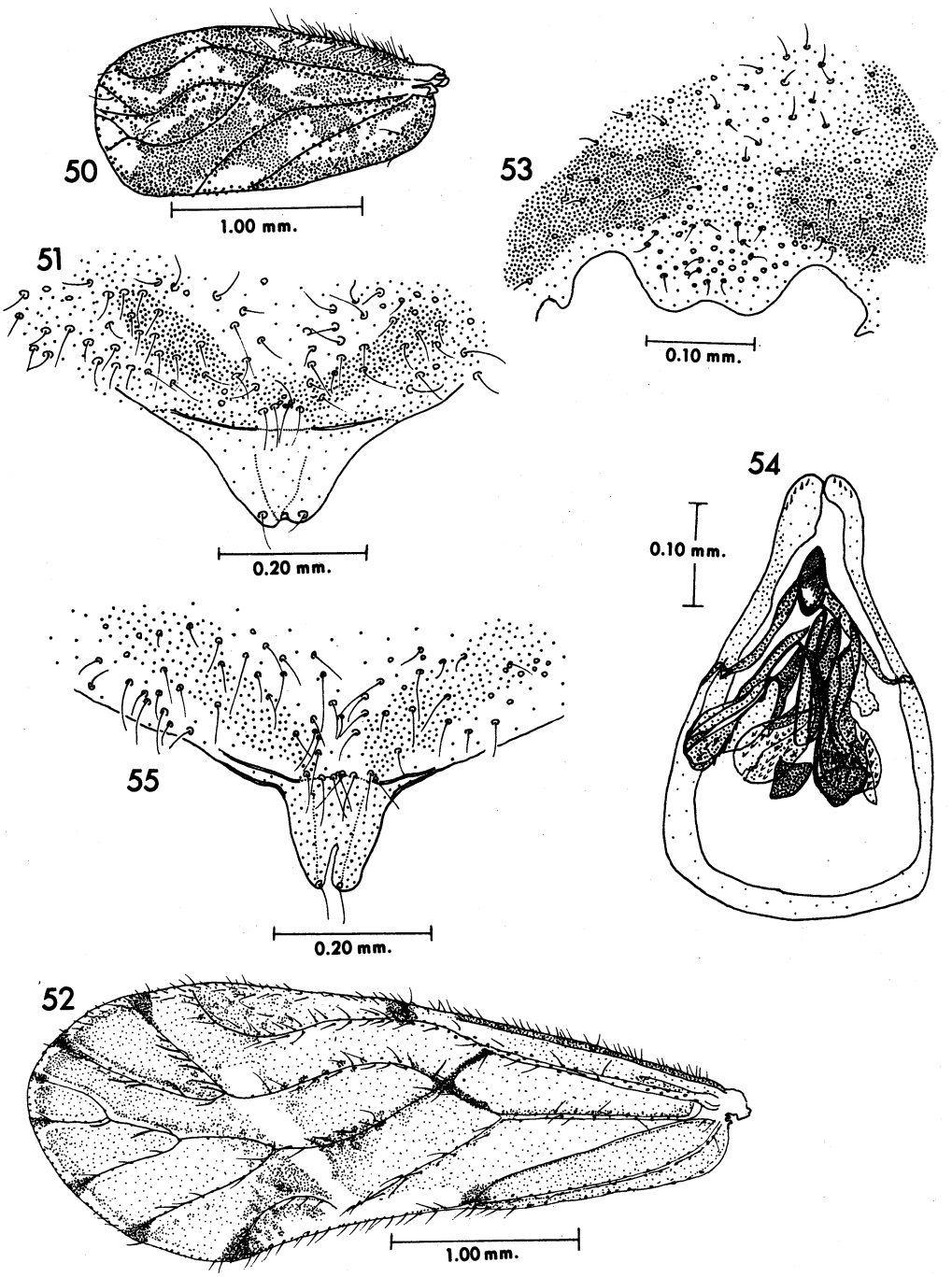


FIG. 50-55. *Austropsocus salmoni* Smithers ♀: 50, fore wing; 51, Subgenital plate.
Austropsocus apicipunctatus Tillyard ♂: 52, fore wing; 53, hypandrium; 54, phallosome, ♀: 55, subgenital plate.

1.III.1971; 2 ♀♀, Lake Rotoroa, shrubs, 1.III.1971; 1 ♀, Eglinton, Cascade Creek, 20.X.1966, J.I. Townsend.

The *apicipunctatus* group

Austropsocus apicipunctatus (Tillyard), **n. comb.** FIG. 52-55

Caecilius apicipunctatus Tillyard, 1923: 189. – Smithers, 1969: 343 (♂).
Heterocaecilius apicipunctatus: Lee & Thornton, 1967: 9.
Pseudocaecilius apicipunctatus: Lee & Thornton, 1967: 111.
Austropsocus hollowayae Smithers, 1969: 335 (♀).

The female *hollowayae* and the male *apicipunctatus* are the same species. The association of the sexes has been proved by breeding in the laboratory. The name *hollowayae* thus falls as a synonym of *apicipunctatus* (Thornton & Smithers 1974).

Further description:

♂. *Coloration* (after 3 years in alcohol): Head, thorax, antennae and legs pale buff, eyes black, ocelli dark gray centripetal borders, a narrow gray-brown band along side of thorax above coxae, 2 distal tarsal segments light brown. Fore wing (FIG. 52) light brown pigment on membrane not entirely uniform. Hind wing hyaline. Abdomen cream, with dark gray-brown granulated pigment laterally and a median narrow gray-brown line dorsally over 7 basal segments. *Morphology:* B = 2.50 mm. I.O.:D = 2.30. f_1 = 0.87 mm. f_2 = 0.67 mm. f_1:f_2 = 1.29. F = 0.69 mm. T = 1.39 mm. t_1 = 0.48 mm. t_2 = 0.06 mm. t_3 = 0.06 mm. rt = 8.00:1:1.00. ct = 20. Fw = 3.32 mm, vein cu_2 bare. Hw = 2.80 mm, hind wing veins bare. Epiproct simple, paraproct with an oval field of 20 trichobothria. Hypandrium (FIG. 53) with large wide apical lobe and much smaller conical lateral lobes. Phallosome (FIG. 54) with a pair of spinous sac-like sclerites, a pair of short wide sclerites, and several long pointed sclerites.

♀. *Coloration:* Newly emerged, general body color greenish-yellow with brown pattern, eyes grayish green. Darkens to color described by Smithers (1969). *Morphology:* Epiproct without dorsal setose flap. Subgenital plate (FIG. 55).

Specimens on which the above further description is based: ♂, ♀, NORTH ISLAND, Levin, tree fern, 28.X.1970 (NZDSIR); ♀, NORTH ISLAND, Hunterville, Bruce Park, tree fern, 1.I.1971.

Other specimens examined: NORTH ISLAND: Otaki Forks, on *Cyathea dealbata* and *Dicksonia squarrosa,* 3 ♂♂, 6 ♀♀, 17.I.1970, 3 ♂♂, 2 ♀♀, 9.VIII.1970; Shannon, shrubs and tree fern, 5 n, 3 ♂♂, 4 ♀♀, 5.IV.1970; Levin, tree fern, 19 ♂♂, 3 ♀♀, 22.III.1970, 21 ♂♂, 7 ♀♀, 12.IV.1970, 17 ♂♂, 25 ♀♀, 14.VI.1970, 18 ♂♂, 20 ♀♀, 22.VIII.1970, 7 ♂♂, 10 ♀♀, 5.IX.1970, 6 n, 7 ♂♂, 5 ♀♀, 28.X.1970, 9 n, 13 ♂♂, 28 ♀♀, 22.XII.1970, n, ♀, 14.I.1971; Waipoua, Kauri forest, 2 ♂♂, 1.VI.1970, 5 ♂♂, 11.II.1971; Te Horo, n, 2 ♂♂, 2 ♀♀, 13.IX.1970; Te Mata, 2 n, 2 ♂♂, 1 ♀, 27.IX.1970; Matawai, tree fern, n, ♀, 28.XI.1970, ♀, 29.XII.1971; Whangarei, Parahaki, 240 m, 4 n, ♂, ♀, 26.XII.1970, ♂, 4 ♀♀, 8.II.1971; Manginangino Reserve, ♀, 27.XII.1970; Taihape, ♂, 30.I.1971; Ohakune,600–1000 m, n, ♂, 4 ♀♀, 31.I.1971; Whangarei, ♀, 7.II.1971; Whangarei Falls, ♂, 8.II.1971; Spirit's Bay, 700 m, ♂, 2 ♀♀, 18.I.1966, A. K. Walker. SOUTH ISLAND: Nelson district, Paturau, litter, 7 n, ♀, 18.VIII.1964, E. S. Gourlay.

The color of the nymph and newly emerged male is like that described for the newly emerged female above. We have examined the type of *apicipunctatus,* and the ground color of the fore wing membrane is not as uniform as shown in Tillyard's figure.

The wings of the male are held very steeply in repose. This species' range does not appear to include the South Island, apart from the Nelson district. Like many of the New Zealand *Austropsocus* species, *A. apicipunctatus* is dimorphic, the females being brachypterous, the males macropterous. This species appears to be particularly associated with tree ferns.

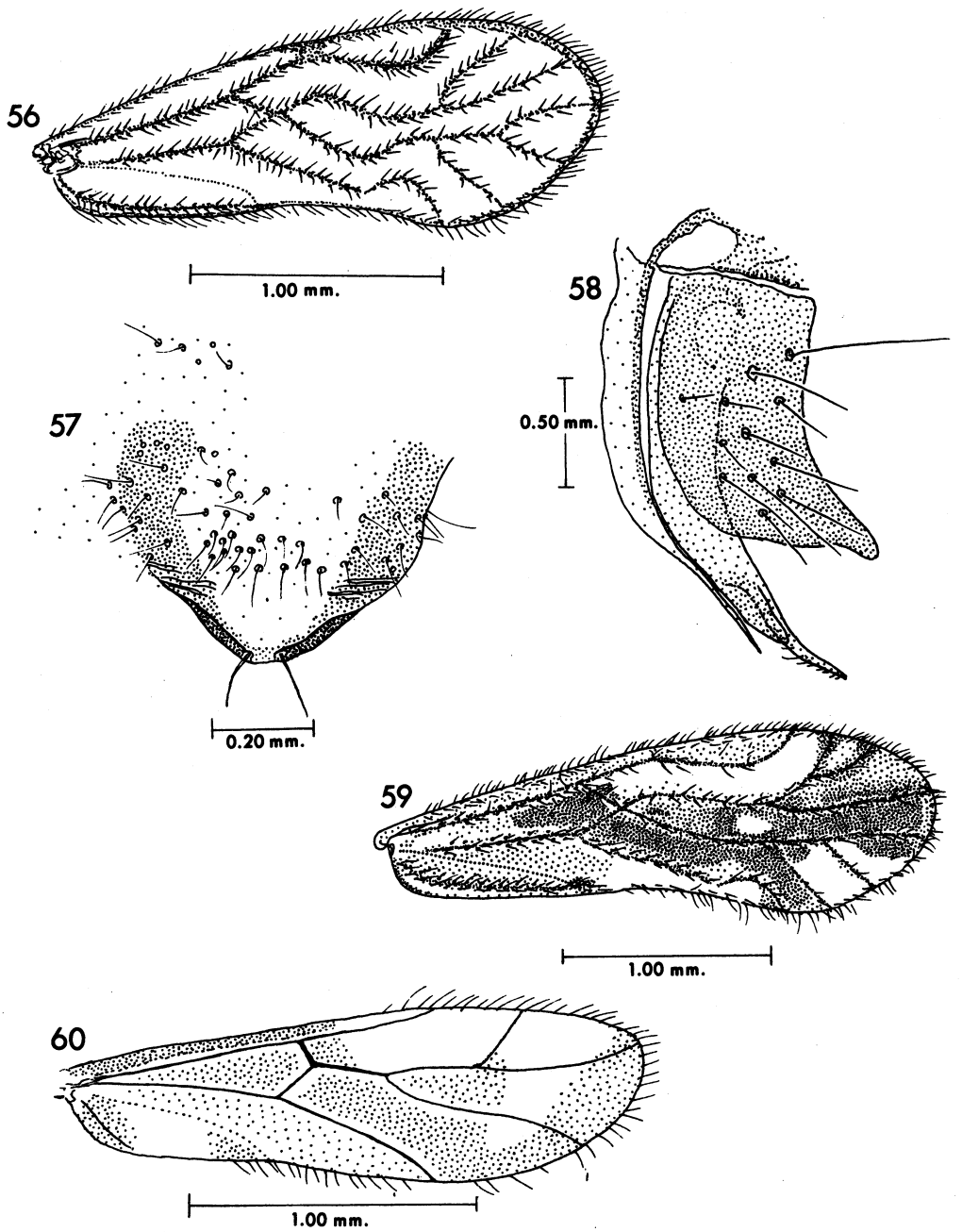


FIG. 56-60. *Austropsocus hyalinus* n. sp. ♀: 56, fore wing; 57, subgenital plate; 58, gonapophyses. *Austropsocus nimbosus* n. sp. ♂: 59, fore wing; 60, hind wing.

Austropsocus nimbosus Thornton, Wong & Smithers, n. sp. FIG. 59–66

♂ *Coloration* (after 2 years in alcohol): Vertex brown, without discernible pattern, median epicranial suture black. Eyes black, ocelli with black centripetal borders. Frons and gena brown. Clypeus darker brown, striae not discernible. Scape and pedicel of antenna light brown, flagellum lighter. Maxillary

palp with apical segment light brown, rest of palp lighter. Thorax wholly brown, not lighter adjacent to sutures. Leg: coxa brown; trochanter, femur, tibia and basal tarsal segment very pale buff, 2 apical tarsal segments light brown. Fore wing (FIG. 59) patterned with brown pigment. Hind wing (FIG. 60) smoky brown in posterior cells. Abdomen light brown, with extensive dark gray-brown granulations. *Morphology:* B = 1.75 mm. I.O.:D = 3.50. Head with many prominent long setae. f_1 = 0.63 mm. f_2 = 0.40 mm. f_1:f_2 = 1.57. F = 0.42 mm. T = 0.87 mm. t_1 = 0.26 mm. t_2 = 0.60 mm. t_3 = 0.60 mm. rt = 4.33:1:1.00. ct = 13. No preapical tooth on claw. Fw = 2.14 mm, macropterous, vein cu_2 bare, setae at sides of veins in basal 1/2 of wing. Hw = 1.97 mm, veins bare. Hypandrium (FIG. 61) trilobed, posterior margin sclerotized. Phallosome (FIG. 62) with internal sclerites, no spinous sac-like sclerites. Head and thoracic sclerites very glossy.

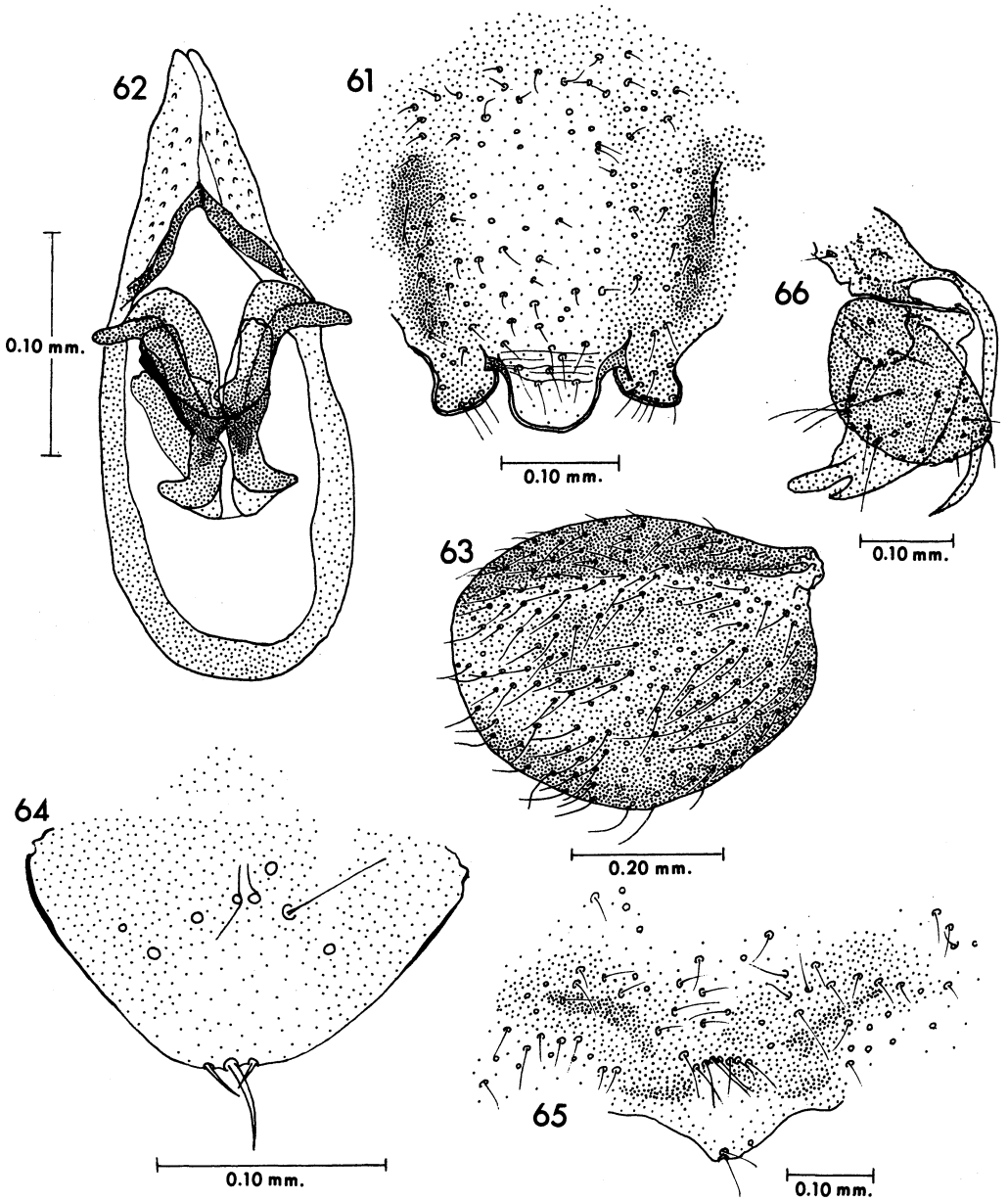


FIG. 61-66. *Austropsocus nimbosus* n. sp. ♂: 61, hypandrium; 62, phallosome. ♀: 63, fore wing; 64, epiproct; 65, subgenital plate; 66, gonapophyses.

♀. *Coloration:* As ♂, with following exceptions: vertex pattern discernible, no dark inner borders to ocelli, femur brown, abdomen creamy buff, last tergite brown, fore wing largely brown (FIG. 63). *Morphology:* B = 2.50 mm. I.O.:D = 5.80. f_1 = 0.40 mm. f_2 broken. Head and thoracic sclerites dull. Setae on head not so prominent as in ♂. F = 0.44 mm. T = 0.66 mm. t_1 = 0.19 mm. t_2 = 0.40 mm. t_3 = 0.07 mm. rt = 4.75:1:1.75. ct = 0. No preapical tooth on claw. Fw = 0.48 mm. Brachypterous fore wing scale-like, setose, no discernible veins. Hw = 0.12 mm, a minute transparent bare scale. Epiproct (FIG. 64) without dorsal setose flap, bare on apical 1/2 except for 1 long stout seta with a shorter seta each side at apex. Paraproct with a field of 6 trichobothria, and 1 seta not in a rosette socket. Subgenital plate (FIG. 65) with apical lobe not sharply distinct from rest of plate, bearing 2 apical setae. Gonapophyses (FIG. 66): ventral valve styliform; outer valve oval, setose; dorsal valve with sharply pointed subapical spine.

Nymph. Coloration: Head and throax white, abdomen with dull red pigmentation. Eye color in life dark green.

Holotype ♂, SOUTH ISLAND, Ferguson's Bush, 3.III.1971 (NZDSIR). Allotype ♀ (NZDSIR) and paratypes, 4 ♂♂, ♀ (BPBM), same data.

Other specimens examined: NORTH ISLAND: Levin, tree fern, ♂, ♀, 14.VI.1970, 4 ♂♂, 2 ♀♀, 22.VII.1970, 3 ♀♀, 22.XI.1970; Otaki Forks, tree fern, 5 ♂♂, 9.VIII.1970; Ohakune, 750–1000 m, shrubs and tree fern, ♀, 31.I.1971; Tiritea, 5 ♂♂, 6 ♀♀, 3.X.1970. SOUTH ISLAND: Pelorus Reserve, tree fern, 11 ♂♂, 6 ♀♀, 16.V.1970, 14 ♂♂, 5 ♀♀, 27.II.1971, 6 n, 12 ♂♂, 5 ♀♀, 9.IV.1972; Mamorangi, shrubs, 2 ♂♂, 5 ♀♀, 27.II.1971; Buller Gorge Reserve, n, ♂, 2 ♀♀, 2.III.1971; Marsden Valley, ♀, 21.X.1965, J. I. Townsend; Queenstown, 335 m, dead *Nothofagus fuscus,* 4 ♂♂, 5 ♀♀, 25.III.1972; Dunedin, *Pinus,* ♂, 31.III.1972.

The sexes of this species, which differ in a number of respects, were associated by laboratory breeding. Males hold their wings very steeply in repose, as do species of *Zelandopsocus.*

The wing pattern of the male is distinctive. The hypandrium is similar to that of *Z. kuscheli.*

Austropsocus ramsayi Thornton, Wong & Smithers, n. sp. FIG. 67–69

♀. *Coloration:* Head brown, except a lighter broad V from antennal socket to ocellar protuberance, eyes and median epicranial suture black, pedicel and flagellum light brown, maxillary palp very pale straw, tip of apical segment light brown. Thorax brown, a little paler bordering sutures of tergites. Fore wing (FIG. 67). Leg: coxa brown, trochanter very pale straw, femur brown, tibia light brown, t_1 very pale straw, t_2 and t_3 brown. Abdomen gray-brown over basal 1/4, remainder buff with gray-brown annular rings. *Morphology:* B = 2.50 mm. I.O.:D = 3.50. Head and thoracic sclerites shining. f_1 = 0.50 mm. f_2 = 0.30 mm. f_1:f_2 = 1.66. F = 0.59 mm. T = 0.95 mm. t_1 = 0.28 mm. t_2 = 0.06 mm. t_3 = 0.06 mm. rt = 4.66:1:1.00. ct = 13 (small). No preapical tooth on claw. Fw = 0.19 mm, brachypterous, with 10 long setae (FIG. 67). Hw absent. Epiproct simple, a single apical seta, no dorsal setose flap. Paraproct with a field of 7 trichobothria. Subgenital plate (FIG. 68) with a pair of apical setae. Gonapophyses (FIG. 69): ventral valve styliform; outer valve oval, setose; dorsal valve with relatively short subapical spine.

♂. Unknown.

Holotype ♀, SOUTH ISLAND, Manapouri, Wilmont Pass, 700 m, on *Polystichum vestitum,* G. W. Ramsay (NZDSIR).

Only 1 specimen of this brachypterous species has been collected.

The *productus* group

Austropsocus hyalinus Thornton, Wong & Smithers, n. sp. FIG. 56–58

♀. *Coloration* (after 2-1/2 years in alcohol): Vertex light brown, markings not discernible, median epicranial suture black. Eyes black, ocelli with black centripetal borders. Frons and area around ocellar protuberance pale buff. Gena light brown, a brown mark between orbit and antennal socket. Clypeus light brown, striae indistinct. Maxillary palp brown, apical segment dark brown. Antennae light brown. Thorax and legs buff, dorsal and apical 2 tarsal segments light brown, a wide brown granulated band across

cervicum and along thoracic pleura above coxae. Fore wing (FIG. 56) membrane pale brown, veins and setal sockets brown. Hind wing hyaline, veins brown. Abdomen cream, a broken lateral gray-brown band in continuation of the thoracic pleural band. *Morphology:* B = 1.80 mm. I.O.:D = 3.50. f_1 = 0.44 mm. f_2 = 0.34 mm. f_1:f_2 = 1.29. F = 0.42 mm. T = 0.81 mm. t_1 = 0.24 mm. t_2 = 0.04 mm. t_3 = 0.06 mm. rt = 6.0:1:1.50. ct = 15. Claw without preapical tooth. Fw = 2.40 mm. Vein cu_2 in fore wing bare, setae on other veins lie at right angles to vein, making veins appear bristly. Hw = 1.93 mm. Hind wing veins bare. Epiproct simple, no dorsal setose flap. Paraproct with circular field of 12 trichobothria, and 2 setae not in rosette sockets. Subgenital plate (FIG. 57) apical lobe shallow, scleroitized laterally, bearing a pair of apical setae. Gonapophyses (FIG. 58): ventral valve styliform; outer valve with a triangular lobate extension; dorsal valve subapical spine extending beyond apex of lobe. Head and thoracic sclerites, particularly thoracic dorsa, glossy.

♂. Unknown.

Holotype ♀, NORTH ISLAND, Hamilton, Rotorua, tree fern, 28.XI.1970 (NZDSIR). Paratypes, 2 ♀♀, same data (BPBM).

Other specimens examined: NORTH ISLAND: New Plymouth, Pukekura Park, shrubs, ♀, 27.VI.1970; Whangarei, Parahaki, 250 m, shrubs, n, ♀, 8.II.1971; Helena Bay, shrubs, ♀, 9.II.1971. SOUTH ISLAND: Pelorus Reserve, tree fern and shrubs, 2 ♀♀, 9.IV.1972. AUSTRALIA: N.S.W., Soldier's Memorial Park, Sydney, wet xerophytes, ♀, 19.XI.1970.

This species is parthenogenetic in the laboratory, and no males have been taken. It is unusual among New Zealand species of *Austropsocus* in being fully winged in the female, and in having the subapical spine of the dorsal valve of the gonapophyses extending beyond the apex of the valve. In these latter respects it resembles the New Caledonian species of *Austropsocus.*

The shape of the outer valve is rather unusual, and the veins of the fore wing have a peculiar close zig-zag appearance because of the pigmentation of alternating setal sockets.

Austropsocus australis Thornton, Wong & Smithers, **n. sp.** FIG. 70-73

♂ *Coloration* (after 1 year in alcohol): Head grayish white, usual markings on vertex and clypeus indistinct, pale grayish brown. Eyes black, ocelli with wide black borders centripetally. Maxillary palp grayish white, apical segment pale brown. Scape and pedicel of antenna grayish white, flagellum pale brown. Thorax generally grayish white, anterior of antedorsum of mesothorax light brown, other dorsa of thorax very pale grayish brown, thoracic pleura light brown. Leg grayish white, 2 apical tarsal segments pale brown. Fore wing (FIG. 70) clouded with brown, hind wing almost hyaline. Abdomen pale grayish brown. *Morphology:* B = 2.85 mm. I.O.:D = 2.50. f_1 = 1.29 mm. f_2 = 0.50 mm. f_1:f_2 = 2.58. Head sclerites dull. F = 0.78 mm. T = 1.46 mm. t_1 = 0.50 mm. t_2 = 0.08 mm. t_3 = 0.10 mm. rt = 6.25:1:1.25. ct = 21. No preapical tooth on claw. Fw = 4.00 mm, macropterous, vein cu_2 bare. Hw = 3.12 mm, veins bare. Epiproct (FIG. 71) with distinct chaetotaxy; paraproct with circular field of 22–24 trichobothria. Hypandrium (FIG. 72) with 5 lobes, the middle one not mushroom-shaped. Phallosome (FIG. 73) with a pair of ribbon sclerites and 2 other pairs of sclerites.

♀. Unknown.

Holotype ♂, SOUTH ISLAND, Milford, beating *Nothofagus* and other trees, 20.III.1972 (NZDSIR).

This species is described from a single male because its genitalic characteristics are so unusual. The hypandrium, although 5-lobed like most species of *Zelandopsocus,* does not have a mushroom-shaped median lobe and the lobes are setose. Its placing in *Austropsocus* is provisional.

There is the possibility that this species is the male of one of the species listed here that is known only from females, possibly *A. salmoni* on color pattern. However, it should be remembered that, for example, in *A. nimbosus,* there are considerable differences between male and female in body coloration.

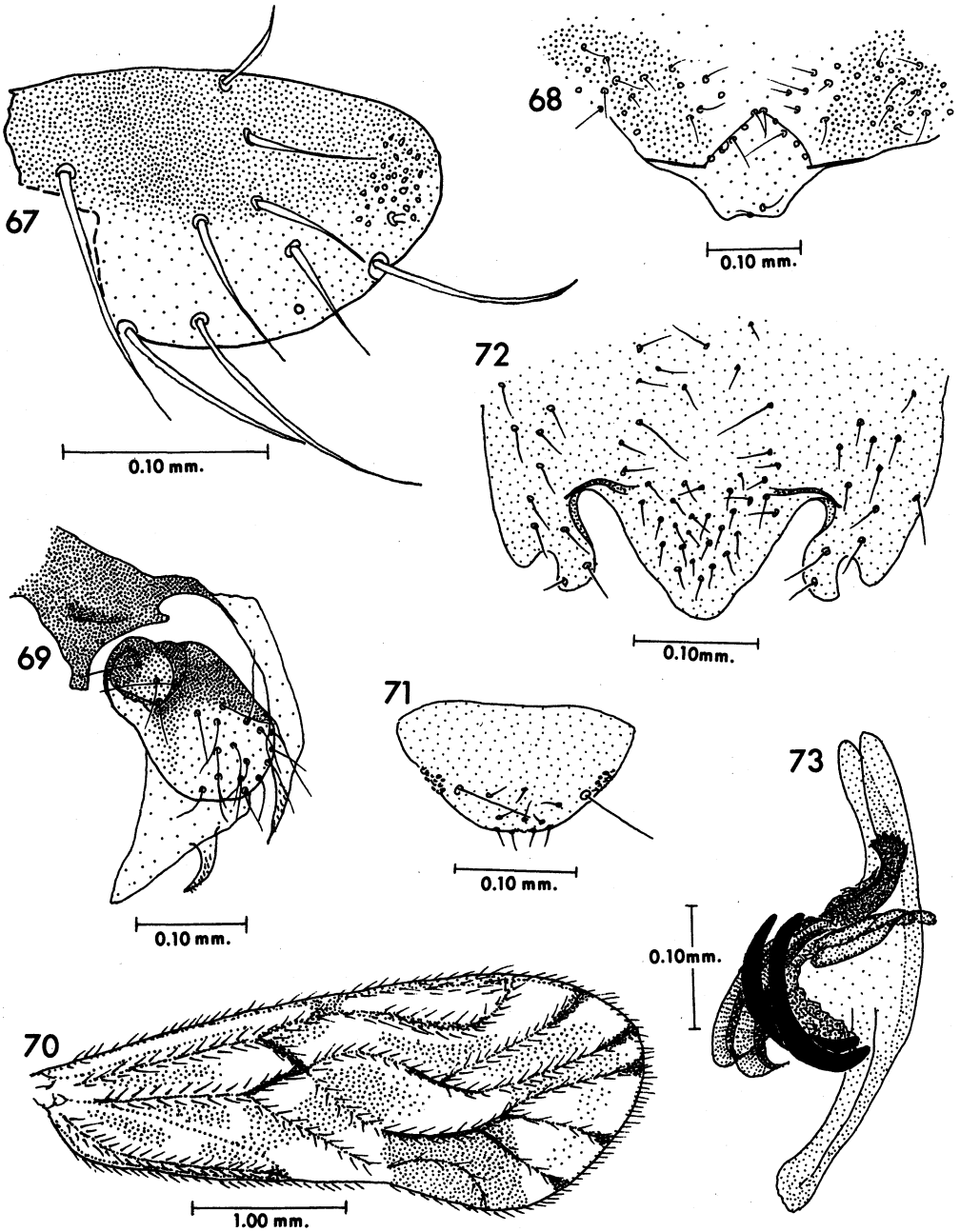


FIG. 67-73. *Austropsocus ramsayi* n. sp. ♀: 67, fore wing; 68, subgenital plate; 69, gonapophyses. *Austropsocus australis* n. sp. ♂: 70, fore wing; 71, epiproct; 72, hypandrium; 73, phallosome.

Austropsocus fasciatus Thornton, Wong & Smithers, **n. sp.** FIG 74–78

♀. *Coloration* (after 2-1/2 years in alcohol): Ground color of head light brown, marks on vertex vague, grayish brown. Frons light brown; clypeus brown, striae just discernible; gena brown. Eyes black, ocelli with black centripetal margins. Antenna very light brown; maxillary palp light brown, distal segment brown apically. Thoracic dorsa and pleura brown, light brown between dorsal sutures. Leg: coxa and apical tarsal segment brown, otherwise light brown; femur of only metathoracic legs is brown. Fore wing (FIG. 74) brown basally, hyaline distally. Hind wing (FIG. 75) light brown basally, hyaline distally. Abdomen cream, with grayish brown granulations. *Morphology:* B = 2.80 mm. I.O.:D = 2.50. Sclerites of head and thorax waxy, shining. f_1 = 0.46 mm. f_2 = 0.22 mm. f_1:f_2 = 2.10. F = 0.44 mm. T = 0.91 mm. t_1 = 0.30 mm. t_2 = 0.05 mm. t_3 = 0.06 mm. rt = 6.00:1:1.2. ct = 20. No preapical tooth on claw. Fw = 2.28 mm, vein cu_2 bare, other basal veins with setae sited on veins. Hw = 1.75 mm, veins bare. Epiproct squarish, apparently without dorsal setose flap, paraproct with circular field of 13 trichobothria and 1 supernumerary seta. Subgenital plate (FIG. 76) with broad apical lobe with rounded sides, carrying 4 terminal setae and with apical margin beset with small spines (FIG. 77). Gonapophyses (FIG. 78): ventral valve broad, with subapical lobe; outer valve with long setae on margin; dorsal valve parallel sided with strongly curved subapical spine.

♂. Unknown.

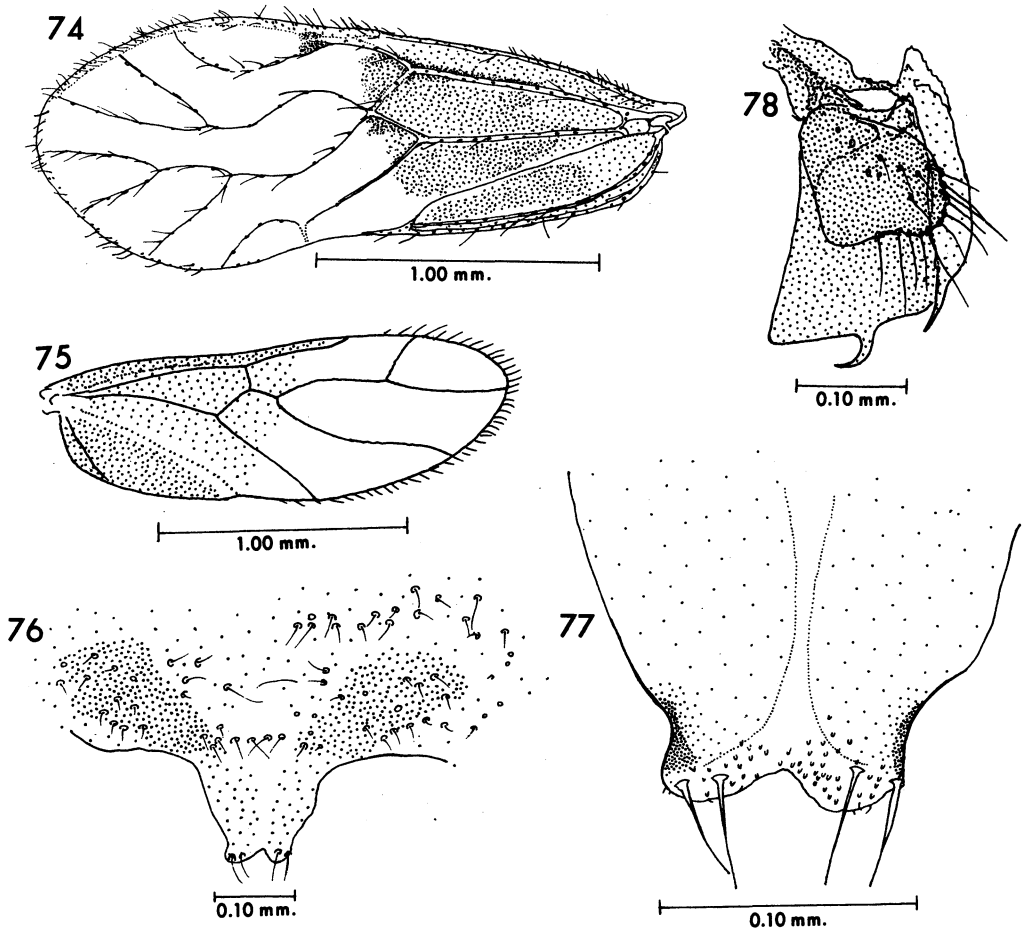


FIG. 74-78. *Austropsocus fasciatus* n. sp. ♀: 74, fore wing; 75, hind wing; 76, subgenital plate; 77, apex of subgenital plate, 78, gonapophyses.

Holotype ♀, NORTH ISLAND, Maungatapere, beating various trees, 12.II.1971 (NZDSIR).

This distinctively marked species is similar in the fore wing to *Z. hemiptenus* from New Caledonia, although the division between pigmented and hyaline portions is not in exactly the same place. The species has some features of *Zelandopsocus* – notably the subgenital plate and gonapophyses, but the typical dorsal setose flap is not clearly distinguishable on the epiproct in our preparation. Possibly it is flattened, and overlaying the epiproct proper. The placing in *Austropsocus* is provisional.

Genus BRYOPSOCUS Thornton, Wong & Smithers, n. genus

Belonging to the Philotarsidae. Claw with preapical tooth. Hind wing veins bare. Female gonapophyses with outer valve large, rounded; subgenital plate apical lobe bare or with a pair of small fine setae. Female epiproct without dorsal setose flap. Hypandrium with a pair of low, widely spaced, setose posterior lobes.

The type-species is *Bryopsocus townsendi.*

This genus is erected to contain the 2 species below, which have in common several features that differ from those of other philotarsid genera.

Bryopsocus townsendi (Smithers), **n. comb.** FIG. 79–88

Austropsocus townsendi Smithers, 1969: 337.

Smithers described this species from ♀♀ only.

Further description:

♂. *Coloration:* Vertex mid-brown, no discernible pattern, frons lighter, gena mid-brown, clypeus as vertex, no discernible striae. Antennae and maxillary palps mid-brown. Eyes black; ocellar protuberance dark brown, ocelli pale. Mesothoracic terga brown, sutures dark brown; metathoracic terga pale buff, when overlain by the fuscous wings appearing the same color as the metathoracic terga. Thoracic pleura brown. Leg: coxa and femur pale buff, remainder of leg brown. Fore wing (FIG. 79) uniformly fuscous light brown, apart from a small area around vein cu_2 which is hyaline, and areola postica and anal cell which are a little darker than rest of membrane. Hind wing uniformly pale brown apart from cell R_1 which is darker. Abdomen dorsally charcoal gray with white patches along sutures dorsally, these sometimes confined to lateral sections; ventrally gray; apical sclerites brown. *Morphology:* B = 2.30 mm. I.O.:D = 4.00. Flagellar setae over 4 times as long as width of segments. f_1 = 0.60 mm. f_2 = 0.37 mm. f_1:f_2 = 1.62. Head and thoracic terga waxy. Fw = 3.18 mm, macropterous (also brachypterous 0.86 to 1.42 mm), venation as in FIG. 79, veins, including cu_2, setose, and setae uniformly scattered over membrane except areola postica, costal and anal cells, and most of cell R. Hw = 2.56 mm, veins bare. F = 0.65 mm. T = 1.17 mm. t_1 = 0.39 mm. t_2 = 0.08 mm. t_3 = 0.10 mm. rt = 4.87:1:1.25. ct = 19. Claw with small preapical tooth. Abdominal terga not hard and fused as they are in ♀. Epiproct with sclerotized rim, paraproct with oval field of 12 trichobothria. Hypandrium (FIG. 80) similar to that of *B. angulatus.* Phallosome (FIG. 81 and 82) with the following pairs of sclerites: boomerang-shaped; short, pointed; long, curved; oval; spinous sacs; large, plate-like, with finely crenulated margins; the last pair are evidently lost when the penis is extruded (FIG. 85) and the long curved sclerites curve around the spinous sacs in the resting position (FIG. 81 and 86). Brachypterous fore wings are brown with paler margins along veins (FIG. 83 and 84); the phallosomes of brachypterous forms, FIG. 85 (same specimen as FIG. 83) and FIG. 86 (same specimen as FIG. 84), are evidently the same as in the macropterous form.

A holotype female was designated by Smithers. Plesiotypes: SOUTH ISLAND: ♂,macropterous Kaikoura, Rehipuhia, 450 m, moss under beech, 12.X.1966, A. K. Walker (NZDSIR) (a macropterous ♂, 7 ♀♀, and 10 n were collected with this specimen; Mt Niger, 1650 m, moss on rocks, brachypterous ♂, 26.II.1966, specimen 66/102, J. Townsend (BPBM); Mt Niger, 1650 m, moss on rocks, 3 brachypterous ♂♂ (2 dissected), 26.II.1966, J. Townsend (AM); Nelson, Mt Malita, 800–1000 m, moss at bush edge and in open, macropterous ♂, 1.IV.1966, J. Townsend; Nelson, Bulles, Gowan Bridge, wet moss, brachypterous ♂ (dissected), 24.IX.1964, specimen 64/104, J. Townsend & L. Marchant.

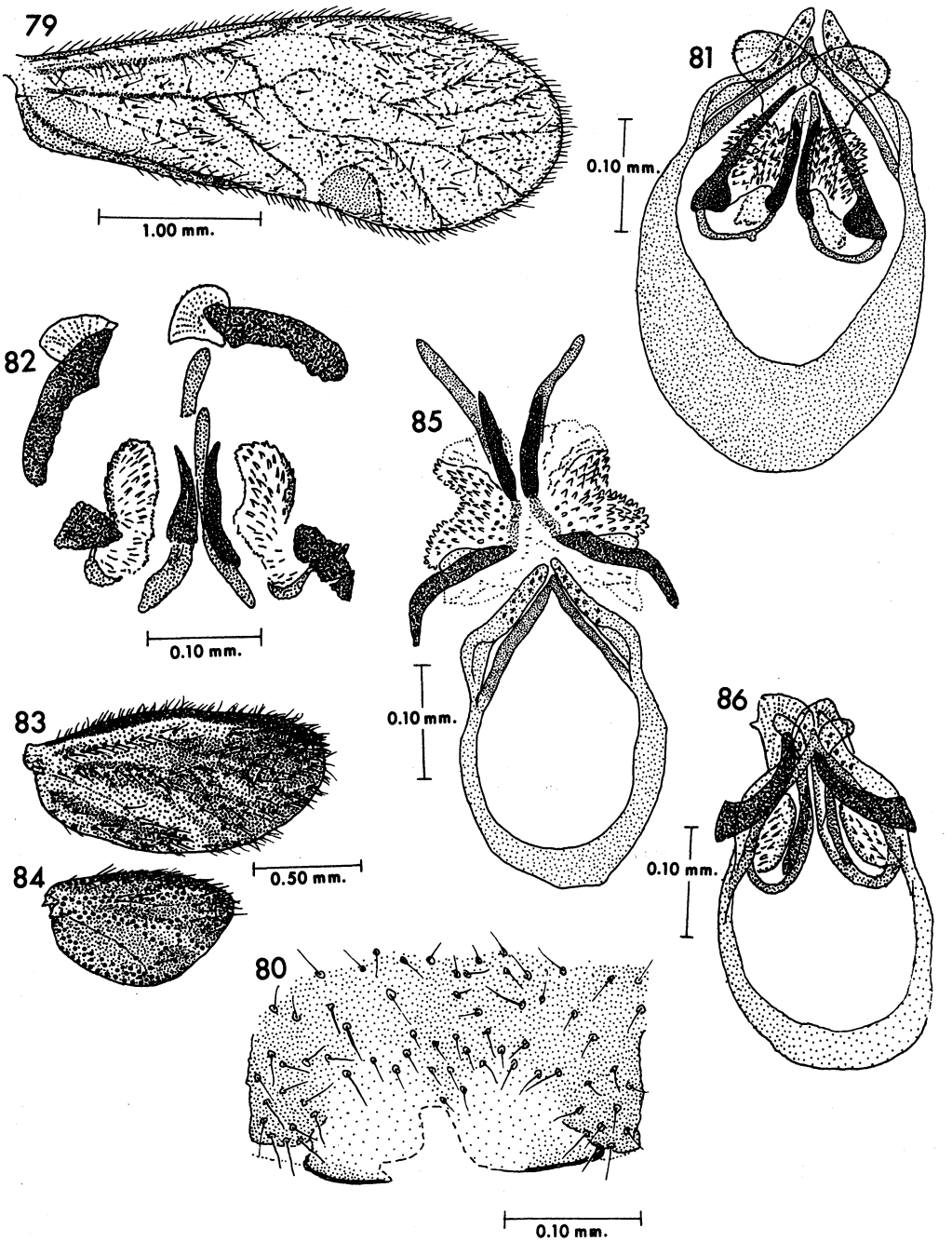


FIG. 79-86. *Bryopsocus townsendi* (Smithers) ♂ allotype: 79, fore wing; 80, hypandrium (torn); 81, phallosome; 82, internal sclerites of phallosome (squashed). ♂♂: 83, fore wing of specimen 66/102; 84, fore wing of specimen 64/104; 85, phallosome of 66/102 (sclerites everted); 86, phallosome of 64/104. Figures 83 and 84 to common scale.

Other specimens examined, the records being additional to those of Smithers (1969): NORTH ISLAND: Omahutu Forest, moss, ♀, n, 30.IV.1965, M. Luxton. SOUTH ISLAND: Otira, litter, 6 n, ♀, 24.III.1965, N. A. Walker; Otira, 400 m, moss, ♀, 12.V.1965, R. Harvey & J. Townsend; Otira, 450 m, moss on stones, 2 ♀♀, 2.III.1966, J. Townsend; Nelson, Pelorus Valley, moss, ♀, 13.VIII.1965, P. Marchant & J. Townsend; Murchison, Maruia Saddle, 600 m, n, ♀, 2.VI.1965, J. Townsend; Marlborough, Ronga Saddle, moss, 2 ♀♀, n, 13.VII.1965, L. Marchant; Nelson, Kawatiri, moss, ♀, 19.VII.1965, J. Townsend; Nelson, Totaranui, Canaan Track, 450 m, rocks and logs, ♀, 7.X.1965, A. K. Walker; Nelson, Totaranui, Awaroa Rd., 150 m, moss on shady bark, ♀, 7.X.1965, A. K. Walker & J. Townsend; Nelson, Collingwood, Mt Burnett, 10 m, moss, n, ♀, 26.X.1965, L. Marchant; Deniston, 700 m, moss and mat plants, ♀, 1.XI.1965, A. C. Eyles & J. Townsend; Rock and Pillar Range, 800 m, moss on rocks, n, macropterous ♂, 24.I.1966, J. Townsend; Lake Rotoiti, Mt Robert track, 780 m, moss, n, 2 ♀♀, 5.IV.1966, J. Townsend; Kaikoura, Mt Alexander, 800 m, moss and lichen, 4 n, ♀, 2.X.1966, A. K. Walker; Mt Malita, 1000 m, moss in open, n, ♀, 1.IV.1966, J. Townsend; Marlborough, Kaikoura, Oara, litter, ♀ (dissected), 20.IX.1968, J. C. Watts; Nelson, Howard Valley Rd., macropterous ♂ (specimen 68/143*), ♀, 3 n, 7.X.1968, S. Edridge. STEWART ISLAND: Port Pegasus, Fraser Parks, moss, macropterous ♂ (specimen 67/179*, dissected), 13.II.1967, D. Clark; Pegasus Creek, litter, ♀, 24.II.1968, G. Kuschel.

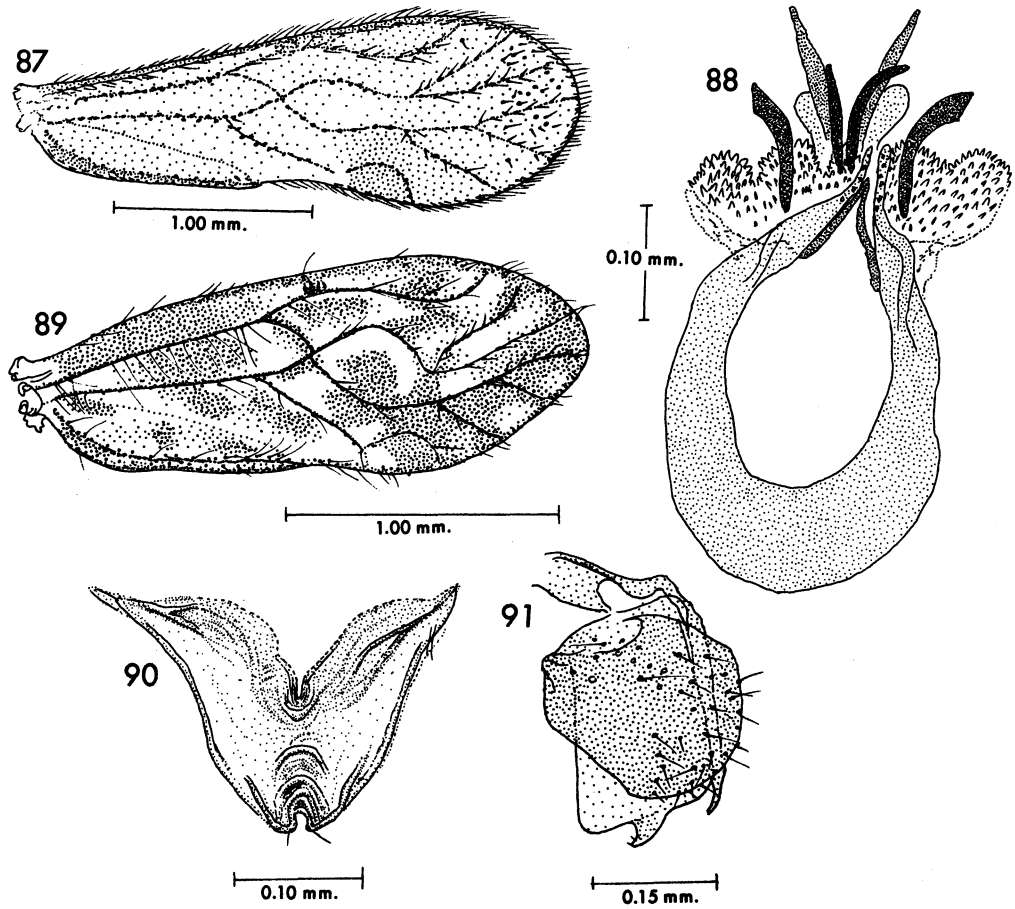
In 2 males (asterisked in the above list, specimens 67/179 and 68/143) the fore wing membrane (FIG. 87) is setose only apically and vein cu_2 is bare. The wing is of rather a different shape from the type, although the phallosome (FIG. 88) does not appear to differ, apart from the fact that, as in other specimens with extruded male genitalia (e.g., FIG. 85), the oval striated sclerites are absent. These males may not be conspecific with *Bryopsocus townsendi,* but further material is required before this point can be settled. The 1 female collected with the Nelson male appears to be typical.

The species has been collected up to 1650 m, and in all months of the year except December.

The male of this species is polymorphic with regard to wing length; both brachypterous and macropterous forms have been collected in association with the brachypterous females, and the brachypterous males vary in wing size from a little longer than that of the female to a length which allows the wing to cover the abdomen. The coloration and genitalic characters are the same in both macropterous and brachypterous males. Males have not been found to show the wide variation of general color that is such a feature of females of the species. The position of the wings in specimens of macropterous males suggest that in the resting condition the wings are held horizontally over the abdomen, 1 wing considerably overlapping the other. The sex of nymphs can be determined not only by the size of wing pads, but also on the extent to which the abdominal terga reach around the abdomen to the much smaller sterna in females.

Smithers' material was from a total of 13 localities. It is remarkable that 10 of these 13 records are from moss. We have examined further material, including males, from 24 more localities, all but 1 in the South Island or Stewart Island (see above), and in 19 of these cases moss is also recorded in the collecting data. The sexes were collected in association on 4 occasions.

This is the most interesting philotarsid in New Zealand, having a number of peculiar features: habitat evidently largely confined to moss, very wide variation in degree of pigmentation of the females, unusual hardening and fusion of the abdominal terga in females, wing polymorphism and possibly an unusual resting position of the wings in males, wing membrane setose. Several of these features may be adaptations to the restricted, rather unusual habitat.



FIG' 87-91. ♂, possibly of *Bryopsocus townsendi* (Smithers) (specimen 67/179, see text): 87, fore wing; 88, phallosome (sclerites everted).
Bryopsocus angulatus (Smithers) ♀: 89, fore wing; 90, apcial lobe of subgenital plate (from paratype, same collecting data as allotype); 91, gonapophyses.

Bryopsocus angulatus (Smithers), **n. comb.** FIG. 89–91

Zelandopsocus angulatus Smithers, 1969: 329.

This species was described from a single male from the Nelson area. We have since collected males and females; the species is dimorphic.

Further description:

♀. *Coloration:* Head as described by Smithers for the ♂, except ground color of vertex, frons and genae cream, and dark brown mark ringing antennal base mesad extends to orbit. Thoracic terga as ♂. Legs: coxa brown, femur pale buff, tibia and tarsus brown. Fore wing (FIG. 89) with distinct pattern of brown patches, distribution of pigment much as in ♂, but intercalary hyaline areas more extensive and patches thus more distinct. Hind wing as ♂. Abdomen buff with wide gray-brown granulated bands dorsally and laterally, these bands continuous ventrally but much narrower. *Morphology:* B = 2.55 mm. Epicranial sutures, frons and clypeus as ♂. Setae on antenna barely twice as long as diameter of basal flagellar segment. I.O.:D = 4.50. Ocelli as ♂. f_1 = 0.52 mm. f_2 = 0.34 mm. f_1:f_2 = 1.52. F = 0.67 mm. T = 1.16 mm, t_1 = 0.38 mm. t_2 = 0.06 mm. t_3 = 0.08 mm. rt = 6.33:1:1.33. ct = 19. Preapical tooth on claw. Fw = 2.64 mm. shorter than ♂, vein cu_2 glabrous, other veins with stiff setae, longer than those of ♂, vein *rs* sharply angled near point of bifurcation. Hw = 2.22 mm. Hind wing veins bare. Epiproct

without dorsal setose flap, broad, rounded and setose posteriorly; paraproct with field of 16 trichobothria. Subgenital plate apical lobe (FIG. 90, from paratype, torn in plesiotype) with a pair of very fine setae, apex evidently grooved, semi-circular ridges anterior to this; base of lobe heavily sclerotized, with complex groove medially. Gonapophyses (FIG. 91): ventral valve fairly broad, with incipient subapical lobe; outer valve very large, circular, with relatively short setae; dorsal valve bluntly rounded apically, a broad blunt subapical spine beset with fairly long fine setae extends almost to apex of valve.

♂. *Coloration:* as described by Smithers. *Morphology:* As described by Smithers, except hind wing veins bare, and preapical tooth on claw.

A holotype male was designated by Smithers. Plesiotypes: ♀, SOUTH ISLAND, Speargrass Creek, 1.III.1971 (NZDSIR); 3 ♂♂, 2 ♀♀, 4 n, same data (BPBM); SOUTH ISLAND, Maruia Falls, beech, ♂, 2.III.1971 (NZDSIR), NORTH ISLAND; Otaki Forks, ♂, 9.VIII.1970 (AM).

Other specimens examined: NORTH ISLAND: Otaki Forks, n, ♀, 2 ♂♂, 9.VIII.1970. SOUTH ISLAND: Whangamoa Saddle, ♂, ♀, 16.V.1970; Pelorus Reserve, 2 ♀♀, 16.V.1970; Maruia Falls, 2 n, 2 ♂♂, 2.III.1971; Lake Rotoiti, *Nothofagus cliffortoides,* 2 ♂♂, 3 ♀♀, 10.IV.1972 (AM); Pelorus Reserve, beating tree fern and other trees, ♂, 9.IV.1972; Cascade Creek, Eglinton, *Nothofagus cliffortoides,* ♀, 20.III.1972. STEWART ISLAND: Rakeahua Valley, 8 n, ♂, 18.II.1968, J. S. Dugdale; Pegasus, 2 ♀♀, 25.II.1968, G. Kuschel.

In the female genitalia and subgenital plate, this species is similar to *Bryopsocus townsendi* as described and figured by Smithers. Although some sexual dimorphism is evident in the fore wing, the distinctive head pattern, the characteristic angular course of vein *rs* or its continuation as r_{3+4} in the fore wing, near the point of bifurcation, and the fact that the sexes have been collected in association on 4 occasions, lead us to place both sexes in the same species.

DISCUSSION

TABLE 1 shows that New Caledonia and New Zealand are extremely rich in philotarsids. The New Caledonian and New Zealand subregions (Gressitt 1961, FIG. 2) contain 61 species of a total known world fauna of about 100 species.

Three of the New Zealand species also occur in Australia, but 2 of these are species of *Haplophallus* and *Aaroniella,* genera that are fairly widely represented over the Oriental Region and the Pacific.

One species, *Austropsocus insularis,* is apparently confined to the subantarctic islands, and another, *A. chathamensis,* has been found only on the Chatham group. Both these species are brachypterous in both sexes.

The New Zealand subregion, in its high proportion of the *Zelandopsocus* line of the family, which also includes the genera *Austropsocus* and *Bryopsocus,* shows a much greater similarity to the New Caledonian subregion than it does to the Australian. Seventy-four percent of the philotarsid species of the New Zealand subregion (14 out of 19) are of the *Zelandopsocus* line, compared with 81% (34 out of 42) for the New Caledonian subregion, and about 29% (2 out of 7) for the Australian. However, the Australian subregion is now the least known in this respect. Speciation in this line of the family is responsible for the unusual richness of the philotarsid faunas of the New Zealand and New Caledonian subregions.

On the evidence to date, it seems reasonable to suggest that the remarkable proliferation of the *Zelandopsocus* line by speciation has occurred primarily along the Melanesian Arc rather than on the Australian continental block, and was thus a Tertiary event. The distributional evidence we have accumulated so far indicates that this line of the family is still practically confined to the islands of the arc, with 1 genus, *Bryopsocus,* endemic to New Zealand.

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of the Melanesian Arcs, of which this work is a part, and to the Department of Scientific and Industrial Research, New Zealand, for the loan of specimens in their collection.

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TABLE 1. Distribution of 66 described species of Philotarsidae* known from the Australian, New Caledonian, and New Zealand subregions, and the subantarctic islands south of New Zealand.

	Australian subregion	New Caledonian subregion				New Zealand subregion			New Zealand subantarctic islands (SA)
		(NC)	(LH)	(NO)	Total	(NZ)	(CH)	Total	
Aaroniella	2**	(0)	(1)	(0)	1	(3)	(0)	3	0
Haplophallus	3**	(5)	(1)	(1)	7	(2)	(1)**	2	0
Zelandopsocus	1	(27)	(0)	(0)	27	(3)	(0)	3	0
Austropsocus	1**	(7)	(0)	(0)	7	(8)	(1)	9	1
Bryopsocus	0	(0)	(0)	(0)	0	(2)	(0)	2	0
	7**	(39)	(2)	(1)	42	(18)	(2)**	19	1

NC = New Caledonia and Loyalty Islands; LH = Lord Howe Island; NO = Norfolk Island; NZ= New Zealand, Three Kings and Stewart Islands; CH = Chatham Island and Pitt Island; SA = Snares, Auckland, Antipodes, Campbell and Macquarie Islands.

*5 species of *Aaroniella*, 11 of *Haplophallus*, 31 of *Zelandopsocus*, 17 of *Austropsocus*, and 2 of *Bryopsocus*. Not included in the table are 1 undescribed Australian species of *Aaroniella* and 2 of *Haplophallus;* it is likely that several other philotarsid species from Australia are in collections that have not yet been examined.

** One species occurs also on New Zealand.